Association of Washington Business

Attached please find additional documents submitted in support of Association of Washington Business' comment letter.

Aluminum Aquatic Life Standard Missing Parameters Document

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

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Executive Summary

The aluminum aquatic life criteria include a calculator that generates instantaneous criteria values (ICVs) (i.e. calculator outputs) based on the water chemistry conditions at a specific location and time. The criteria values vary with changes in water chemistry and are calculated using the input parameters pH, dissolved organic carbon (DOC), and total hardness. This document provides support and data analysis details for the DEQ's *Aluminum Standard Interpretation and Application Procedures* (ODEQ 2020), which contains specific guidance for applying the aluminum aquatic life criteria, including when one or more input parameters are missing. Specifically, this report describes the analyses used to produce estimates of missing input parameters or to calculate default values for applying the aluminum standard in Oregon.

In the absence of measured data, DEQ establishes and provides support for two different methods of estimating the input parameter of total hardness while applying the aluminum aquatic life standard in this document First, following DEQ's technical support document for implementing the copper biotic ligand model (Cu-BLM), DEQ will use dissolved hardness data when total hardness is unavailable or cannot be directly calculated from total calcium and magnesium ion concentrations (see section 3 of this document for supporting information for this decision)

The second method for estimating total hardness applies in cases where no total or dissolved hardness data are available. DEQ provides for an equation to estimate total hardness from specific conductance in cases where specific conductance data are available but hardness (or calcium and magnesium) is not. See section 4 of this document for information on the method used to derive Equation 1.

$$\text{Total Hardness} = \exp^{(1.050*[\ln(\text{SpC})] - 1.211)}$$

Equation 1. Total hardness is measured in units of mg/L. "SpC" is a measurement of specific conductance in µmhos/cm, "ln" is the natural logarithm, and "exp" is a mathematical constant that is the base of the natural logarithm (≈ 2.71828).

In the absence of data and estimation methods, DEQ will rely on default input parameter values (when DOC has not been measured and cannot be estimated) or default ecoregional criteria (when either pH or total hardness are missing and cannot be estimated). These conservative regional default values have been developed to ensure that Oregon's waters are protected against aluminum toxicity at least 90% of the time.

As established in Oregon's copper standard (OAR 340-041-0033 Table 30; Endnote N), when DOC is unavailable, Oregon will use total organic carbon (TOC) multiplied by the statewide conversion factor of 0.83 to estimate the input parameter of dissolved organic carbon (DOC). For cases where DOC is the only aluminum criteria calculator input parameter missing and it cannot be estimated from TOC, DEQ will use a georegional default DOC input value, similar in concept to those used in implementing the copper aquatic life criteria. These defaults are based on conservative percentiles of the DOC distributions in each georegion. The aluminum aquatic life criteria require different default DOC percentiles compared those used for copper criteria calculation in order to ensure sufficient protection for aquatic life (**Table 1**). See section 5 of this document for information on the method used to derive these default DOC values.

Table 1. Georegional default DOC percentiles and values for calculating aluminum criteria in Oregon		
Georegion	Default DOC Percentile	Default DOC Value (mg/L)
Willamette Valley	15th	0.83
Coastal	30th	0.85
Cascades	20th	0.48
Eastern	15th	0.83
Columbia River	10th	1.37

Due to the complexity (e.g. non-monotonic) of the effects of pH and total hardness on aluminum toxicity and thus criteria values, DEQ chose not to develop default input values for pH or total hardness. In cases where either sufficient pH or total hardness are unavailable and cannot be estimated, DEQ will rely on default aluminum criteria values based on the 10th percentile of the distribution of all observed criteria in EPA Level III ecoregions (EPA 2021b) with the Columbia River mainstem analyzed as a separate region (**Table 2**). Due to the prevalence of pH and hardness or specific conductance data, DEQ expects the need to apply the default ecoregional aluminum criteria will be rare. See section 6 of this document for information on the methodology used to derive these default aluminum criteria values.

Table 2. Ecoregional default aluminum criteria values for Oregon			
Level III Ecoregion	Default Criteria Percentile	Default Acute Criterion (CMC [a]) µg/L	Default Chronic Criterion (CCC [b]) µg/L
Coast Range	10th	580	300
Klamath Mountains		1500	770
Willamette Valley		830	440
Cascades		360	210
Eastern Cascades Slopes and Foothills		1100	620
Columbia Plateau		1400	800
Blue Mountains		1200	740
Snake River Plain		2900	1200
Northern Basin and Range		1300	680
Columbia River [c]		1600	750

[a] The CMC is applied as a 1-hour average, not to be exceeded more than once every three years on average.
[b] The CCC is applied as a 4-day average, not to be exceeded more than once every three years on average.
[c] The Columbia River mainstem is not a Level III Ecoregion, but has been analyzed as a separate region.

1. Introduction

The EPA has promulgated aluminum freshwater aquatic life criteria for Oregon. In 2004, Oregon revised its aquatic life criteria for aluminum based on EPA's 1988 recommended 304(a) criteria, which were EPA's most recent criteria recommendations at that time. In 2013, EPA disapproved the aluminum criteria submission from the state, and in 2015, EPA was subsequently sued for failing to promptly promulgate replacement criteria. In 2016, a federal consent decree established that EPA must approve or promulgate aluminum criteria for Oregon by December 31, 2020. The rule became effective on April 19, 2021 (EPA 2021a), and the criteria statement from that rule may be found as an appendix in this document for convenience (See Appendix: Federal Criteria Statement).

The aluminum criteria for Oregon are based on EPA's 2018 national recommended freshwater aquatic life criteria for aluminum (EPA 2018) . The 2018 national recommended freshwater aquatic life criteria for aluminum includes the Aluminum Criteria Calculator based on multiple linear regression models and species sensitivity distributions. This calculator produces instantaneous criteria values (ICV) that account for changes in toxicity of aluminum to aquatic life due to differences in water chemistry. The aluminum criteria calculator uses three water quality parameters (referred to as "input parameters") to calculate acute and chronic ICVs that represent aluminum toxicity under the inputted water chemistry conditions. The input parameters are pH, dissolved organic carbon (DOC), and total hardness collected concurrently from the same location. While DEQ collects all three parameters when making aluminum measurements, there may be historic instances where one or more parameters is missing for a given location and time.

This document describes DEQ's methods and supporting analyses for dealing with missing input parameters for the aluminum aquatic life criteria. DEQ's approach for determining aluminum application procedures is largely consistent with the procedures used to apply the copper aquatic life criteria (ODEQ 2016). However, DEQ has adjusted some recommendations (e.g. default DOC percentiles) for aluminum implementation compared with those used for copper implementation in order to ensure that DEQ's handling of missing parameters is protective against aluminum toxicity to aquatic life.

DOC is the only input parameter that increases monotonically with aluminum criteria (i.e. as DOC increases, aluminum criteria magnitudes also increase). Given this consistency of a response from changes in DOC, when DOC is the only input parameter missing, EPA recommends the use of default DOC input values paired with measured pH and total hardness data to determine aluminum criteria (EPA 2020). The complexity of the relationship between pH and total hardness and aluminum criteria makes it difficult to derive protective default input values for pH or total hardness. Therefore, when either pH or total hardness are missing from a sample and cannot be credibly estimated, conservative default aluminum criteria will be applied instead.

2. Data Acquisition and Processing

2.1 Data Sources and Quality Assurance

Data collected by the Oregon Department of Environmental Quality (AWQMS dataset, which includes the historical LASAR dataset) and by the USGS (NWIS dataset) were used to compile a master dataset (**Table 3**). Data were screened by the following characteristics:

- Sites within the state of Oregon.
- Samples collected during the period January 1, 2000 through April 21, 2021.
- Sites identified as fresh surface waters including lakes, rivers, streams and reservoirs.
- Samples with a high QA/QC rating or grade according to the agency of origin.
    - For DEQ, data with A or B quality grades and "final" result status.
    - For USGS, data result status was "accepted", indicating it passed with respect to USGS QA/QC criteria.
- Sampling events with at least one aluminum criteria calculator input parameter (dissolved organic carbon (DOC), pH, total hardness), total organic carbon (TOC), dissolved hardness, calcium (total or dissolved), magnesium (total or dissolved), or specific conductance.
- Specific conductance less than 1500 µmhos/cm, so that sites potentially influenced by marine waters would be excluded as well as samples that might represent sources, such as landfill leachate, untreated wastewater, and other potentially highly contaminated samples, rather than receiving waters.
- Grab sample data. When both field and laboratory data were provided for the same sample, field measurements were used preferentially to best represent ambient water quality conditions. This dataset was compiled, in part, to calculate default aluminum criteria values, with paired DOC, total hardness, and pH measurements collected at the same location, date, and time, as in a similar analysis performed by EPA (EPA 2019a, 2019b). Continuous measurements of pH were omitted because they were unlikely to be paired with other aluminum criteria calculator input parameters in the same place, date, and time.

Table 3. Parameters from Oregon measurements included in the master dataset

Parameter	Parameter Type
pH	Aluminum Criteria Calculator Input
Organic carbon (DOC)	Aluminum Criteria Calculator Input
Total Hardness	Aluminum Criteria Calculator Input
Organic carbon (TOC)	To estimate DOC
Dissolved Hardness	To estimate total hardness
Calcium (total or dissolved)	To calculate total or dissolved hardness
Magnesium (total or dissolved)	To calculate total or dissolved hardness
Specific Conductance	To estimate total hardness

2.2 Treatment of Censored Data

Data were defined as censored if the measurement was at or below the Minimum Reporting Limit (MRL) of the laboratory method used to quantify the sample. Uncensored data refer to data with values above the

MRL. Censored data were included in the master dataset, but flagged because they represent measurements with a higher degree of quantification uncertainty. Censored data reporting and handling followed the procedure described in DEQ's Technical Support Document for Copper (ODEQ 2016). This procedure for treating censored data is also most amenable with data reporting in DEQ's AWQMS dataset. If a measurement was reported at the MRL, then the MRL was used as the numeric measured value, and the measurement was flagged as censored. If a measurement was reported at Minimum Detection Limit (MDL) or as a non-detect, then the MDL was used as the numeric measured value, and that measurement was flagged as censored. Occasionally, the laboratory reported an estimated concentration if a parameter was detected at a level above the MDL but below the MRL. In those cases, the estimated value was used and the sample was flagged as censored. Censored data most often took the value of the MRL using this method for assigning values. Most parameters in the master dataset had a very low proportion of censored data (< 1%) with the exception of organic carbon (18% censored; **Table 4**). To illustrate the levels of censoring, DEQ has provided more details for organic carbon, which was the parameter most affected by censoring (**Table 5**).

Table 4. Samples by parameter and censor status in the master dataset

Parameter	Total (n)	Uncensored (n)	Censored (n)	% Censored
pH	65,883	65,883	0	0%
Organic carbon (DOC/TOC)	28,840	23,576	5,264	18%
Hardness (Total or Dissolved)	6,948	6,936	12	0.17%
Calcium (Total or Dissolved)	9,871	9,858	13	0.13%
Magnesium (Total or Dissolved)	9,553	9,546	7	0.07%
Specific Conductance	35,460	35,458	2	0.01%

Table 5. Organic carbon values by censor status in the master dataset

Censoring Level	Minimum Value (mg/L)	Maximum Value (mg/L)	Censored (n)	% of All Censored Values
at MRL	0.120	10.0	3,073	58%
between MDL and MRL (estimated value)	0.258	1.90	744	14%
at MDL	0.100	0.360	1,447	28%

2.3 Methodology for using Data

To address the needs for substituting dissolved for total hardness, estimating total hardness from specific conductance, calculating default DOC input values, and calculating default aluminum criteria values, DEQ produced four datasets from the master dataset, each with slightly different characteristics. The methodology used to build each dataset is listed below.

2.3.1 Dissolved and Total Hardness Dataset

The Dissolved and Total Hardness dataset was compiled by selecting paired dissolved and total hardness data from the master dataset collected from the same location, date, and time with the following characteristics:

- Uncensored measurements of dissolved and total hardness.
    - If hardness was not reported, but paired (dissolved or total) calcium and magnesium were measured, hardness was calculated using the equation:
      Hardness = $2.497*[Ca^{2+}] + 4.1189*[Mg^{2+}]$, where calcium and magnesium concentrations were either total or dissolved fractions and all values were in mg/L

2.3.2 Total Hardness and Specific Conductance Dataset

The Total Hardness and Specific Conductance dataset was compiled by selecting paired total hardness and specific conductance measurements from the master dataset collected from the same location, date, and time with the following characteristics:

- Uncensored measurements of total hardness, calcium, magnesium, or specific conductance.
    - If hardness was not reported, but paired total calcium and magnesium were measured, total hardness was calculated using the equation:
        Total Hardness = $2.497*[Ca^{2+}] + 4.1189*[Mg^{2+}]$, where calcium and magnesium concentrations were total fractions and all values were in mg/L.

2.3.3 Default DOC Dataset

The Default DOC dataset was compiled by selecting organic carbon measurements from the master dataset with the following characteristics:

- Censored and uncensored dissolved (DOC) or total (TOC) organic carbon measurements.
- In cases where DOC data were unavailable, but TOC was available, DOC was estimated by multiplying TOC by 0.83 as established in Oregon's Cu-BLM TSD (ODEQ 2016).
    - However, if DOC was a censored measurement but TOC was not, then DOC was estimated by multiplying TOC by 0.83.

2.3.4 Default Aluminum Criteria Dataset

The Default Aluminum Criteria dataset was compiled by selecting data from the master dataset collected from the same location, date, and time with the following characteristics:

- Censored and uncensored measurements of pH, DOC, TOC, hardness, calcium, magnesium, or specific conductance.
- In cases where DOC data were unavailable, but TOC was available, DOC was estimated by multiplying TOC by 0.83 as established in Oregon's Cu-BLM TSD (ODEQ 2016).
    - However, if DOC was a censored measurement but TOC was not, then DOC was estimated by multiplying TOC by 0.83.
- Total (unfiltered) hardness data were used preferentially, but dissolved (filtered) hardness data were used when total hardness was not available (see section 3 below).
    - If hardness was not reported, but calcium and magnesium were measured, hardness was calculated using the equation:
        Hardness = $2.497*[Ca^{2+}] + 4.1189*[Mg^{2+}]$, where calcium and magnesium concentrations were either total or dissolved fractions and all values were in mg/L
    - If calcium and magnesium were not measured, total hardness was estimated using the relationship between hardness and specific conductance:
        Total Hardness = $\exp^{(1.050*[\ln(SpC)] - 1.211)}$ (see section 4 below).

3. Using Dissolved Hardness as an Estimate for Total Hardness

When total hardness measurements (or total calcium and magnesium concentrations) are not reported, DEQ sometimes utilizes dissolved hardness (or dissolved calcium or magnesium concentrations) instead. To demonstrate that the relationship between dissolved and total hardness is strong and that the variables may be used interchangeably with a minimal effect on aluminum criteria, DEQ used the Dissolved and Total Hardness dataset (see section 2 for details). In this dataset, a sample consisted of paired, uncensored dissolved and total hardness measurements for a given location, date, and time (**Table 6**).

Table 6. Summary statistics for parameters used to establish the relationship between dissolved and total hardness

Sample Parameter	Parameter Units	n	Minimum	Mean	Median	Maximum
Dissolved Hardness	mg/L $CaCO_3$	1,070	6.99	62.68	39.75	589
Total Hardness	mg/L $CaCO_3$	1,070	7.22	63.69	40.20	593

DEQ used Spearman's rank correlation (ρ), a non-parametric method of statistical dependence, to evaluate the relationship between dissolved and total hardness. A positive value near 1 indicates a strong positive correlation. DEQ found the correlation between dissolved and total hardness was strong and positive ($\rho = 0.996$).

DEQ used ordinary least-square regression (OLS) to establish a linear relationship between dissolved and total hardness data. This resulted in a high adjusted R^2 value (0.998) and low root mean square error (RMSE = 3.41 mg/L) (**Figure 1; Table 7)**. The strong and positive relationship between dissolved and total hardness and a simple linear regression equation with a slope of 1.0 provide support for using dissolved hardness as an estimate of total hardness for instances in which total hardness is unavailable.

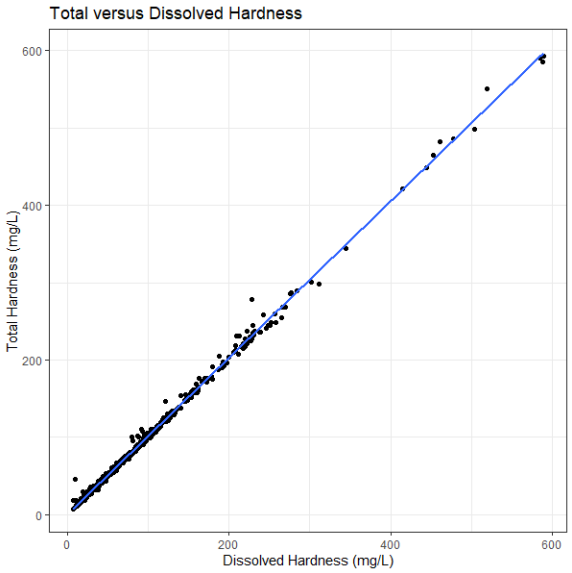
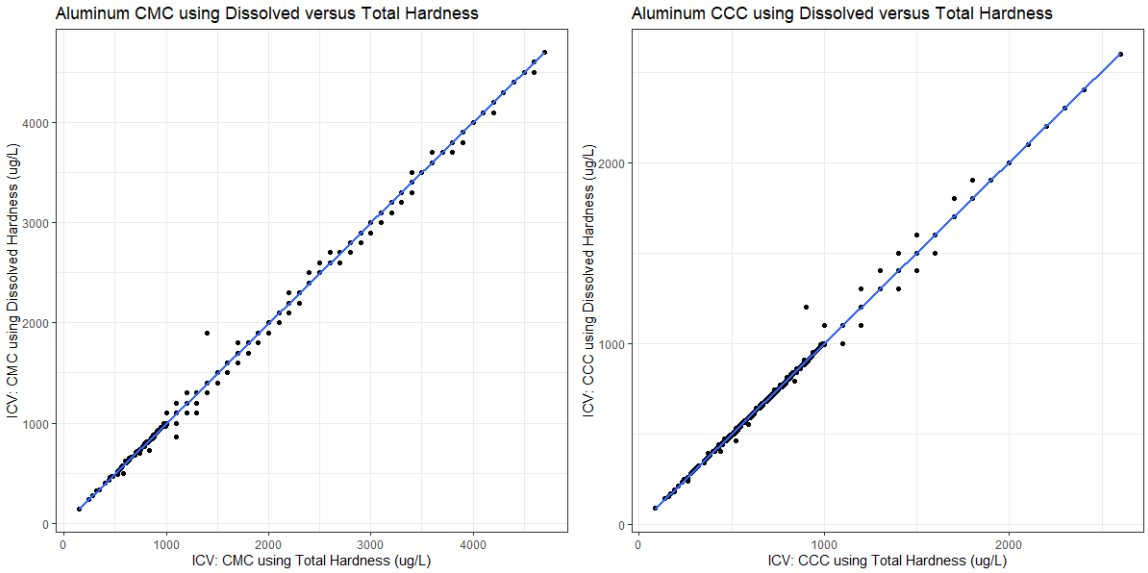


Figure 1. Linear regression for total hardness vs. dissolved hardness in Oregon during the period 2000 through 2021. The blue line represents linear relationship of best fit.

Table 7. Total versus dissolved hardness Spearman's rank correlation statistic and regression equation information from Oregon data in the Dissolved and Total Hardness Dataset	
Spearman's rank correlation (ρ)	0.996
Regression equation	Total Hardness = 1.0123(Dissolved Hardness)–0.2415
Adjusted R^2 value	0.998
p-value	< 2.2e-16
RMSE	3.41 mg/L

To evaluate the effect of using dissolved hardness instead of total hardness on resulting aluminum criteria values, DEQ used a measured dataset of 1,070 concurrent measurements of pH, DOC, total hardness, and dissolved hardness (a subset of the Default Aluminum Criteria dataset, see section 6 below) to compare calculated criteria output values using total hardness to those calculated by substituting dissolved hardness values instead (**Figure 2**). Strong positive Spearman's rank correlation coefficient (ρ = 0.999), regression equations with high adjusted R^2 values (0.998, 0.999), and low root mean square error (RMSE ≤ 31 µg/L) provide strong support that dissolved hardness may be used as a substitute for total hardness in Oregon waters with a minimal effect on output criteria values. Thus, DEQ will use dissolved hardness as an estimate for total hardness when implementing the aluminum aquatic life standard if total hardness is not available.



ICV	Acute (CMC)	Chronic (CCC)
Spearman's rank correlation (ρ)	0.999	0.999
Equation	$ICV_{Disolved\ Hardness} = 1.000(ICV_{Total\ Hardness}) - 4.643$	$ICV_{Disolved\ Hardness} = 1.003(ICV_{Total\ Hardness}) - 2.702$
Adjusted R^2	0.999	0.998
p-value	< 2.2e-16	< 2.2e-16
RMSE	31 µg/L	17 µg/L

Figure 2. Comparison of ICVs calcultaed using dissolved hardness data with those calculated using total hardness data for both the acute (CMC) and chronic (CCC) aluminum criteria calculator outputs.

4. Estimating Total Hardness from Specific Conductivity

When hardness measurements or calcium and magnesium concentrations were not reported, an equation to estimate total hardness from specific conductivity was established using data in the Total Hardness and Specific Conductance dataset (see section 2 for details). In this dataset, a sample consisted of paired, uncensored total hardness and specific conductance measurements for a given location, date, and time (**Table 8**).

Table 8. Summary statistics for parameters used to establish the relationship between total hardness and specific conductance

Sample Parameter	Parameter Units	n	Minimum	Mean	Median	Maximum
Total Hardness	mg/L $CaCO_3$	836	6.5	49.1	36.6	261
Specific Conductance	µmhos/cm at 25ºC	836	24.0	127.1	100	666

DEQ performed a similar analysis in the Cu-BLM TSD, in which hardness and specific conductance were found to be highly correlated in Oregon waters (ODEQ 2016). The relationship between these variables was reassessed during the aluminum standard analysis to specify the relationship between *total* hardness and specific conductance for current conditions in Oregon ambient waters.

DEQ found the correlation between total hardness and specific conductance was strong and positive (ρ = 0.993), which was slightly higher than the correlation from a similar analysis DEQ performed for the copper standard using median site values to establish a strong positive correlation between hardness and specific conductance (ρ = 0.97) (ODEQ 2016).

DEQ used ordinary least-square regression (OLS) to establish a linear relationship between total hardness and specific conductance data. As in the Cu-BLM TSD (ODEQ 2016), natural-log transformed data provided a higher adjusted R^2 value (0.986 versus 0.980) and lower root mean square error (0.102 versus 6.47 mg/L) compared with non-transformed data, indicating a better model fit for the natural-log transformed data (**Figure 3**). The natural-log transformed data were used to establish the equation that DEQ will use to estimate total hardness from specific conductance in cases where total and dissolved hardness are unavailable (**Table 9**). The relationship established between total hardness and specific conductance during the aluminum standard analysis was very similar to the one established between hardness and specific conductance previously during the copper analysis[1].

[1] The Cu-BLM TSD (ODEQ 2016) established the following relationship:
ln(Hardness) = 1.02·ln(Specific Conductance)–1.16.
Hardness in was measured in mg/L as $CaCO_3$, specific conductance in µmhos/cm at 25ºC. "ln" is the natural log.

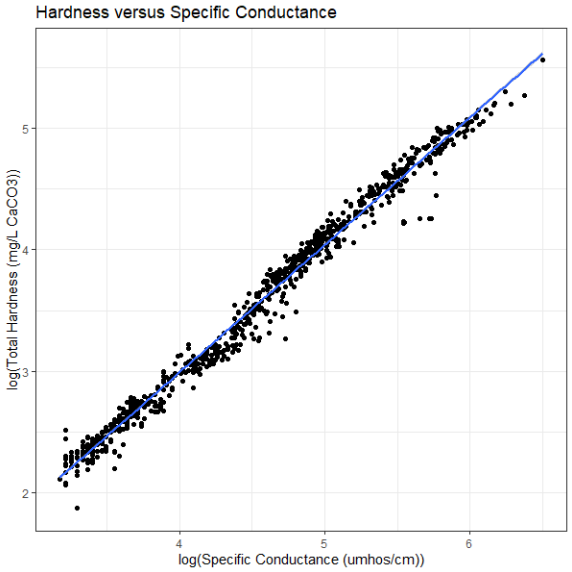
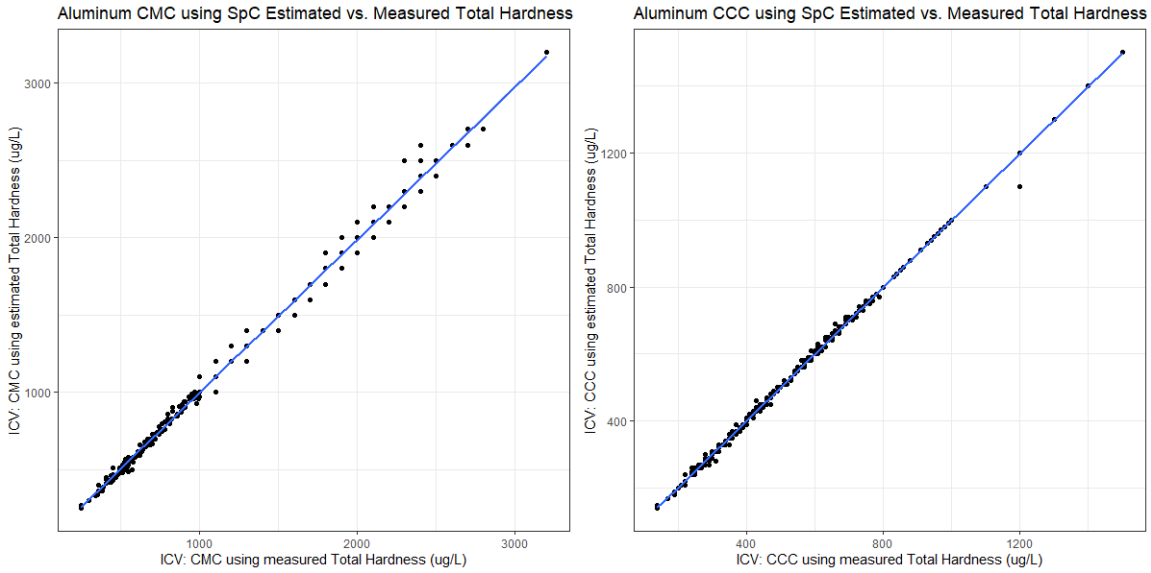


Figure 3. Natural-log transformed total hardness vs. natural-log transformed specific conductance in Oregon during the period 2000 through 2021. The blue line represents linear relationship of best fit.

Table 9. Total hardness vs. specific conductance Spearman's rank correlation statistic and regression equation information from Oregon data in the Total Hardness and Specific Conductance dataset.	
Spearman's rank correlation (ρ)	0.993
Regression equation	ln(Total Hardness) = 1.050·ln(Specific Conductance)–1.211
Adjusted R^2 value	0.986
p-value	< 2.2e-16
RMSE	0.102 mg/L

DEQ evaluated the effect that estimating total hardness from specific conductance had on aluminum criteria compared to criteria generated using measured total hardness. To perform this evaluation, DEQ used paired samples from the Default Aluminum Criteria Dataset (see section 6 below), where both specific conductance and total hardness were available. A total of 403 samples with paired pH, DOC (measured or estimated), total hardness and specific conductance measured at the same location, date, and time were available for this analysis.

Linear regressions between ICVs calculated using specific-conductance estimated total hardness and measured total hardness were strong with slopes near 1.0 (0.988 for the CMC and 0.996 for the CCC). Regressions indicated high correlations (0.999) and adjusted R^2 values (0.997, 0.999) as well as low RMSE (≤ 41 µg/L) relative to the scale of the criteria for both the CMC and CCC (**Figure 4**). The aluminum criteria are not strongly affected by estimating total hardness using specific conductance. Thus, DEQ will use specific conductance to estimate total hardness in the absence of other hardness data during the implementation of the aluminum standard.



ICV	Acute (CMC)	Chronic (CCC)
Spearman's rank correlation (ρ)	0.999	0.999
Equation	$ICV_{SpC\text{-}Estimated\ Total\ Hardness} = 0.988(ICV_{Measured\ Total\ Hardness}) + 11.95$	$ICV_{SpC\text{-}Estimated\ Total\ Hardness} = 0.996(ICV_{Measured\ Total\ Hardness}) + 2.59$
Adjusted R^2	0.997	0.999
p-value	< 2.2e-16	< 2.2e-16
RMSE	41 µg/L	9.6 µg/L

Figure 4. Comparison of ICVs calcultaed using total hardness data estimated using specific conducatnce with those calculated using measured hardness data for both the acute (CMC) and chronic (CCC) aluminum criteria value calculator outputs.

5. Default DOC Input Values

Of the three input parameters used to calculate aluminum criteria, DOC is the only one that has a direct and positive relationship with the calculator output values (i.e. as DOC increases, aluminum criteria increase). As such, in cases where pH and hardness are available for a given sample, but when DOC is missing, EPA recommends inputting default DOC values for use in the aluminum criteria calculator (EPA 2018). DEQ uses Oregon georegional default DOC values as inputs to the Copper Biotic Ligand model (15^{th} percentile DOC for Eastern georegion, 20^{th} percentile for all other georegions; OAR 340-041-8033). These georegions were created by grouping EPA Level III ecoregions using similarities in water quality parameters, including DOC (ODEQ 2016). For consistency with copper standard implementation procedures (ODEQ n.d.), DEQ will also use default DOC input values based on georegional percentiles for aluminum standard implementation (ODEQ 2020). Georegional DOC data within the Default DOC dataset (see section 2 for details) from 1,782 sites in Oregon (**Table 10**) were used to generate DOC distributions (**Figure 5**) for each of the five Oregon georegions.

Table 10. Summary statistics for Oregon DOC measurements from the Default DOC dataset

	n		DOC (mg/L)			
Georegion	Samples	Sites	Minimum	Mean	Median	Maximum
Cascades	1,445	261	0.083	1.00	0.83	14.94
Coastal	5,689	469	0.083	1.82	1.66	99.60
Columbia River	194	22	0.83	3.97	1.66	246.51
Eastern	7,389	626	0.083	4.06	3.10	79.60
Willamette Valley	6,981	404	0.083	2.52	1.70	132.00
Statewide	21,698	1,782	0.083	2.77	1.66	246.51

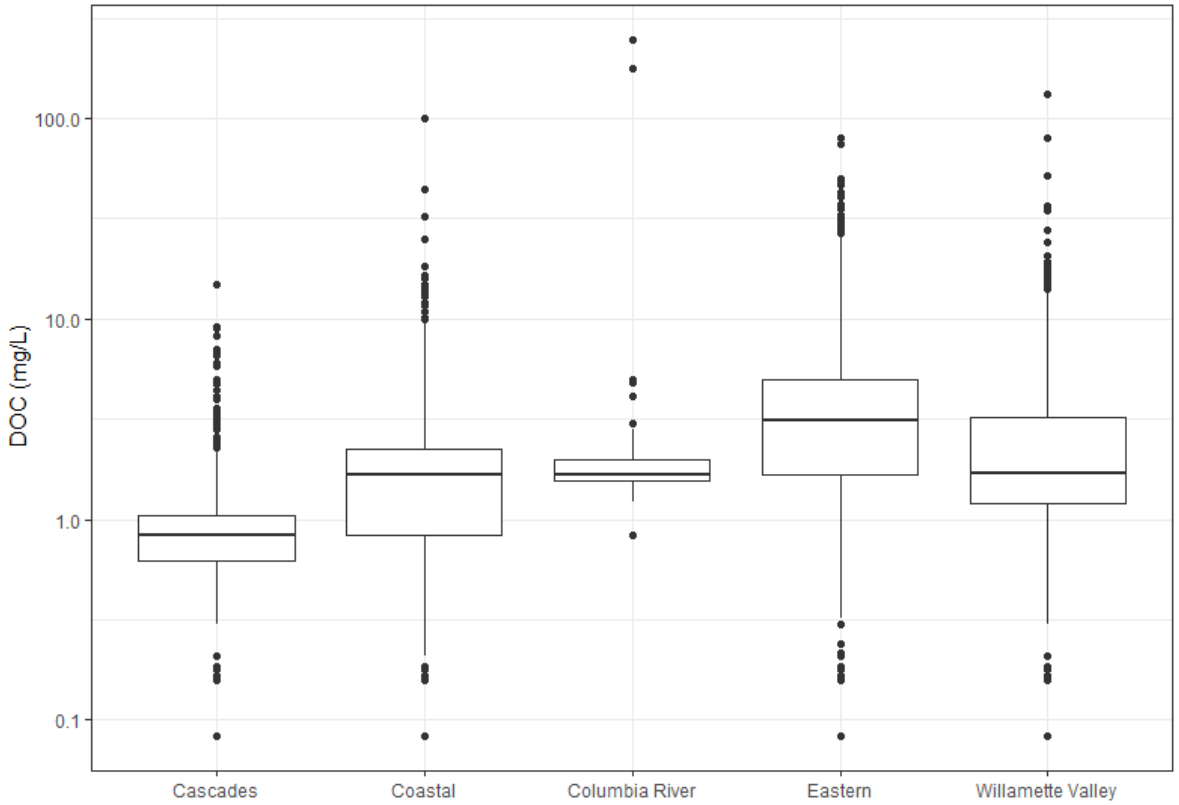


Figure 5. Boxplots of DOC (measured and estimated) from the Default DOC dataset, by georegion. Boxes are comprised of 25th, 50th and 75th percentile boundaries. Upper and lower whiskers represent the highest and lowest measurements within 1.5 times the interquartile range. Points above upper whiskers or below lower whiskers are outliers.

EPA performed an analysis to determine the impact of using regional default DOC input values based on a variety of percentiles on the protectiveness of subsequently generated aluminum criteria (EPA 2019a). EPA defined protective conditions in the analysis by the following:

- The default-DOC based criteria values were lower than measured numeric criteria values at least 90% of the time.
- The 90th percentile of the ratio between the default DOC-based and measured criteria values (the criteria magnitude ratio (CMR)) was less than or equal to 1.0.

DEQ used EPA's approach for determining default DOC protectiveness. To determine default DOC input value protectiveness, DEQ used a measured dataset of 4,008 concurrent measurements of pH and measured or estimated DOC and total hardness described below (see section 6 below) to compare calculated criteria output values from measured (or estimated) data to those calculated by substituting default DOC values on a georegional basis. DEQ explored using default DOC percentiles ranging from the 5th percentile to the 35th percentile for each georegion. The full range of default DOC percentiles and corresponding evaluation metrics (percent protection and 90th percentile CMR) can be found in the Appendix: Default DOC Percentiles and Protection Evaluation Metrics.

DEQ found that using the 10th percentile for the Columbia River mainstem, the 15th percentile for the Willamette Valley and Eastern georegions, the 20th percentile for the Cascades georegion, and the 30th percentile for the Coastal georegion provided a sufficient level of percent protectiveness (89% to 98%)

and georegional 90th percentile CMRs at or below 1.0. (**Table 11**). Thus, DEQ will use the default DOC values provided in Table 11 to implement the aluminum standard in Oregon.

Table 11. Oregon's georegional default DOC input parameter percentiles, values, and evaluation metrics for aluminum

Georegion	Defaults		Georegional Protection Analysis			
			Acute (CMC)		Chronic (CCC)	
	Default DOC Percentile	Default DOC Input Value (mg/L)	% Protection	90th Percentile CMR [a]	% Protection	90th Percentile CMR [a]
Willamette Valley	15th	0.83	97%	1.00	97%	1.00
Coastal	30th	0.85	92%	1.00	89%	1.02
Cascades	20th	0.48	91%	0.98	91%	0.98
Eastern	15th	0.83	98%	1.00	96%	1.00
Columbia River	10th	1.37	92%	1.00	94%	1.00

[a] The Criteria Magnitude Ratio is the ratio between the default DOC-based and measured criteria values for a given sample.

6. Default Aluminum Criteria

The complex relationship between pH, total hardness, and aluminum criteria magnitudes makes it difficult to calculate conservative default pH or total hardness input parameter values that would protect against aluminum toxicity. Instead, EPA recommends the use of default aluminum criteria values when pH or total hardness measurements are missing and cannot be estimated for a sample (EPA 2020). DEQ's Default Aluminum Criteria dataset (see section 2 for details) contained 4,008 concurrent measurements of pH and measured estimated DOC and total hardness from a total of 512 sites in Oregon (**Figure 7**). DEQ evaluated default aluminum criteria by EPA Level III ecoregion (EPA 2021b), with the Columbia River mainstem designated as a separate region.-.

DEQ examined the distribution of sites with paired aluminum criteria calculator input data and determined that while some ecoregions had more sites and samples than others, the sites were well distributed across the state and within ecoregions (**Figure 7**). DEQ used the data available in the Default Aluminum Criteria dataset to generate both acute (CMC) and chronic (CCC) aluminum ICV distributions for each ecoregion (**Figure 8**).

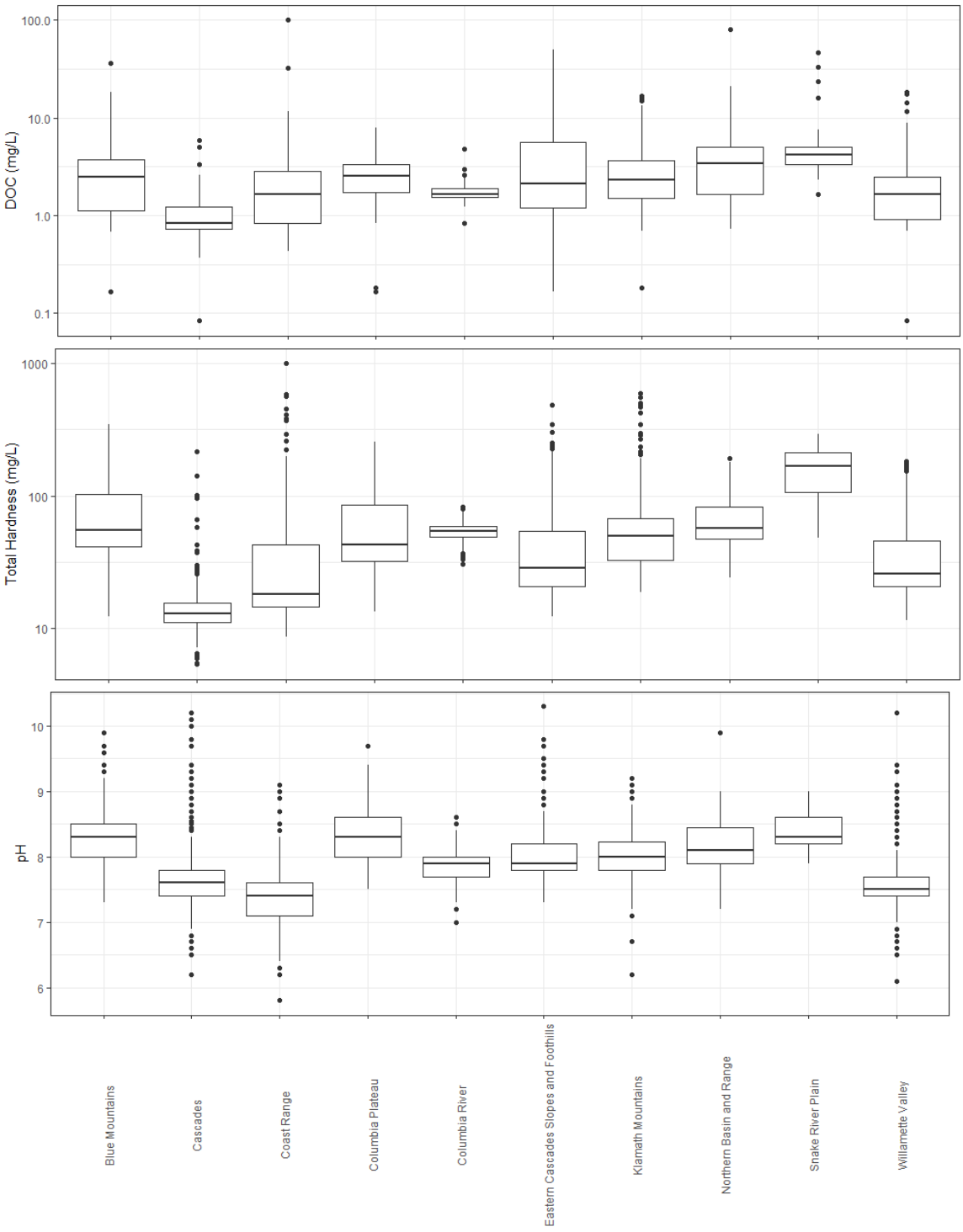


Figure 6. Boxplots of input parameter data from the Default Aluminum Criteria dataset used to calculate default aluminum criteria by Level III Ecoregion with the Columbia River mainstem treated separately. DOC and total hardness were measured or estimated while pH was measured only. Boxes are comprised of 25th, 50th and 75th percentile boundaries. Upper and lower whiskers represent the highest and lowest measurements within 1.5 times the interquartile range. Points above upper whiskers or below lower whiskers are outliers.

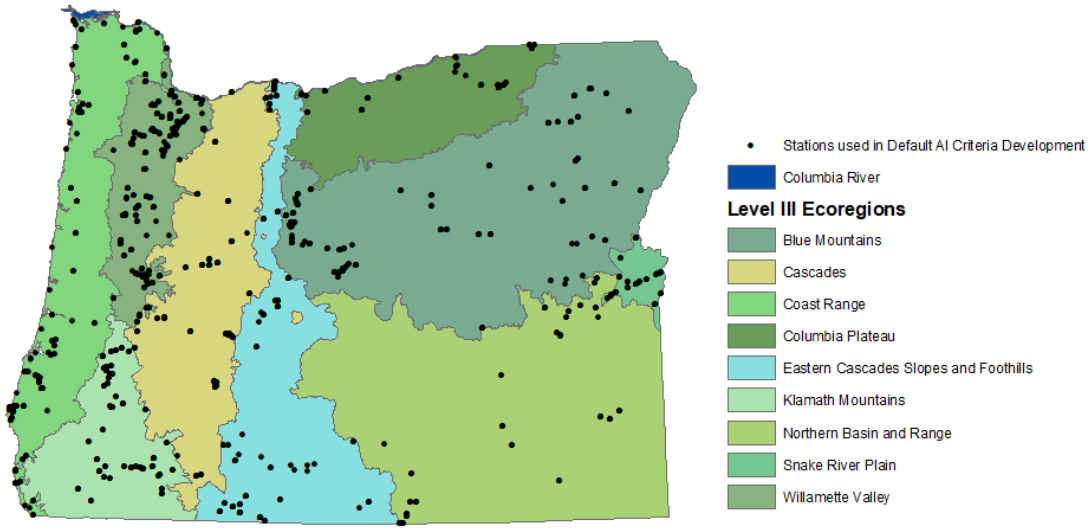


Figure 7. Sites in Oregon with concurrently measured pH and measured or estimated DOC and total hardness input parameter data that were used in default aluminum criteria development.

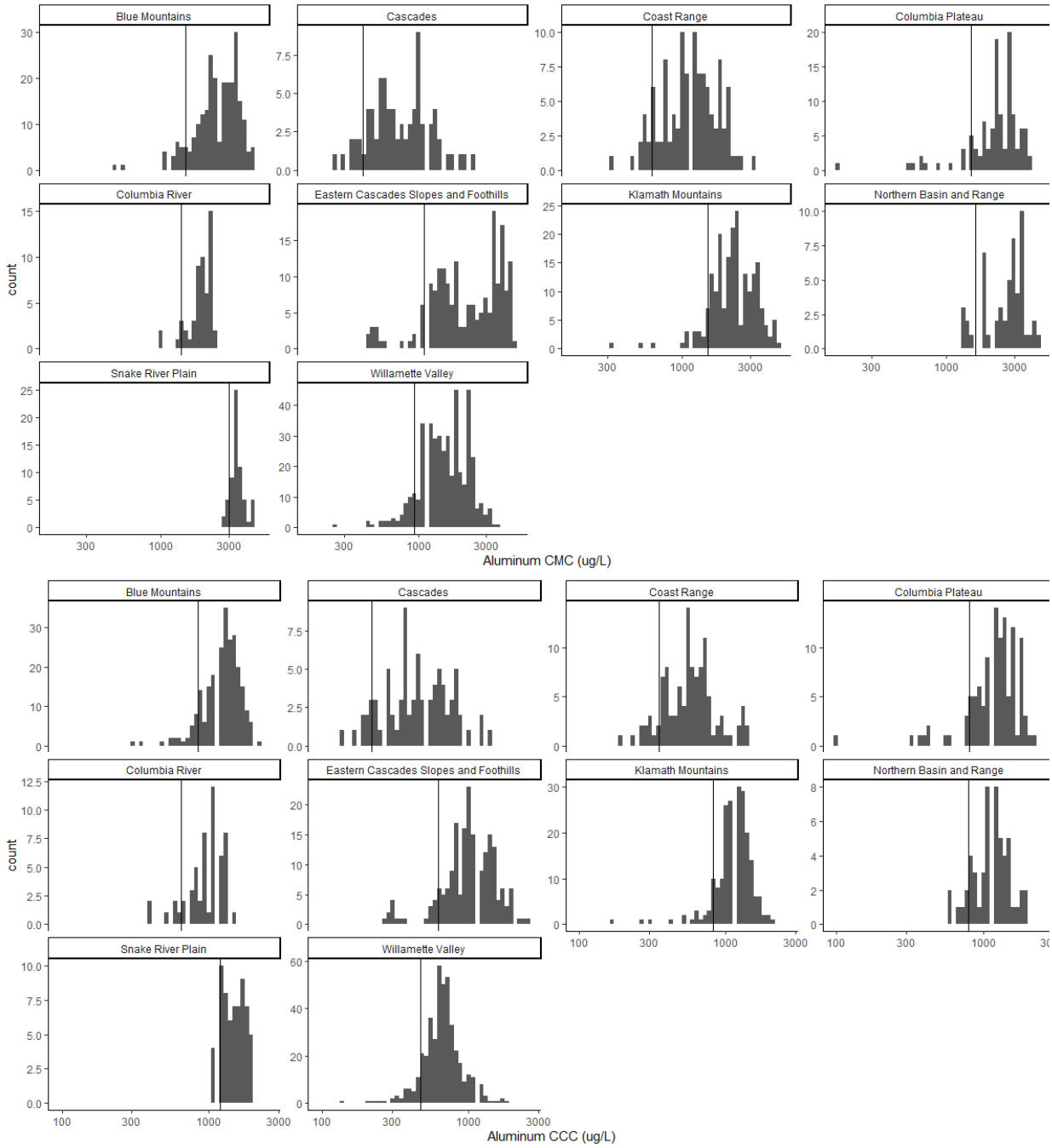


Figure 8.: Distribution of aluminum acute (CMC) and chronic (CCC) ICVs by Level III Ecoregion with the Columbia River mainstem calculated separately. Vertical lines are 10th percentile criteria values for each region.

EPA performed an analysis using Oregon data that recommended establishing default criteria at the 5th or 10th percentile of each ecoregional distribution to ensure that default aluminum criteria were protective, depending on the treatment of censored data (EPA 2019b). EPA defined protective conditions in the analysis by the following:

- The default criteria values were lower than measured numeric criteria values at least 90% of the time.
- The 90th percentile of the ratio between the default criteria values and measured criteria values (the criteria magnitude ratio (CMR)) was less than or equal to 1.0.

DEQ used EPA's approach for determining default aluminum criteria protectiveness. DEQ calculated the 10th percentile of aluminum criteria by ecoregion (with the Columbia River calculated separately) as a conservative default, using bootstrapping with 10,000 replicates to establish 95% confidence intervals. DEQ found that default aluminum criteria based on the10th percentile provided a high level of percent protectiveness (90% to 92%) and 90th percentile CMRs at or below 1.0 (0.98 to 1.01) depending on the ecoregion (**Table 12**). Thus, aluminum criteria set at the 10th percentile by ecoregion represent conservative and protective default values for Oregon waters, and DEQ will use these values during implementation of the aluminum standard when pH or total hardness are unavailable.

Table 12. Ecoregional aluminum default criteria (10th percentile) and evaluation metrics

Level III Ecoregion	n		Acute					Chronic				
			Default Acute Aluminum Criteria (CMC) µg/L			Default CMC Protection Metrics		Default Chronic Aluminum Criteria (CCC) µg/L			Default CCC Protection Metrics	
	Samples	Sites	CMC [a]	95% Confidence Interval		% Protect	90th Percentile CMR[b]	CCC [c]	95% Confidence Interval		% Protec	90th Percentile CMR[b]
Coast Range	399	100	580	520	630	90%	1.00	300	270	330	90%	1.01
Klamath Mountains	244	47	1500	1400	1700	90%	1.00	770	710	860	90%	1.00
Willamette Valley	1740	125	830	790	870	90%	1.00	440	430	460	90%	1.00
Cascades	489	38	360	280	420	90%	1.00	210	180	240	90%	1.00
Eastern Cascades Slopes and Foothills	260	47	1100	1000	1300	92%	1.00	620	560	670	90%	1.00
Columbia Plateau	118	23	1400	1200	1800	90%	0.98	800	690	1000	90%	1.00
Blue Mountains	434	76	1200	1100	1300	91%	1.00	740	710	830	90%	1.00
Snake River Plain	102	19	2900	2800	3100	90%	1.00	1200	1200	1300	92%	1.00
Northern Basin and Range	91	29	1300	1100	1400	92%	1.00	680	540	750	91%	1.00
Columbia River [d]	131	8	1600	1400	1800	92%	1.00	750	720	890	91%	1.00

[a] The CMC is applied as a 1-hour average, not to be exceeded more than once every three years on average.
[b] The Criteria Magnitude Ratio is the ratio between the default aluminum and measured criteria values for a given sample.
[c] The CCC is applied as a 4-day average, not to be exceeded more than once every three years on average.
[d] The Columbia River mainstem is not an ecoregion but was analyzed as separate region.

7. Summary

In this document, DEQ provides information about the data analyses performed to support the DEQ's *Aluminum Standard Interpretation and Application Procedures* (ODEQ 2020). This includes a description of data handling and use, support for the decision to use dissolved hardness as an estimate of total hardness when total hardness input parameter data for the aluminum criteria calculator are unavailable, an equation for estimating total hardness from specific conductivity when total and dissolved hardness are unavailable, default DOC input values (when DOC is the only aluminum input parameter missing), and default aluminum criteria values (when either pH or measured or estimated total hardness input parameters are missing). While these approaches are generally consistent with DEQ's implementation of the copper BLM in Oregon, DEQ has adjusted its approach to ensure that implementation of the aluminum aquatic life criteria provide sufficient protection in Oregon waters. For example, DEQ has changed the default DOC input percentiles compared to those used for the copper standard for select georegions based on an independent analysis of protectiveness. Further, DEQ has elected not to use default input parameter values for pH or total hardness, given the complexity of the relationship between pH, total hardness, and the aluminum criteria. Instead DEQ is electing to use conservative default aluminum criteria when either pH or total hardness have not been measured or estimated. DEQ encourages concurrent measurements of pH, total hardness, and DOC during data collection, while relying on defaults primarily for evaluation of historical aluminum concentrations where the input parameter data are not available.

8. References

EPA. 2018. *Final Aquatic Life Ambient Water Quality Criteria for Aluminum 2018*. EPA-822-R-18-001. Washington, D. C.: U.S. Environmental Protection Agency, Office of Water.

EPA. 2019a. *Analysis of the Protectiveness of Default Dissolved Organic Carbon Options*.

EPA. 2019b. *Analysis of the Protectiveness of Default Ecoregional Aluminum Criteria Values*.

EPA. 2020. *Draft Technical Support Document: Implementing the 2018 Recommended Aquatic Life Water Quality Criteria for Aluminum*. U.S. Environmental Protection Agency, Office of Water.

EPA. 2021a. *Federal Aluminum Aquatic Life Criteria Applicable to Oregon*.

EPA. 2021b. *Level III and IV Ecoregions of the Continental United States*.

ODEQ. 2016. *Technical Support Document: An Evaluation to Derive Statewide Copper Criteria Using the Biotic Ligand Model*. Oregon Department of Environmental Quality.

ODEQ. 2020. *Draft Aluminum Standard Interpretation and Application Procedures*. Oregon.

ODEQ. n.d. *Implementation of the Freshwater Aquatic Life Water Quality Standards for Copper*. Oregon Department of Environmental Quality.

Appendix: Federal Criteria Statement (EPA 2021a)

TABLE 1 TO PARAGRAPH (b)—ALUMINUM AQUATIC LIFE CRITERIA FOR OREGON FRESH WATERS

Metal	CAS No.	Criterion maximum concentration (CMC) [3] (μg/L)	Criterion continuous concentration (CCC) [4] (μg/L)
Aluminum [1] [2]	7429905	Acute (CMC) and chronic (CCC) freshwater aluminum criteria values for a site shall be calculated using the 2018 Aluminum Criteria Calculator (Aluminum Criteria Calculator V.2.0.xlsx), or a calculator in R or other software package using the same 1985 Guidelines calculation approach and underlying model equations as in the Aluminum Criteria Calculator V.2.0.xlsx, as defined in EPA's Final Aquatic Life Ambient Water Quality Criteria for Aluminum.[5]	

[1]To apply the aluminum criteria for Clean Water Act purposes, criteria values based on ambient water chemistry conditions must protect the water body over the full range of water chemistry conditions, including during conditions when aluminum is most toxic.

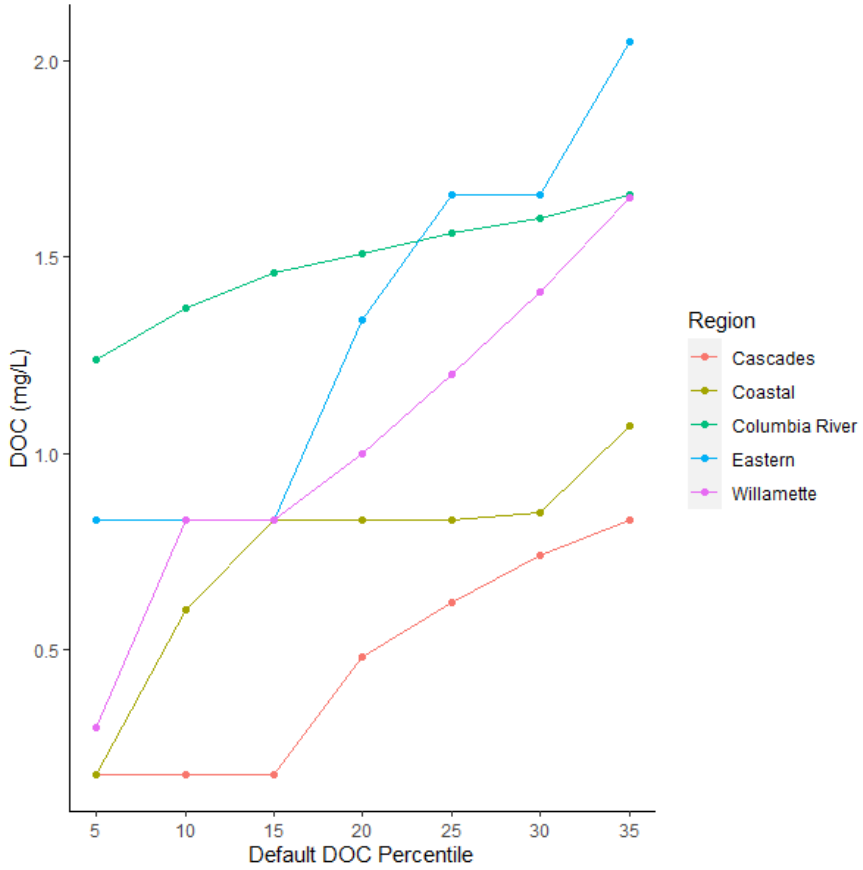
[2]These criteria are based on aluminum toxicity studies where aluminum was analyzed using total recoverable analytical methods. Oregon may utilize total recoverable analytical methods to implement the criteria. For characterizing ambient waters, Oregon may also utilize, as scientifically appropriate and as allowable by State and Federal regulations, analytical methods that measure the bioavailable fraction of aluminum (e.g., utilizing a less aggressive initial acid digestion, such as to a pH of approximately 4 or lower, that includes the measurement of amorphous aluminum hydroxide yet minimizes the measurement of mineralized forms of aluminum such as aluminum silicates associated with suspended sediment particles or clays). Oregon shall use measurements of total recoverable aluminum where required by Federal regulations.

[3]The CMC is the highest allowable one-hour average ambient concentration of aluminum. The CMC is not to be exceeded more than once every three years. The CMC is rounded to two significant figures.

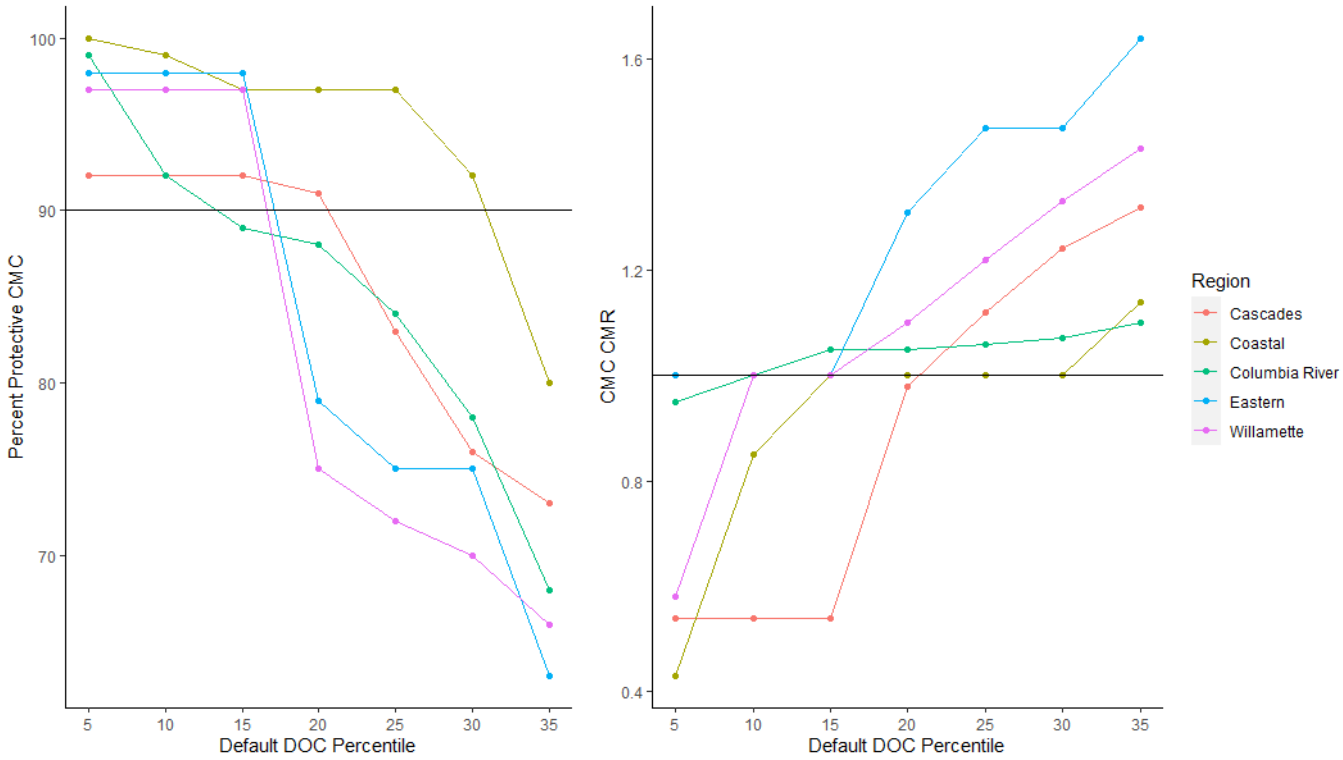
[4]The CCC is the highest allowable four-day average ambient concentration of aluminum. The CCC is not to be exceeded more than once every three years. The CCC is rounded to two significant figures.

[5]EPA–822–R–18–001, Final Aquatic Life Ambient Water Quality Criteria for Aluminum—2018, December 2018, is incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available from U.S. Environmental Protection Agency, Office of Water, Health and Ecological Criteria Division (4304T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460; telephone number: (202) 566–1143, www.epa.gov/wqc/aquatic-life-criteria-aluminum. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email fedreg.legal@nara.gov or go to www.archives.gov/federal-register/cfr/ibr-locations.html.

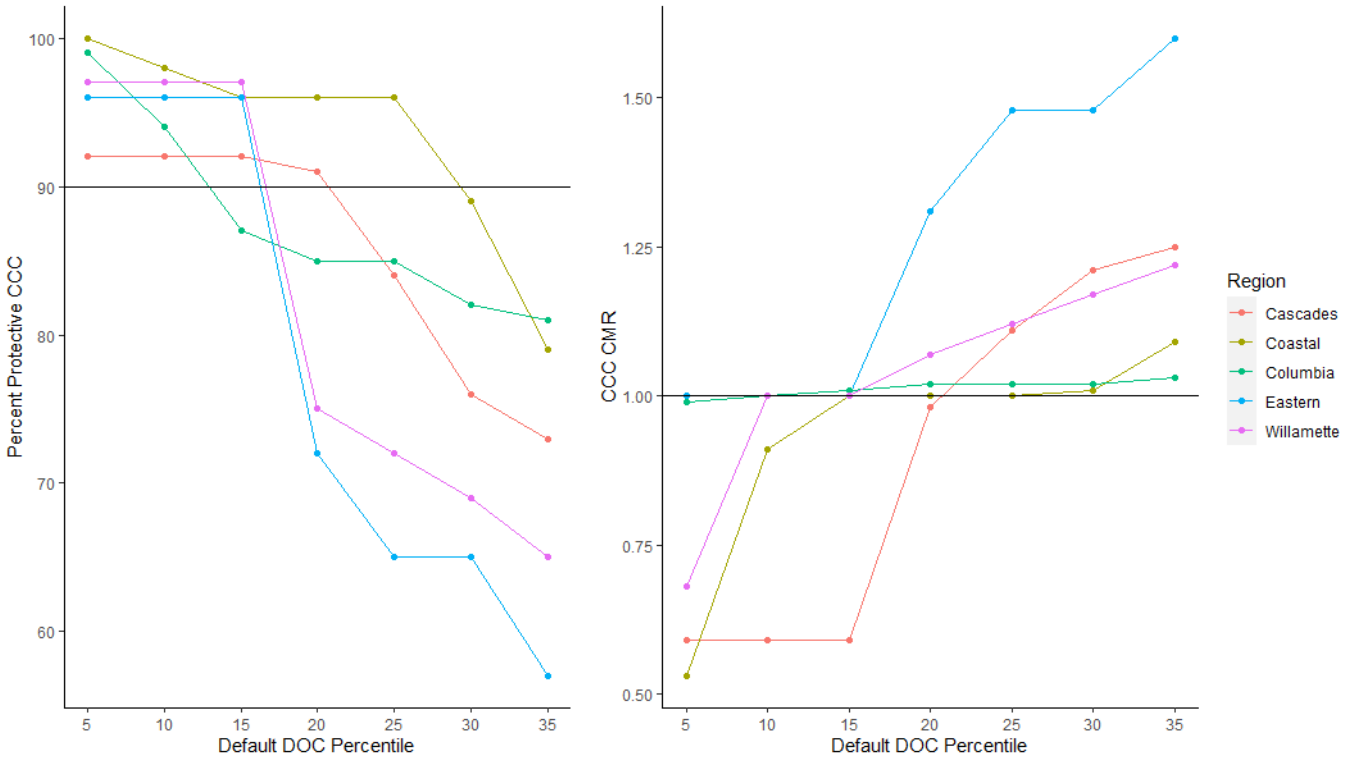
Appendix: Default DOC Percentiles and Protection Evaluation Metrics



Default DOC percentile values (5th through 35th percentiles) by georegion.



The effect of georegional default DOC percentile on protectiveness of calculated acute aluminum criteria (CMC) values. Protection of pairing default DOC values with total hardness and pH was evaluated using percent protection (left graph) and criteria magnitude ratio (CMR; right graph). A protective condition from a given default DOC percentile was defined as a percent protectiveness of 90% or greater (left horizontal line) or a CMR equal to or less than 1.00 (right horizontal line).



The effect of georegional default DOC percentile on protectiveness of calculated chronic aluminum criteria (CCC) values. Protection of preparing default DOC values with total hardness and pH was evaluated using percent protection (left graph) and criteria magnitude ratio (CMR; right graph). A protective condition from a given default DOC percentile was defined as a percent protectiveness of 90% or greater (left horizontal line) or a CMR equal to or less than 1.00 (right horizontal line).

Errata

For the Boatyard General Permit Issued on July 20, 2022 and effective on September 1, 2022

August 24, 2022

Ecology corrected two dates and added two clarifications in Table 1. The changes are listed below with deleted text in red ~~strikethrough~~ text and the updated text in blue underlined text.

Table 1: Summary of Permit Submittals and Monitoring Requirements

Permit Section	Submittal (a)	Frequency	Submittal Date
S1	Request for Modification of Permit Coverage	As necessary	As necessary
S1	Transfer of Permit Coverage	As necessary	Thirty days before expected transfer
S2 S9	Discharge Monitoring Report (DMR): Pressure-Wash Wastewater Monitoring Results	Once per month in June, July, August, and September	First DMR: ~~September~~ October 28, 2022 Then, DMR: Twenty-eighth day of the month following the sample collection month
S6 S9	Discharge Monitoring Report (DMR): Stormwater Runoff Monitoring Results	Once per month in October, November, January, March, April, and May	First DMR: ~~October~~ November 28, 2022 Then, DMR: Twenty-eighth day of the month following the sample collection month

March 01, 2023

Ecology corrected the definition for Puget Sound Sediment Cleanup Site. The definition now references the BYGP website. The changes are listed below with deleted text in ~~red strikethrough~~ text and the updated text in blue underlined text.

Puget Sound Sediment Cleanup Site means Category 4B (Sediment) portions of Budd Inlet (Inner), Commencement Bay (Inner), Commencement Bay (Outer), Dalco Passage and East Passage, Duwamish Waterway (including East and West Waterway), Eagle Harbor, Elliot Bay, Hood Canal (North), Liberty Bay, Rosario Strait, Sinclair Inlet, and Thea Foss Waterway; Category 5 (Sediment) portions of the Duwamish Waterway; Category 4A (Sediment) portions of Bellingham Bay (Inner); and the Everett/Port Gardener and Port Angeles Harbor sediment cleanup areas, as mapped on Ecology's ~~ISGP~~ **BYGP** website.

Issuance Date: July 20, 2022
Effective Date: September 1, 2022
Expiration Date: August 31, 2027

BOATYARD GENERAL PERMIT

A National Pollutant Discharge Elimination System (NPDES) and
State Waste Discharge General Permit for Stormwater and Wastewater Discharges
Associated with Boatyards

State of Washington
Department of Ecology
Olympia, Washington

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, § 1251 et seq.

Until this permit expires, is modified, or is revoked, Permittees that have properly obtained coverage by this permit are authorized to discharge in accordance with the special and general conditions which follow.

DEPARTMENT OF ECOLOGY
State of Washington

Vincent McGowan, P.E.
Water Quality Program Manager
Washington State Department of Ecology

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ADA ACCESSIBILITY

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request ADA Accommodation, contact Water Quality Reception at 360-407-6600. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's accessibility webpage[1] for more information.

For document translation services, call Water Quality Reception at 360-407-6600. Por publicaciones en espanol, por favor llame Water Quality Reception al 360-407-6600.

[1] https://ecology.wa.gov/About-us/Accessibility-equity/Accessibility/

SUMMARY OF PERMIT SUBMITTALS AND MONITORING REQUIREMENTS

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S7	Level One Response – Operational Source Control BMPs	One or two exceedances of a benchmark or limit value	Along with the corresponding DMR
S7	Level Two Response – Structural Source Control BMPs	Three exceedances of a benchmark or limit value	Three months from DMR due date
S7	Level Three Response – Treatment BMPs	Four exceedances of a benchmark or limit value	Three months from DMR due date
S9	Notification of Non-Compliance	As necessary	Immediately by phone Within 5 days by written report
S9	Additional Monitoring Results	As necessary	Twenty-eighth day of the month following the sample collection month
S9 S10	Notification of Spills or Other Discharges	As necessary	Immediately by phone Within 5 days by written report
S10	Notification of Planned Bypass	As necessary	As necessary
G1	Notice of Change in Signatory Authorization	As necessary	Prior to or upon document submittal
G6	Permit Application Supplement or Notification of Significant Change in Process or Discharge	As necessary	Sixty days prior to the planned change
G14	Application for permit coverage renewal	Once during the permit term	March 5, 2027
G20	Other Information	As necessary	As necessary

(a)Electronic submittal is required via the Water Quality Permitting Portal.
More information is available at Ecology's WQWebPortal guidance web page[2].

[2] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

SPECIAL CONDITIONS

S1. PERMIT COVERAGE REQUIRED

This statewide general permit applies to boatyards that discharge stormwater runoff from areas with industrial activity directly to the ground, to a surface waterbody, or to a storm sewer system that drains to a surface waterbody. This general permit also regulates process wastewater from boatyards, unless the wastewater is discharged to a municipal sanitary sewer operated by a sewer authority (POTW) with a delegated pretreatment program. The geographic area covered by this general permit is the entire State of Washington, except for Federal and Tribal lands and waters as specified in Condition S1.B (Exemption from Coverage).

A. Boatyard Activities Requiring Coverage under This Permit

All boatyards in the State of Washington must apply for coverage under this permit and must comply with all conditions specified in this permit, as applicable to their facility, unless exempted by the following section.

A boatyard, as defined for the purpose of this permit, is a facility engaged in the construction, repair, or maintenance of small vessels, where 85% of those vessels are 65 feet or less in length, or the boatyard generates more than 85% of its gross receipts working on those vessels. Services typically provided include, but are not limited to:

(a) pressure washing hulls

(b) painting and coating

(c) engine and propulsion system repair or replacement

(d) hull repair

(e) joinery

(f) bilge cleaning

(g) fuel and lubrication system repair or replacement

(h) welding and grinding of the hull

(i) buffing and waxing

(j) marine sanitation device (MSD) repair and replacement

(k) vessel deconstruction

(l) exterior cleaning activities that produce wastewater containing soaps or other pollutants

(m) other activities necessary to maintain a vessel

All areas of the boatyard where any of these activities or materials have the potential to be exposed to precipitation or stormwater runoff are subject to this permit. For example, any area designated as a boat storage area where occasional boat work is done and exposed to

precipitation or stormwater runoff is subject to all permit controls, Best Management Practices (BMPs), and monitoring. This definition includes mobile and do-it-yourself activities.

B. Exemption from Coverage

1. Limited Services

Facilities that provide only the following services do not require coverage under this permit:

(a) Use of tidal grids solely for emergency repair or for inspection by marine surveyors;

(b) Minor engine repair or maintenance within the engine space without vessel haul-out;

(c) Minor repairs or modifications to the vessel rigging or superstructure (topside) limited to 25% of the topside surface;

(d) Topside cleaning, detailing, and bright work;

(e) Electronics servicing and maintenance; or

(f) MSD servicing and repair without vessel haul-out.

2. Indian Country

Discharges from facilities located on "Indian Country" as defined in 18 U.S.C. §1151, except portions of the Puyallup Reservation as noted below, are not covered by this general permit. Indian Country includes:

(a) All land within any Indian Reservation, including rights-of-way running through the reservation. This includes all Federal, Tribal, and Indian and non-Indian privately-owned land within the reservation.

(b) All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

(c) All off-reservation Federal trust lands held for Native American Tribes.

Puyallup Exception: Following the Puyallup Tribes of Indian Land Settlement Act of 1989, 25 U.S.C. §1773; this general permit does apply to surface water on land held in trust by the Federal Government.

3. Federal Facilities

The following discharges are not covered by this permit:

(a) Discharges from activities operated by any department, agency, or instrumentality of the Federal Government of the United States.

(b) Discharges from activities (i) Located on federally-owned sites; and (ii) Operated by an entity, such as a private contractor performing industrial activity on behalf of or under the direction of any department, agency, or instrumentality of the Federal Government of the United States.

4. Vessel Deconstruction

   This general permit does **not** cover vessel deconstruction activities that take place in the water or on a floating dry dock or barge, **unless** within the boundaries of your facility. For vessel deconstruction activities that take place outside the boundaries of a permittee's facility, the boatyard must obtain either an individual permit or the vessel deconstruction general permit.

5. Coverage Under Another Permit

   Facilities exempted from this permit may require coverage under the Industrial Stormwater General Permit or an individual permit.

C. Conditional "No Exposure" Exemption

A facility engaged in boatyard activity may qualify for a Conditional "No Exposure" Exemption (CNE) if there is no exposure of boatyard materials or activities to rain, snow, snowmelt, and/or runoff. Facilities that discharge wastewater to a non-delegated POTW do not qualify for a Conditional "No Exposure" Exemption. Boatyard materials and activities include, but are not limited to, any boatyard activities listed in S1.A, material handling equipment or activities, industrial machinery, raw materials, intermediate products, byproducts, and final products, or waste products. Material handling activities include storage, loading and unloading, transport, or conveyance of any raw materials, intermediate product, by-product, final products, or waste products. Facilities that conduct boatyard activities exclusively indoors may qualify for a conditional exemption from coverage under this permit in accordance with 40 CFR Part 122.26 (g). To acquire a Conditional No Exposure Exemption, a facility or Permittee must complete the following steps:

(a) Submit a completed Request for a Conditional No Exposure Exemption form to Ecology.

(b) Certify that none of the following materials or activities are, or will be in the foreseeable future, exposed to precipitation or stormwater runoff:

   i. Using, storing, or cleaning industrial machinery or equipment, and areas where residuals from using, storing, or cleaning industrial machinery or equipment remain and are exposed to stormwater.

   ii. Materials or residuals from spills or leaks on the ground or in stormwater inlets.

   iii. Materials or products from past industrial activity.

   iv. Material handling equipment (except adequately maintained vehicles).

   v. Materials or products during loading, unloading, or transporting activities.

   vi. Materials or products stored outdoors (except final products intended for outside use, e.g., new cars, where exposure to stormwater does not result in the discharge of pollutants).

vii. Materials contained in open, deteriorated, or leaking storage drums, barrels, tanks, and similar containers.

viii. Materials or products handled or stored on roads or railways owned or maintained by the discharger.

ix. Waste material (except waste in covered, non-leaking containers, e.g., dumpsters).

x. Application or disposal of process wastewater (unless otherwise permitted).

xi. Particulate matter or visible deposits of residuals from roof stacks or vents not otherwise regulated, i.e., under an air quality control permit, and evident in the stormwater outflow.

(c) Submit to on-site facility inspection(s) by Ecology to verify compliance with all "no exposure" conditions.

(d) Receive from Ecology written approval of this exemption. Regardless of whether a facility meets all of the conditions to quality for a Conditional No Exposure Exemption, Ecology may require a facility to obtain coverage under this permit if Ecology determines the facility is a significant contributor of pollutants to waters of the State in accordance with Condition S1.D (Significant Contributors of Pollutants).

(e) Facilities that are granted a Conditional No Exposure Exemption must submit a new completed Request for a Conditional No Exposure Exemption form to Ecology once every 5 years, and may again undergo inspection by Ecology.

(f) If, during the term of this general permit, fees are established under Chapter 173-224 WAC for processing applications for this exemption or for administering this exemption, the Permittee must pay the assessed fees by the dates due.

(g) Ecology will automatically terminate permit coverage when it grants a Conditional No Exposure Exemption to a permitted facility.

(h) If a change occurs at an exempt facility that results in the exposure of boatyard activities or industrial materials to precipitation or stormwater runoff, the facility must immediately apply for and obtain a permit.

D. Significant Contributors of Pollutants

Ecology may require a facility to obtain coverage under this permit if Ecology determines the facility:

(a) Is a significant contributor of pollutants to waters of the State, including groundwater;

(b) May reasonably be expected to cause a violation of any water quality standard; or

(c) Conducts boatyard or other related industrial activity, or produces stormwater runoff with characteristics similar to other boatyards or related industrial activities.

E. Obtaining Permit Coverage

Unpermitted facilities that require coverage under this permit shall submit to Ecology, a complete and accurate ***Notice of Intent (NOI)*** using Ecology's Water Quality Permitting Portal – Permit Coverage Notice of Intent form as follows:

(a) Existing Facilities

i. Unpermitted existing facilities that require coverage under this permit shall submit a complete and accurate permit application to Ecology.

ii. Existing facilities means a boatyard facility that begins activities that result in a discharge or a potential discharge to waters of the State prior to the effective date of this general permit, September 1, 2022 and meets the Permit Coverage renewal requirement in WAC 197-11-800 (13) (i).

(b) New Facilities

i. New facilities means a boatyard facility that begins activities that result in a discharge or a potential discharge to waters of the State on or after the effective date of this general permit, September 1, 2022. All unpermitted new facilities shall*:*

(1) Submit a complete and accurate permit application to Ecology at least 60 days before the commencement of stormwater or process wastewater discharge from the facility.

ii. The application shall include certification that the facility has met the applicable public notice and ***State Environmental Policy Act (SEPA)*** requirements in WAC 173-226-200(3)(f).

(c) Electronic Submittal

Use the Water Quality Permitting Portal (WQWebPortal) to submit a complete application for coverage to Ecology. To access the WQWebPortal, you must first register for Secure Access Washington (SAW). For more information about the WQWebPortal or SAW, visit Ecology's WQWebPortal guidance webpage[3].

F. Modification of Permit Coverage

1. Any facility with coverage under this general permit that intends to implement a change in processes from those identified on the application for coverage, change its discharge location, or request an alternate sampling protocol, must request a modification of

[3] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

coverage by submitting a revised application for coverage or a supplement to the existing application, clearly indicating the proposed change.

2. The Permittee must give advance notice to Ecology at least 60 days prior to commencement of significant process changes or any facility expansions, production increases, or other planned changes that may result in noncompliance with permit limits or conditions. Significant process changes include a substantially increased discharge of pollutants or a change in the nature of the discharge of pollutants.
3. The applicant must also complete the public notice requirements of WAC 173-226-130(5) before receiving modification of permit coverage.
4. The facility must have its Stormwater Pollution Prevention Plan (SWPPP) updated and implemented to reflect the change before commencement of any process change.
5. The applicant must comply with the State Environmental Policy Act (SEPA) as applicable to the proposed significant process change.

G. Transfer of Permit Coverage

This permit coverage may be transferred to a new Permittee if:

(a) The Permittee notifies Ecology at least 30 days in advance of the proposed transfer date;

(b) The type of industrial activities and practices remain substantially unchanged.

(c) The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them; and

(d) Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke permit coverage.

S2. DISCHARGE LIMITS

A. Boatyards Discharging Pressure-Wash Wastewater to a Non-Delegated POTW

1. Limits

Permittees are authorized to discharge treated pressure-wash wastewater to a municipal sanitary sewer operated by a sewer authority (POTW), which does not have a delegated pretreatment program, in accordance with the following effluent limits (Table 2), monitoring schedule, and permit conditions, and upon written acceptance of the municipality. These discharges must meet the limits in Table 2 unless the POTW has more stringent limits or monitoring in which case the more stringent limits and monitoring requirements will apply. The Permittee must notify Ecology of the more stringent POTW limits.

Table 2: Limits for Discharges of Treated Pressure-Wash Wastewater or Stormwater Runoff to Non-Delegated POTWs

Parameter	Units	Daily Maximum Value [a]	Analytical Method	Laboratory Quantitation Level	Minimum Sampling Frequency
Copper, Total	mg/L	2.4	EPA 200.8	2.0	Once in each of the months of June, July, August, and September
Lead, Total	mg/L	0.69	EPA 200.8	0.5	Once in each of the months of June, July, August, and September
Zinc, Total	mg/L	2.61	EPA 200.8	2.5	Once in each of the months of June, July, August, and September
pH	Standard Units	Between 5.0 and 9.0	Meter [b]	±0.5	Once in each of the months of June, July, August, and September

a. Maximum daily effluent limit is the highest allowable daily discharge. The daily discharge is the arithmetic average measurement of the pollutant over a day. Averaging does not apply to pH, which must be reported as the highest and lowest values if more than one sample is taken in a day.

b. Permittees shall use either a calibrated pH meter consistent with EPA 9040 or an approved state method.

2. General Prohibitions

(a) The Permittee must not discharge pressure-wash wastewater or other process wastewaters directly to any water of the State through stormwater drainage conveyances or otherwise.

(b) The Permittee must not introduce into the POTW any pollutant(s), which cause pass through, upset, or interference. In addition, any discharges to a POTW must meet the discharge restrictions of 40 CFR 403.

(c) The discharge of dangerous wastes, as defined in Chapter 173-303 WAC, is prohibited.

(d) The Permittee must not dilute the wastewater discharge with stormwater or increase the use of potable water, process wastewater, or non-contact cooling water, or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the benchmarks or limits contained in this permit.

B. Boatyards Discharging Stormwater Runoff from Areas with Industrial Activity to a Non-Delegated POTW

Permittees may discharge stormwater runoff to a non-delegated POTW only upon special approval by Ecology. The Permittee must submit a request to Ecology demonstrating:

(a) That no other option is feasible;

(b) That the POTW has excess wet season hydraulic capacity (no sanitary sewer overflows or treatment system bypasses);

(c) That the POTW is willing to accept the discharge; and

(d) How it will reduce the amount of stormwater runoff sent to the POTW by separating uncontaminated water and discharging it directly.

The request must also certify that the Permittee routinely practices all BMPs applicable to the boatyard.

The limits, upon approval of the discharge by Ecology, are the same as provided in Condition S2.A (Boatyards Discharging Pressure-Wash Wastewater to a Non-Delegated POTW) unless the POTW has more stringent limits or monitoring in which case the more stringent limits and monitoring requirements will apply. The Permittee must notify Ecology of the more stringent POTW limits. Ecology may impose additional requirements in the approval for this discharge, such as flow equalization and characterization of any uncontaminated water discharges.

C. Boatyards Discharging Treated Pressure-Wash Wastewater or Stormwater Runoff to a Delegated POTW

Permittees may discharge pressure-wash wastewater or stormwater runoff to a sanitary sewer system operated by a municipality with a delegated pretreatment program provided they receive a discharge authorization from the delegated municipality and authorization from all other applicable local sewerage authorities. Limits and monitoring and reporting requirements will be determined by the municipality. All Permittees discharging pressure-wash wastewater or stormwater runoff to a delegated municipal sanitary sewer system must comply with any applicable sewer use ordinances adopted by the municipality and/or local sewerage authority operating the sewer system.

The applicable limits and monitoring schedules for discharges to a POTW to which Ecology has delegated the authority to issue discharge permits are those limits and schedules specified in the permit issued by that POTW to cover the individual boatyard.

D. Boatyards Discharging Stormwater Runoff to Waters of the State

The Permittee is authorized to discharge stormwater runoff from areas with industrial activity and conditionally approved non-stormwater discharges listed in Condition S5 (Non-Stormwater Miscellaneous Discharges) to waters of the State. All discharges and activities authorized by this permit must be consistent with the terms and conditions of this permit.

1. General Prohibitions:

   All facilities must manage stormwater discharges to prevent each of the following:

   (a) The discharge of synthetic, natural, or processed oil, or oil-containing products;

   (b) The discharge of floating materials;

   (c) The discharge of process wastewater, and

   (d) A visible change in turbidity or color in the receiving water.

2. Benchmarks

The benchmarks in Table 3 apply to facilities discharging stormwater runoff from areas with industrial activity to any surface water bodies in the State. If the Permittee's discharge exceeds a benchmark, the Permittee must take the actions specified in Condition S7 (Response to Monitoring Results that Exceed Benchmarks).

Table 3: Stormwater Benchmarks and Sampling Requirements for discharges to Surface Waters of the State

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency
Turbidity	NTU	25	EPA 180.1 /Meter	0.5	Once in each of the months of October, November, January, March, April, and May
pH	Standard Units	Between 6.0 and 9.0	Meter/Paper [b]	±0.5	Once in each of the months of October, November, January, March, April, and May
Oil Sheen	Yes/No	No Visible Oil Sheen	N/A	N/A	Once in each of the months of October, November, January, March, April, and May
Copper, Total	µg/L	Marine Water: 44 Tidally Influenced Streams: 36 Western Streams: 45 Eastern Streams: 60 Lakes: 32	EPA 200.8	2.0	Once in each of the months of October, November, January, March, April, and May
Zinc, Total	µg/L	90	EPA 200.8	2.5	Once in each of the months of October, November, January, March, April, and May
Petroleum Hydrocarbons (Diesel Fraction)	mg/L	10	NWTPH-Dx	0.25	Once in each of the months of October, November, January, March, April, and May

a The Permittee shall ensure laboratory results comply with the quantitation level (QL) specified in the table. However, if an alternate method from 40 CFR Part 136 is sufficient to produce measurable results in the sample, the Permittee may use that method for analysis. If the Permittee uses an alternative method, it must report the test method and QL on the discharge monitoring report.

b. Permittees shall use either a calibrated pH meter or narrow-range pH indicator paper with a resolution not greater than ± 0.5 SU.

Facilities discharging stormwater runoff from areas with industrial activity to an infiltration basin or trench lined with absorptive media must comply with the applicable limits in Table 4. The discharge point to ground and all parts of the basin or trench must be located at least 200 feet from the water's edge.

Table 4: Stormwater Limits and Sampling Requirements for discharges to Ground

Parameter	Units	Maximum Daily Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency
Copper, Total	µg/L	Ground: 1000	EPA 200.8	2.0	Once in each of the months of October, November, January, March, April, and May
Zinc, Total	µg/L	Ground: 1020	EPA 200.8	2.5	Once in each of the months of October, November, January, March, April, and May

a The Permittee shall ensure laboratory results comply with the quantitation level (QL) specified in the table. However, if an alternate method from 40 CFR Part 136 is sufficient to produce measurable results in the sample, the Permittee may use that method for analysis. If the Permittee uses an alternative method, it must report the test method and QL on the discharge monitoring report.

E. Boatyards Discharging to Impaired Waters

1. General Requirements for Discharges to Impaired Waters

   Permittees that discharge to a 303(d)-listed waterbody (Category 5), or an impaired waterbody with an applicable TMDL (Category 4A), or a pollution control program for sediment cleanup (i.e., a Category 4B sediment-impaired waterbody), either directly or indirectly through a stormwater drainage system, shall conduct sampling and inspections in accordance with Conditions S6, S7, and S8.

   Existing facilities that discharge to an impaired waterbody on the current U.S. EPA-approved 303(d) list must not cause further permanent impairment of any 303(d)-listed water body for any listed parameter.

2. Eligibility for Coverage of New Discharges to Impaired Waters

   Facilities that meet the definition of new discharger and discharge to a 303(d)-listed waterbody (Category 5), or an impaired waterbody with an applicable TMDL (Category 4A), or a pollution control program for sediment cleanup (i.e., a Category 4B sediment-impaired waterbody) are not eligible for coverage under this permit unless the facility:

   (a) Prevents all exposure to stormwater of the pollutant(s) for which the waterbody is impaired, and retains documentation of procedures taken to prevent exposure onsite with its SWPPP; or

   (b) Documents that the pollutant(s) for which the waterbody is impaired is not present at the facility, and retains documentation of this finding with the SWPPP; or

   (c) Provides Ecology with data showing that the discharge is not expected to cause or contribute to an exceedance of a water quality standard, and retain such data onsite with its SWPPP. The facility must provide data and other technical information to Ecology sufficient to demonstrate:

i. For discharges to waters without an EPA approved or established TMDL, that the discharge of the pollutant for which the water is impaired will meet instream water quality criteria at the point of discharge to the waterbody; or

ii. For discharges to waters with an EPA approved or established TMDL, that there are sufficient remaining wasteload allocations in an EPA approved or established TMDL to allow industrial stormwater discharge and that existing dischargers to the waterbody are subject to compliance schedules designed to bring the waterbody into attainment with water quality standards.

Facilities are eligible for coverage under this permit if Ecology issues permit coverage based upon an affirmative determination that the discharge will not cause or contribute to the existing impairment.

3. Additional Sampling Requirements and Effluent Limits for Discharges to Certain Impaired Waters and Puget Sound Sediment Cleanup Sites

(a) Permittees discharging to a 303(d)-listed waterbody (Category 5), either directly or indirectly through a stormwater drainage system, shall comply with the applicable sampling requirements and numeric effluent limits in Table 5. If a discharge point is subject to an impaired waterbody effluent limit for a parameter that also has a benchmark, the effluent limit supersedes the benchmark, unless a compliance schedule is in effect. Permittees discharging to a 303(d) – listed waterbody (Category 5) or Puget Sound Sediment Cleanup Site who were not assigned an 303(d) list impaired waterbody or Puget Sound Sediment Cleanup Site limit, at the time of 2016 permit coverage shall comply with the applicable sampling requirements and numeric effluent limits in Table 5 as soon as possible, but no later than July 1, 2025, when the compliance schedule expires.

i. For purposes of this condition, “applicable sampling requirements and effluent limits” means the sampling and effluent limits in Table 5 that correspond to the specific parameter(s) the receiving water is 303(d)-listed for at the time of permit coverage, and/or total suspended solids (TSS) if the waterbody is 303(d)-listed (Category 5) for sediment quality at the time of permit coverage.

ii. Permittees discharging to a Puget Sound Sediment Cleanup Site, either directly or indirectly through a stormwater drainage system, shall comply with this section:

(1) Permittees shall sample the discharge for total suspended solids (TSS) in accordance with the limits in Table 5.

(2) Permittees shall remove accumulated solids from storm drain lines (including inlets, catch basins, sumps, conveyances lines, and oil/water separators) on or beneath your facility at least once in the term of the permit.

Permittees shall conduct line cleaning operations (e.g., jetting, vacuuming, removal, loading, storage, and/or transport) using BMPs to prevent discharges of storm drain solids to surface waters of the State.

Removed storm drain solids and liquids shall be disposed of in accordance with applicable laws and regulations and documented in the SWPPP.

(b) If a Permittee can demonstrate, based on video inspection, in-line storm drain solids sampling, or other documentation, that storm drain line cleaning is not necessary to prevent downstream sediment contamination or recontamination, Ecology may waive this requirement by approving a modification of permit coverage. The Permittee shall record the results of each storm drain line cleaning in a report or checklist and keep the records on-site for Ecology review. The Permittee shall ensure each report documents cleaning and includes:

i. Time and date of the cleaning.

ii. Locations cleaned.

iii. Company or personnel who performed the cleaning.

iv. Name, title, and signature of the person conducting the line cleaning; and the following statement: "*I certify that this report is true, accurate, and complete, to the best of my knowledge and belief*."

Table 5: Sampling and Effluent Limits Applicable to Discharges to 303(d)-listed Waters and Puget Sound Sediment Cleanup Sites that are not Category 5 for Sediment Quality

Parameter	Units	Maximum Daily[a] Freshwater	Maximum Daily[a] Marine	Analytical Method [b]	Laboratory Quantitation Level [c]	Minimum Sampling Frequency
pH	SU	[g]	Between 7.0 and 8.5	Meter [d]	±0.1	Once in each of the months of October, November, January, March, April and May
TSS [e]	mg/L	30	30	SM2540-D	5	Once in each of the months of October, November, January, March, April and May
Copper, Total	µg/L	[f]	5.8	EPA 200.8	2.0	Once in each of the months of October, November, January, March, April and May
Lead, Total	µg/L	[f]	220.8	EPA 200.8	0.5	Once in each of the months of October, November, January, March, April and May
Zinc, Total	µg/L	[f]	95.1	EPA 200.8	2.5	Once in each of the months of October, November, January, March, April and May

a. Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. The daily discharge is the average measurement of the pollutant over the day; this does not apply to pH.

b. Or other equivalent method with the same reporting level.

c The Permittee shall ensure laboratory results comply with the quantitation level (QL) specified in the table. However, if an alternate method from 40 CFR Part 136 is sufficient to produce measurable results in the sample, the Permittee may use that method for analysis. If the Permittee uses an alternative method it must report the test method and QL on the discharge monitoring report.

d. Permittees shall use either a calibrated pH meter consistent with EPA 9040 or an approved state method.

e Permittees who discharge to a 303(d)-listed waterbody (Category 5) for sediment quality or to a Puget Sound Sediment Cleanup Site shall sample discharge for TSS.

f. Site-specific effluent limitation will be set at water quality standard in Chapter 173-201A-240 WAC at the time of permit coverage.

- Copper = ((0.960)(e(0.9422[ln(hardness)] - 1.464))).
- Lead = 0.791)(e(1.273[ln(hardness)] - 1.460)) at hardness = 100. Conversion factor (CF) of 0.791 is hardness dependent. CF is calculated for other hardness's as follows: CF = 1.46203 - [(ln hardness)(0.145712)].
- Zinc = (0.978)(e(0.8473[ln(hardness)] + 0.8604))

g. The effluent limit for a Permittee who discharges to a freshwater body 303(d)-listed for pH is: Between 6.0 and 8.5, if the 303(d)-listing is for high pH only; Between 6.5 and 9.0, if the 303(d)-listing is for low pH only; and Between 6.5 and 8.5 if the 303(d)-listing is for both low and high pH. All pH effluent limits are applied end-of-pipe.

F. Boatyards Discharging to Lined Evaporative Pond or Above Ground Tanks

Permittees east of the crest of the Cascade Mountains may discharge pressure-wash wastewater or process wastewater to an Ecology-approved lined evaporative pond or pre-manufactured above ground tank.

At a minimum, the Permittee must comply with the following Best Management Practices:

(a) Constructed wastewater ponds must maintain a minimum setback distance of 100 feet from surface waters of the State.

(b) Prior to construction and operation of the pond or tank, the Permittee must submit an Engineering Report and Operation and Maintenance Manual, in accordance with Chapter 173-240 WAC. The Permittee must notify Ecology at the time the pond or tank is in place and operational. The submittal must include:

i. The design and construction data for all devices and structures that are to be installed, including a characterization of the wastewater influent and the sizing calculations of the evaporation pond or tank.

ii. A description of the evaporation structure process and operation, including a flow diagram.

iii. The types and amounts of chemicals used in the treatment process, if any.

iv. A proposed schedule for construction and implementation.

v. A statement expressing sound engineering justification (through the use of pilot plant data, results from similar installations, and/or scientific evidence) that the proposed structure is not reasonably expected to discharge wastewater to waters of the State.

vi. The Engineering Report must be prepared and certified by a licensed professional engineer.

(c) Ensure that the pond or tank does not overflow, leak, or otherwise escape containment at any time. Permittees shall take all necessary actions to prevent overflow. All above ground tanks shall comply with the requirements in S8.B3.f – Spill Prevention and Emergency Cleanup Plan (SPECP).

(d) Conduct inspections of the pond or tank and in accordance with the Operation and Maintenance Manual and all requirements in S6. E – Visual Inspection Requirements.

(e) Replace or repair the liner or tank if substantial deterioration or leaks are found.

(f) The Permittee must ensure any evaporation pond or tank complies with all applicable sections of this permit. This includes but is not limited to Monitoring (S8.B.2), Preventative Maintenance (S8.B.3.e), and all Reporting and Recordkeeping Requirements (S10).

S3. MANDATORY BEST MANAGEMENT PRACTICES

Permittees must prepare a handout describing these best management practices (BMPs) and provide copies to all employees, contractors, boat owners, and other customers, as appropriate. The Permittee must post these BMPs conspicuously within the work areas and incorporate them into the facility's SWPPP, as required by Condition S8 (Stormwater Pollution Prevention Plan).

A. Vacuum Sander Required

1. Permittees must use a vacuum sander or rotary tool meeting minimum performance standards for all antifouling paint removal. The Permittee may petition Ecology for use of an alternative to this requirement for vacuum sanding/grinding.
2. The process for approval of alternatives is:
   (a) The Permittee must request consideration of an alternative by a letter to Ecology with a conceptual proposal and justification that the proposal will be equivalent to vacuum sanding/grinding. Ecology will respond with an approval to proceed or a denial.
   (b) After Ecology approves the conceptual proposal, the Permittee must submit details of the proposal including size, construction materials, equipment specifications, site plan with location, operational procedures, and any evidence that the proposal will be equivalent to vacuum sanding/grinding. Ecology may

require a site visit by an Ecology inspector prior to a decision on the proposed alternative. Ecology will then again respond with approval or denial for construction.

B. Tidal Grids

Permittees may use tidal grids only for emergency repair and marine surveying. Tidal grids must not be used for surface preparation, painting, routine maintenance, or other non-emergency uses.

C. In-Water Vessel Maintenance and Repair

1. Cleaning, repair, modifications, and surface preparation, coating, or finishing of any portion of a vessel's hull while the vessel is afloat is prohibited. If this work is necessary, then the Permittee must haul the vessel out onto a dry dock, the upland portion of a facility covered by this general permit, or another facility covered by an individual permit issued in accordance with the provisions of Chapter 173-220 WAC.
2. Only minor in-water repair, modification, surface preparation, or coating of topside or superstructure is allowed, limited to 25% of the topside surface. When stripping, sanding, scraping, sandblasting, painting, coating and/or varnishing any deck or superstructure of a vessel in-water, Permittees must collect all particles, oils, grits, dusts, flakes, chips, drips, sediments, debris, and other solids to prevent their release into the environment and entry into waters of the State.
3. Permittees must securely fasten drop cloths, tarpaulins, drapes, shrouding, or other protective devices between various portions of the vessel or between the vessel and the dock, pier, boathouse, bulkhead, or shoreline to collect all such materials. No work from a float, a barge, or another boat is allowed. The Permittee must clean up all collected materials daily to prevent their release into the environment and entry into waters of the State.

D. Upland Vessel Maintenance and Repair

1. When cutting, welding, stripping, sanding, scraping, sandblasting, painting, coating, and/or varnishing any portion of a vessel, Permittees must collect and manage all particles, oils, grits, dusts, flakes, chips, overspray, drips, sediments, debris, and other solids to prevent their release into the environment and entry into waters of the State.
2. Permittees must securely anchor or fasten drop cloths, tarpaulins, structures, drapes, shrouding or other protective devices around the vessel, as necessary, to collect all such materials. These protective devices should be secured in such a way that they remain in place during all weather conditions. The Permittee must routinely cleanup all collected materials or wastes and manage them appropriately to prevent their release into the environment and entry into waters of the State.

E. Solids Management

1. The Permittee must control and collect all particles, oils, grits, dusts, flakes, chips, overspray, drips, sediments, debris, and other solids from work, service, and storage areas of the boatyard to prevent their release into the environment and entry into waters of the State. When solids-generating activity is occurring, the minimum collection frequency is once per day and prior to tidal inundation. The Permittee must avoid wetting the solids during collection and must not wash solids into any surface water or into a stormwater collection system. Hull recoating work conducted on a marine railway should occur only if the boat is positioned at least one boat length from the high water level. In any case, the Permittee must ensure that all debris from working on the boat while it is on the marine railway structure is contained by or at the structure and may not escape to the environment.
2. The Permittee must clean marine railways and dry docks of all solids and garbage prior to submergence to prevent such materials from washing into waters of the State. The Permittee must install sediment traps in all storm drains to intercept and retain solids prior to their discharge into waters of the State. The Permittee must visually inspect sediment traps, storm drains, and catch basins weekly and clean these devices, either manually or with a vacuum device, on a routine basis to prevent the entry of solids into waters of the State.

F. Paint and Solvent Use

1. The Permittee must use all paints and solvents in such a manner as to prevent their release into the environment and entry into waters of the State.
   (a) The Permittee must use appropriate spill kits, drip pans, drop cloths, tarpaulins, or other protective devices during surface preparation, paint and solvent transfer, paint mixing, and application unless those activities are completely enclosed in a building. Painting of the hull surface over or near water is prohibited except for minor touchup, such as the vessel numbers, with non-metallic paints.
   (b) When painting decks or superstructure, the Permittee must place paint cans in a drip pan on top of a drop cloth or tarpaulin.
   (c) The Permittee must mix paints and solvents only at secure locations onshore or onboard a vessel.
   (d) Solvent and paint containers must be kept securely closed at all times when not in use.
2. Paints containing tributyltin are prohibited from use on any vessel less than 25 meters in length (82 feet) except as applied by a licensed applicator for the painting of aluminum hulls of a vessel that is less than 25 meters in length, and for the painting of outboard motors and out drives of vessels less than 25 meters in length.
3. Only persons with a current Washington State Department of Agriculture pesticide applicator's license may purchase, handle, and apply tributyltin.

G. Oils, Bilge Water, and Engine/Motor Cooling Water Management

1. The Permittee must not discharge hydraulic fluids, oily wastes, and petroleum products to waters of the State.
2. Bilge water and engine/motor cooling water discharges must not cause any visible sheen in waters of the State.
3. The Permittee must not discharge bilge or engine/motor cooling water to waters of the State if it has solvents, detergents, emulsifying agents, or dispersants.
4. If a vessel is moved prior to pumping out the bilge, the Permittee must use absorbent pads to prevent the discharge of oils to waters of the State.
5. The Permittee must use drip pans or other containment devices during all petroleum product transfer operations to catch incidental leaks and spills. Absorbent pads and/or booms must be available during petroleum transfer operations occurring over water.

H. Sacrificial Anode (Zincs) Management

The Permittee must not dispose of zincs used as sacrificial anodes into waters of the State. The Permittee must store spent zincs in a covered container and properly dispose of or recycle them.

I. Chemical Management

1. The Permittee must store all of the following under cover on an impervious surface: solid chemical products, chemical solutions, paints, oils, solvents, acids, caustic solutions, and waste materials, including used batteries and lead and copper waste.
2. The Permittee must securely close lids on all chemical containers including solid chemical products, chemical solutions, paints, oils, solvents, acids, caustic solutions, and waste materials at all times when not in use.

J. Wash Pad Decontamination

Prior to actively pumping or passively discharging any stormwater from the pressure-wash pad to waters of the State, the Permittee must clean the pad of all debris, paint waste, sludge, and other solids. The Permittee must then pressure wash the entire pad into the collection sump and clean the pad and sump of all debris, wastewater, and other solids before the next high tide that would inundate any part of the wash pad or sump. The Permittee must document the procedures, personnel, and equipment used to meet this requirement in the facility's SWPPP in accordance with S8.B.3(k).

No Permittee may construct a new wash pad in any area of the facility subject to inundation due to tides.

K. Sewage and Gray Water Discharges

The Permittee must notify all owners of vessels moored for repair or under repair at a permitted facility in writing that this permit prohibits the discharge of sewage (including

discharges from the vessel's galley) into waters of the State. Sanitary waste must be discharged to either the sanitary sewer or into a holding tank. The Permittee must make available to customers a list of contractors providing holding tank pump-out services.

L. Oversight of Do-It-Yourselfers and Independent Contractors

The Permittee must ensure that all individuals who service marine vessels or any other motor-driven vehicle or otherwise conduct boatyard activities at its facility, whether employed by the boatyard or not, implement all of the mandatory BMPs described in Condition S3 (Mandatory Best Management Practices). Whether through signage and education, denial of access, or some other means, the Permittee must exercise control over all potential sources of pollutants at its facility. Do-it-yourselfers and independent contractors who fail to implement all the required or appropriate BMPs must be prohibited from working at the boatyard. The Permittee must document its compliance with this BMP by:

(a) Describing in the SWPPP the Permittee's procedures for communicating the required practices to non-boatyard individuals;

(b) Describing in the SWPPP the Permittee's procedures for providing oversight of non-boatyard individuals, e.g., by conducting regularly scheduled inspections of their work area(s) and activities;

(c) Maintaining written agreements with those non-boatyard individuals that they will implement all of the mandatory BMPs; and

(d) Describing in the SWPPP the process for excluding repeat offenders from its facilities.

M. Dry Docks and Graving Docks

1. When performing boatyard activities on vessels in a dry dock or graving dock, permittees shall comply with all requirements in S3.D.
2. The Permittee must not conduct any boatyard activities on a dry dock that is located outside their facility, unless covered by another permit such as the Vessel Deconstruction General Permit.
3. Prior to actively pumping or passively discharging any stormwater from a dry dock to waters of the State, the Permittee must clean the dock of all debris, paint waste, sludge, and other solids. The Permittee must pressure-wash the entire dry dock into a wastewater collection system and clean the dry dock and collection system of all debris, wastewater, and other solids before the permittee sinks or floods any part of the dock.
4. Permittees must not flood docks with any particles, oils, grits, dusts, flakes, chips, overspray, drips, sediments, debris, or other solids the dock floor.
5. Prior to flooding, the Permittee must remove floatable and low density waste, such as wood, plastic, and miscellaneous trash, such as paper, insulation, and packaging, from the dock floors.
6. The Permittee must document the procedures, personnel, and equipment used to meet this requirement in the facility's SWPPP in accordance with S8.B.3(k).

S4. COMPLIANCE WITH WATER QUALITY STANDARDS

1. Permittees must comply with Washington State surface water quality standards (Chapter 173-201A WAC), sediment management standards (Chapter 173-204 WAC), ground water quality standards (Chapter 173-200 WAC), and human health-based water quality criteria in the National Toxics Rule (40 CFR 131.36). Compliance with water quality standards means that stormwater discharges by a facility with permit coverage must not cause or contribute to a violation of water quality standards in the receiving water.
2. Prior to discharging stormwater and non-stormwater to waters of the State, the Permittee must apply all known, available, and reasonable methods of prevention, control, and treatment (AKART). To comply with this condition, the Permittee must prepare and implement an adequate SWPPP, with all applicable and appropriate BMPs, including the BMPs necessary to meet the standards identified here in this condition, and must install and maintain the BMPs in accordance with the SWPPP, applicable stormwater technical manuals, and the terms and conditions of this permit.

S5. NON-STORMWATER MISCELLANEOUS DISCHARGES

The categories and sources of non-stormwater discharges identified below are conditionally approved, provided the non-stormwater discharge complies with all applicable discharge limits in Condition S2 (Discharge Limits), including compliance with State water quality standards. The Permittee must address the following discharges (except from fire-fighting activities) in the facility SWPPP, as described in Condition S8 (Stormwater Pollution Prevention Plan).

(a) Discharges from fire-fighting activities;

(b) Fire protection system flushing, testing, and maintenance;

(c) Discharges of potable water including water line flushing, provided that the Permittee de-chlorinates the water line flushing wastewater prior to discharge;

(d) Uncontaminated air conditioning or compressor condensate;

(e) Landscape watering and irrigation drainage;

(f) Uncontaminated groundwater or spring water; and

(g) Uncontaminated discharges associated with dewatering of foundations, footing drains, or utility vaults.

S6. MONITORING REQUIREMENTS

Samples and measurements taken to meet the requirements of this general permit must represent the volume and nature of the monitored discharge within the monthly monitoring period, including representative sampling during bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

A. General Sampling Requirements

1. Sample Timing and Frequency

   (a) The Permittee shall sample the discharges from each designated location at least as frequently as is required in S2.

   (b) During a given sampling period, Permittees shall collect stormwater samples within the first 12 hours of stormwater discharge events. If it is not possible to collect a sample within the first 12 hours of a stormwater discharge event, the Permittee must collect the sample as soon as practicable after the first 12 hours, and keep documentation with the sampling records (Condition S9.C) explaining why they could not collect samples within the first 12 hours; or if it is unknown (e.g., discharge was occurring during start of regular business hours).

   (c) The Permittee shall obtain representative samples, which may be a single grab sample, a time-proportional sample, or a flow-proportional sample.

   (d) Permittees need not sample outside of regular business hours, during unsafe conditions, or during months where there is no discharge, but shall submit a Discharge Monitoring Report each reporting period (Condition S9.A).

   (e) Permittees monitoring more than once per month shall average all of the monitoring results for each parameter (except pH and visible oil sheen) and compare the average value to the benchmark value. However, if Permittees collect more than one sample during a 24-hour period, they must first calculate the daily average of the individual grab sample results collected during that 24-hour period; then use the daily average to calculate a monthly average.

2. Sample Location(s)

   (a) The Permittee shall designate sampling location(s) at the point(s) where it discharges stormwater or wastewater associated with boatyard activities off-site.

   (b) Ecology may require that sampling points which are located in areas where unsafe conditions prevent regular sampling, be moved to areas where regular sampling can occur.

   (c) The Permittee shall notify Ecology of any changes or updates to sample locations, discharge points, and/or outfalls by submitting a “Boatyard General Permit Discharge/Sample Point Update Form” to Ecology. The Permittee may be required to provide additional information to Ecology prior to changing sampling locations.

3. Substantially Identical Stormwater Discharge Points

   The Permittee shall sample each distinct point of discharge off-site except as otherwise exempt from monitoring as a substantially identical stormwater discharge point. If applicable, the Permittee is only required to monitor applicable parameters at one of the substantially identical discharge points.

B. Pressure Wash Effluent to Sanitary Sewer

See Condition S2.A (Boatyards Discharging Pressure-Wash Wastewater to a Non-Delegated POTW) or Condition S2.C (Boatyards Discharging Treated Pressure-Wash Wastewater or Stormwater Runoff to a Delegated POTW) as applicable for the required monitoring frequency.

C. Discharges to Waters of the State (including surface and ground)

The Permittee must monitor discharges of stormwater runoff from the areas of the facility where industrial activity has the potential to be exposed to precipitation or stormwater runoff. Non-industrial areas of the facility may be excluded from discharge monitoring ***only*** if:

(a) The area is used solely for the dry storage of boats, the Permittee certifies in the facility SWPPP that no boatyard or any other industrial activities occur there; and no possibility exists for stormwater runoff to flow from an industrial area onto the storage area; **or**

(b) The Permittee certifies in the facility SWPPP that, within the area, none of the following materials or activities are, or will be in the foreseeable future, exposed to precipitation or stormwater runoff:

i. Boatyard materials and activities, including, but are not limited to, any boatyard activities listed in S1.A.

ii. Material handling equipment or activities, industrial machinery, raw materials, intermediate products, byproducts, and final products, or waste products. Material handling activities include storage, loading and unloading, transport, or conveyance of any raw materials, intermediate product, by-product, final products, or waste products.

iii. Using, storing, or cleaning industrial machinery or equipment, and areas where residuals from using, storing, or cleaning industrial machinery or equipment remain and are exposed to stormwater.

iv. Materials or residuals from spills or leaks on the ground or in stormwater inlets.

v. Materials or products from past industrial activity.

vi. Material handling equipment (except adequately maintained vehicles).

vii. Materials or products during loading, unloading, or transporting activities.

viii. Materials or products stored outdoors (except final products intended for outside use, e.g., new cars, where exposure to stormwater does not result in the discharge of pollutants).

ix. Materials contained in open, deteriorated, or leaking storage drums, barrels, tanks, and similar containers.

x. Materials or products handled or stored on roads or railways owned or maintained by the discharger.

xi. Waste material (except waste in covered, non-leaking containers, e.g., dumpsters).

xii. Application or disposal of process wastewater.

xiii. Particulate matter or visible deposits of residuals from roof stacks or vents not otherwise regulated, i.e., under an air quality control permit, and evident in the stormwater outflow.

The Permittee must collect samples from a location or locations affected by boatyard related activities and as noted on the application for coverage. If stormwater runoff from the industrial areas of a facility occurs as sheet flow, then the Permittee must construct a collection point to collect an adequate sample volume. If stormwater runoff discharges do not occur during the sampling period, then the Permittee must indicate that on the Discharge Monitoring Report (DMR) for that monitoring period. Stormwater runoff must be monitored in accordance with the monitoring schedule listed in Tables 3-5.

D. Analytical Procedures

Monitoring data required by Ecology in this general permit or by order must be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*.

Sampling and analytical methods used to meet the water and wastewater monitoring requirements specified in this general permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136. The required detection and quantitation levels are listed in Tables 2-5.

The Permittee must ensure laboratory results comply with the detection limit and quantitation level specified in the table. However, if an alternate method from 40 CFR Part 136 is sufficient to produce measurable results for the effluent, the Permittee may use that method for analysis. If the Permittee uses an alternative method, it must report the test method and quantitation level on the DMR. If the Permittee is unable to obtain the required quantitation level due to matrix effects, the Permittee must report the matrix-specific method detection limit and quantitation level on the DMR.

E. Visual Inspection Requirements

1. Inspection Frequency and Personnel

   (a) The Permittee must conduct and document a visual inspection of the entire site once per week when boatyard activities are occurring at the site. These visual inspections must occur at both the industrial areas and any dry boat storage or non-industrial areas as defined in S6.C within or areas contiguous with an industrial area.

   (b) The Permittee must ensure that inspections are conducted by qualified personnel.

2. Inspection Components

(a) Each inspection must include:

i. Observations made at stormwater runoff sampling locations and areas where stormwater runoff associated with boatyard activity is discharged off-site; to waters of the State, or to a storm sewer system that drains to waters of the State.

ii. Observations for the presence of floating materials, visible oil sheen, discoloration, turbidity, odor, etc. in the stormwater runoff discharge(s). If these pollutants are observed, the source must be found and the pollutant discharge stopped. The observation and source control efforts must be recorded in the inspection report.

iii. Observations for the presence of illicit discharges such as domestic wastewater or process wastewater (including leachate).

(1) If an illicit discharge is discovered, the Permittee must notify Ecology within 24 hours.

(2) The Permittee must eliminate the illicit discharge as soon as practicable, but in no case later than within 30 days of its discovery. The Permittee must also follow all of the applicable requirements of Condition S9.E (Noncompliance Notification).

iv. An assessment of any dry boat storage areas or non-industrial areas for whether any industrial operations had occurred there since the last inspection. Such operations include, but may not be limited to, any of the activities listed in Special Condition S1.A or S6.C, fueling, and/or exterior cleaning activities that produce wastewater containing soaps or other pollutants. If the Permittee finds that industrial activities have occurred in the storage or non-industrial area, the Permittee must cause those activities to cease immediately and report the occurrence to Ecology as soon as practicable, but in no case later than within 30 days of its discovery.

v. A verification that the descriptions of potential pollutant sources required under this permit are accurate.

vi. A verification that the site map in the SWPPP reflects current conditions.

vii. An assessment of all BMPs that have been implemented, noting all of the following:

(1) Probable effectiveness of the inspected BMPs in controlling pollutants.

(2) Locations of BMPs that need maintenance.

(3) The reason(s) maintenance is needed and a schedule for maintenance.

(4) Locations where additional or different BMPs are needed and the rationale for the additional or different BMPs.

viii. An assessment of all stormwater or wastewater conveyances including ditches, pipes, catch basins, vaults, evaporation ponds or tanks, swales, etc.

3. Inspection Results

(a) The Permittee shall record the results of each inspection in an inspection report or checklist and keep the records on-site for Ecology review. The Permittee shall ensure each inspection report documents the observations, verifications, and assessments required in Condition S6.E (Visual Inspection Requirements) and includes:

i. Time and date of the inspection

ii. Locations inspected

iii. Certification that the facility is in compliance with the SWPPP and the permit, identification of any incidents of non-compliance found during the inspection, and a schedule for implementing the remedial actions that the Permittee plans to take to resolve those non-compliance issues and to prevent future occurrences. Name, title, and signature of the person conducting the site inspection; and the following statement: "*I certify that this report is true, accurate, and complete, to the best of my knowledge and belief*."

iv. Certification and signature of the person described in Condition G17.A or a duly authorized representative of the facility, in accordance with Condition G17.B (Signatory Requirements).

4. Reports of Non-Compliance

(a) The Permittee shall prepare reports of non-compliance identified during an inspection in accordance with the requirements of Condition S9.E.

S7. RESPONSE TO MONITORING RESULTS THAT EXCEED BENCHMARKS

A. Benchmark Responses

The following responses are required when any monitoring result exceeds a benchmark value in a sampling period. Benchmark exceedances are counted during a calendar year. Benchmark exceedances counted under the prior Boatyard General Permit do not count as exceedances during the effective term of this permit.

1. Level One Response – Operational Source Control BMPs

Permittees that exceed an applicable benchmark value(s) in Table 3, for any one or two required sampling months, during a calendar year shall complete a Level One Corrective Action for each parameter exceeded in accordance with the following actions. For example, if a single sample for a monitoring period yields analytical results exceeding benchmarks for total copper and total zinc, then a Level One Response is required for each

parameter. A Level One Response is not required after three or four monthly exceedances for the same benchmark.

(a) Conduct an inspection of the permitted facility as promptly as possible after the monitoring results become available;

(b) In addition to the elements identified in Condition S6.D (Visual Inspection Requirements), the inspection must:

i. Identify and evaluate possible sources of the exceeding parameter in the discharge,

ii. Review the SWPPP and ensure that it fully complies with Permit Condition S3, and contains the applicable BMPs from the appropriate Stormwater Management Manual.

iii. Identify source/operational control methods by which the contamination can be reduced, and

iv. Evaluate which improvements or changes to the SWPPP are necessary to control the exceeding parameter;

v. Make appropriate revisions to the SWPPP to include additional operational source control BMPs with the goal of achieving the applicable benchmark value(s) in future discharges.

(c) Summarize the inspection results in a Level One Response Form, including remedial actions taken or planned, place them in the SWPPP, described in Condition S8 (Stormwater Pollution Prevention Plan), and Submit a copy of the completed Level One Response Form to Ecology at the same time as submitting the corresponding DMR.

2. Level Two Response – Structural Source Control BMPs

Permittees that exceed an applicable benchmark value in Table 3 (for a single parameter), for any three required sampling months during a calendar year shall complete a Level Two Response for each parameter exceeded, at any stormwater monitoring location (e.g., two copper exceedances from one monitoring location and one copper exceedance from another monitoring location), must perform the following actions. Alternatively, the Permittee may skip the Level Two Response and complete a Level Three Response instead in accordance with Condition S7.A.3.

(a) Review the SWPPP and ensure that it fully complies with Permit Condition S8.

(b) Make appropriate revisions to the SWPPP to include additional structural source control BMPs with the goal of achieving the applicable benchmark value(s) in future discharges.

(c) Investigate all available and applicable stormwater treatment BMPs to reduce contaminant levels below the permit benchmark values.

(d) Prepare a Level Two Structural Source Control Report outlining potential stormwater control structures that may be appropriate at that location.

(e) Submit the Level Two Structural Source Control Report to Ecology within three months of reporting the third value above a benchmark.

(f) Fully implement the Level Two Structural Control Report within 6 months of reporting the third value above a benchmark. If installation of necessary structural source control BMPs is not feasible by the 6 month deadline, Ecology may approve additional time, by approving a Modification of Permit Coverage.

During the 6 month reporting and implementation period, or while a time extension is in effect, benchmark exceedances (for the same parameter) do not count towards additional Level Two or Three Responses.

3. Level Three Response – Treatment BMPs

Permittees that exceed an applicable benchmark value in Table 3 (for any single parameter), for any four required sampling months, at any stormwater monitoring location, shall complete a level Three Response for each parameter exceeded.

(a) Treatment

i. The Permittee must prepare an Engineering Report that includes the following items, at a minimum:

(1) Brief summary of the treatment alternatives considered and the reasons the proposed option was selected. The report must include cost estimates of ongoing operation and maintenance, including disposal of any spent media.

(2) The basic design and construction data for all treatment devices and structures that are to be installed, including a characterization of the stormwater runoff influent and the sizing calculations of the treatment units.

(3) A description of the treatment process and operation, including a flow diagram.

(4) The types and amounts of chemicals used in the treatment process, if any.

(5) A proposed schedule for implementation of the preferred option.

(6) Results expected from the treatment process, including the predicted characteristics of the stormwater runoff discharge.

(7) A statement expressing sound engineering justification (through the use of pilot plant data, results from similar installations, and/or scientific evidence) that the proposed treatment is reasonably expected to meet the permit benchmarks and limits.

(8) The Engineering Report must be prepared and certified by a licensed professional engineer.

ii. The Permittee must submit the Engineering Report to Ecology within three months of reporting the fourth monitoring result above a benchmark. Failure to submit an acceptable Engineering Report may result in an order, penalty, or both. The Permittee must notify Ecology at the time the new or

modified treatment BMP is in place and operational. Level One and Level Two Reports are not required for benchmark exceedances for the same parameter(s) that may occur during the period the preferred option is being put into place and started up.

iii. Full implementation of the Engineering Report must be completed within 12 months of the time when Ecology accepts the Engineering Report.

iv. Starting at 15 months after the date of the fourth exceedance, the next benchmark exceedance for that parameter shall count as the first level 1 benchmark exceedance. The Permittee shall then complete the appropriate responses for all future benchmark value exceedances as defined in S7.

(b) Demonstration that Treatment is Not Feasible or Not Necessary

If installation of necessary treatment BMPs is not feasible by the Level 3 deadline, Ecology may approve additional time by approving a Modification of Permit Coverage. If installation of treatment BMPs is not feasible or necessary to prevent discharges that may cause or contribute to violation of a water quality standard, Ecology may waive the requirement for treatment BMPs by approving a Modification of Permit Coverage. Ecology may subsequently approve modification of the permit in accordance with Condition S1.C (Modification of Permit Coverage) if the Permittee:

i. Requests such a modification,

ii. Fulfills all the requirements specified in Condition S1.C, and

iii. Demonstrates to Ecology's satisfaction that one or more of the following conditions apply:

(1) Installation of necessary treatment BMPs is not feasible by the Level Three deadline, up to a maximum of 15 months following reporting the fourth monitoring results above a benchmark.

(2) Installation of treatment BMPs is not feasible or not necessary to prevent discharges that may cause or contribute to violation of a water quality standard.

In this context, "not necessary" means that even without the installation of additional treatment BMP(s), the permitted discharges would not cause or contribute to a violation of water quality standards. Likewise, "not feasible" means that specific local conditions would prevent the Permittee from installing the BMP(s), such as the Permittee's landlord or the local fire marshal refusing to allow the installation. "Not feasible" does not include a Permittee's financial limitations. RCW 90.48.520 states, "*In no event shall the discharge of toxicants be allowed that would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria*."

B. Implementation of Source Control and Treatment BMPs from Previous Permit

In addition to the Corrective Action Requirements of S7, Permittees shall implement any applicable Level 1, 2 or 3 Responses required by the previous Boatyard General Permit(s). Permittees shall continue to operate and/or maintain any BMPs related to benchmark responses implemented prior to the effective date of this permit.

S8. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Every facility covered by this permit must prepare and maintain a Stormwater Pollution Prevention Plan (SWPPP), which is developed specifically for its facility. The SWPPP must be consistent with requirements defined in this permit, and be fully implemented and updated as necessary to maintain compliance with permit conditions. The SWPPP must include those BMPs necessary to achieve the limits and benchmarks in Condition S2 (Discharge Limits).

New facilities must develop and implement a SWPPP before beginning operation. However, some components of a SWPPP are added over time and cannot be included in the first SWPPP. The Permittee must update the SWPPP as required by the general permit and as needed to reflect significant process changes before those changes occur.

The Permittee must document the technical basis for the selection of all stormwater BMPs within the SWPPP. The SWPPP must document how stormwater BMPs were selected, the pollutant removal performance expected from the selected BMPs and the technical basis which supports the performance claims for the selected BMPs. Ecology assumes this documentation is a demonstration the selected BMP will comply with water quality standards and satisfy the State AKART requirements and the Federal technology-based treatment requirements under 40 CFR Part 125.3. See Condition S8.A.3 (Proper Selection and Use of Stormwater Management Manuals) for an exception to the requirements of this paragraph.

A. General Requirements

1. Public Access and Signature

   (a) The Permittee must retain the SWPPP and permit on site or within reasonable access to the site and, upon request, make it immediately available to Ecology or the local jurisdiction.

   (b) A copy of the SWPPP must be provided to Ecology within 14 days of receipt of a written request for the SWPPP from Ecology.

   (c) A copy of the SWPPP or access to the SWPPP must be provided to the public when requested in writing. Upon receiving a written request from the public for the Permittee's SWPPP, the Permittee must either:

      i. Provide a copy of the SWPPP to the requestor within 14 days of receipt of the written request; or

      ii. Provide access to the SWPPP within 14 days of receipt of the written request at a mutually agreed upon location for viewing and/or copying of

the SWPPP. The Permittee will provide reasonable access to copying services for which a reasonable fee may be charged; or

iii. Provide a URL in your NOI where your SWPPP can be found, and maintain your current SWPPP at this URL, you will have complied with the public availability requirements for the SWPPP. To remain current, you must post any SWPPP modifications, records, and other reporting elements required for the permit term at the same URL as the main body of the SWPPP.

The responsible party as identified in Condition G17 (Signatory Requirements) must sign the SWPPP and all of its modifications.

2. Enhanced/Additional Best Management Practices

The Permittee must provide in the SWPPP an implementation schedule of any additional or enhanced BMPs required due to an Ecology notice, facility changes, self-inspection, or monitoring results that exceed benchmark values for one to three times, as described in Condition S7 (Response to Monitoring Results that Exceed Benchmarks). The Permittee must complete and enter a schedule for implementation (plan) into the SWPPP within 30 days of a determination of necessary improvements or exceedance of benchmark values. BMPs identified in the plan must be implemented with diligence. The Permittee must complete non-capital BMPs within 2 weeks after completing the plan and capital BMPs within 6 months. Enhanced/additional BMPs must comply with Condition S8.A.3 (Proper Selection and Use of Stormwater Management Manuals). This paragraph does not apply to a Level Two or a Level Three Response triggered by four or more exceedances of the same benchmark. Complying with this provision does not limit the potential liability for enforcement action where the Permittee has failed to implement required BMPs or where discharges of stormwater runoff violate water quality standards.

Ecology may notify the Permittee when the SWPPP does not meet one or more of the minimum requirements of this Condition or when the SWPPP is not adequate to assure compliance with standards. The Permittee must modify the SWPPP and the BMPs to correct the deficiencies identified in the notice within 30 days of the notice or receipt of the inspection report.

The Permittee must modify the SWPPP whenever there is a change in design, construction, operation, or maintenance of any BMP which cause(s) the SWPPP to be less effective in controlling the pollutants.

This permit requires the Permittee to conduct visual monitoring. This monitoring may identify BMPs that are inadequate or pollutant sources that are not identified or poorly described in the SWPPP. When visual monitoring identifies inadequacies in the SWPPP, due to the actual discharge of or potential to discharge a significant amount of any pollutant, the Permittee must modify the SWPPP and adjust the BMPs to correct the deficiency.

3. Proper Selection and Use of Stormwater Management Manuals

Permittees who select BMPs from an Ecology-approved stormwater management (Stormwater manuals - Washington State Department of Ecology[4]) manual must clearly specify the stormwater management manual in their SWPPP. Permittees who choose to use BMPs from approved stormwater management manuals do not have to demonstrate the technical basis for the BMPs as set forth in the introductory paragraphs of this section.

4. Other Pollution Control Plans

   The Permittee may incorporate by reference applicable portions of plans prepared for other purposes at their facility. Plans or portions of plans incorporated into a SWPPP become enforceable requirements of this permit and must meet the availability requirements of the SWPPP, described in Condition S8.A.1 (Public Access and Signature). A Pollution Prevention Plan prepared under the Hazardous Waste Reduction Act, Chapter 70A.214 RCW, is an example of such a plan.

B. SWPPP Contents and Requirements

The SWPPP must contain a detailed assessment of the entire facility and a detailed description of the BMPs. The Permittee must clearly identify in the plan any parts of the SWPPP which it wants to claim as Confidential Business Information. At a minimum, the SWPPP must include the following:

1. Facility Assessment

   The facility assessment must include a description of the entire facility, a detailed site map, and an inventory of facility activities, equipment, and materials that contribute to or have the potential to contribute pollutants to stormwater. The assessment must be as complete as possible (including incidental sources such as tire wear or equipment leaks) and must be updated to reflect substantive changes at the facility. The SWPPP must address each potentially significant pollutant source with BMPs that will eliminate or reduce the potential to contaminate stormwater through source control or treatment.

   (a) Facility Description: The facility description must describe the activities conducted at the site, the general layout of the facility, including buildings and storage of raw materials, and the flow of goods and materials through the facility. It must include seasonal variations, including peaks in production and any changes in work based on season or weather.

   (b) Site Map: The site map must be drawn to an identified scale that indicates the relative distances between significant structures and drainage systems. It must be of sufficient size and identify the following significant features:

      i. The scale or include relative distances between significant structures and drainage systems.

      ii. The size of the property in acres.

[4] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals

iii. The location and extent of all buildings, structures and all impervious surfaces.

iv. Direction of stormwater flow (use arrows).

v. Locations of all structural source control BMPs.

vi. Locations of all receiving water (including wetlands and drainage ditches) in the immediate vicinity of the facility.

vii. Locations of all stormwater conveyances including ditches, pipes, catch basins, vaults, ponds, swales, etc.

viii. Locations of actual and potential pollutant sources.

ix. Locations of all stormwater monitoring points.

x. The stormwater drainage areas for each stormwater discharge point off site (including discharges to groundwater).

xi. Locations of stormwater inlets and outfalls with a unique identification number for each sampling point and discharge point, indicating any that are identified as substantially identical, and identify, by name, any other party other than the Permittee that owns any stormwater drainage or discharge structures.

(c) Industrial Activities: The inventory of industrial activities must identify all areas associated with industrial activities which have been or may potentially be sources of significant amounts of pollutants, including the following:

i. Loading and unloading of dry bulk materials or liquids.

ii. Outdoor storage or staging of materials or products.

iii. Outdoor work and repair areas, including any do-it-yourself areas.

iv. Dust- or particulate-generating processes.

v. Roofs or other surfaces exposed to air emissions from an enclosed vessel repair or a process area.

vi. On-site waste treatment, storage, or disposal.

vii. Vehicle and vessel fueling, maintenance, and/or cleaning (includes washing).

viii. Roofs or other surfaces composed of materials that may be mobilized by stormwater (e.g., galvanized or copper roofs).

(d) Inventory of Materials: The inventory of materials must include the following:

i. A list of all the types of materials handled at the site that potentially may be exposed to precipitation or runoff and could result in stormwater pollution of a significant amount.

ii. A short narrative for each material describing the potential of the pollutant to be present in stormwater discharges.

iii. A narrative description of any potential sources of pollutants of a significant amount from past activities; significant materials that were previously handled, treated, stored, or disposed of in a manner to allow ongoing exposure to stormwater. The Permittee must update this narrative when data become available to verify the presence or absence of these pollutants.

iv. The method and location of any on-site storage or disposal; and a list of significant spills and significant leaks of toxic or hazardous pollutants.

(e) Non-Stormwater Miscellaneous Discharges, identified in Condition S5 (Non-Stormwater Miscellaneous Discharges): These discharges must be specified as to volume, frequency of discharge, expected duration of discharge, and BMPs to assure they are uncontaminated. Visual monitoring must be included in the plan described in Condition S8.B.2 (Monitoring Plan).

2. Monitoring Plan

The SWPPP must include a monitoring plan. The plan must identify all the points of discharge of pressure-wash wastewater, process wastewater, and stormwater runoff to the sanitary sewer, to surface water, to an infiltration basin or trench, or to a storm drain system. If there is more than one point where stormwater runoff discharges, then the plan must include a discussion of how the Permittee has determined which point(s) of discharge are to be monitored and which substantially identical discharge point(s) will not be monitored.

(a) The SWPPP must contain the following documentation of why specified parameters are not to be monitored at each discharge point, if applicable:

i. General industrial activities conducted in the drainage area of each discharge point.

ii. Exposed materials located in the drainage area of each discharge point that are likely to be significant contributors of pollutants to stormwater runoff discharges.

iii. Impervious surfaces in the drainage area that could affect the percolation of stormwater runoff into the ground (e.g., asphalt, crushed rock, grass).

iv. Best management practices conducted in the drainage area of each discharge point.

v. Location(s) of the discharge point(s) the Permittee will not monitor because the pollutant concentrations are substantially identical to another discharge point that is being monitored.

vi. Reasons why the Permittee expects the discharge points to discharge substantially identical effluents.

(b) The plan must identify who is responsible for monitoring and how monitoring will be conducted to comply with permit conditions. The monitoring plan must address stormwater sampling requirements and visual inspections. Records of these inspections must be kept as attachments to the SWPPP. The plan must include the following:

i. Identification of all points of discharge;

ii. The checklist to be used for visual monitoring;

iii. The person (or position) who conducts stormwater sampling;

iv. Where samples will be taken;

v. Parameters for analysis and the analytical methods to be employed;

vi. Procedures for sample collection and handling;

vii. Procedures for sending samples to lab; and

viii. Procedure for submitting monitoring results to Ecology.

3. Best Management Practices

The SWPPP must include a description of the best management practices (BMPs) in addition to those specified in Condition S3 (Mandatory Best Management Practices) that are necessary for the facility to eliminate or reduce the potential to contaminate stormwater. BMPs must be considered to regulate peak flow and volume of stormwater discharge**.**

The SWPPP must document how the Permittee selected stormwater treatment BMPs, the pollutant removal performance expected from each treatment BMP, the technical basis that supports the performance claims for the selected treatment BMPs, and an assessment of how the selected treatment BMPs will comply with State water quality standards and satisfy the technology-based treatment requirements of 40 CFR Part 125.3 and Chapter 90.48 RCW.

Permittees who choose to follow the stormwater management practices, or their functional equivalents, contained in approved stormwater management manuals(Stormwater manuals - Washington State Department of Ecology[5]), including the proper selection, implementation, and maintenance of appropriate BMPs, are presumed to have satisfied the demonstration requirement of the previous paragraph.

Many BMPs are common to all facilities. The categories listed below must be included in the SWPPP. The Permittee must identify in the SWPPP the BMP categories listed below and implement those BMPs to meet the following requirements:

(a) Operational Source Control BMPs

[5] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals

The SWPPP must include those Operational Source Control BMPs listed as "applicable" in Ecology's Stormwater Management Manual (SWMM), approved stormwater technical manuals chosen per Condition S8.A.3 (Proper Selection and Use of Stormwater Management Manuals), or other guidance documents or manuals approved in accordance with Condition S8.A.3.

(b) Structural Source Control BMPs

The SWPPP must include the Structural Source Control BMPs listed as "applicable" in Ecology's SWMM, approved stormwater technical manuals chosen per Condition S8.A.3 (Proper Selection and Use of Stormwater Management Manuals), or other guidance documents or manuals approved in accordance with Condition S8.A.3.

(c) Pollution Prevention Team

The SWPPP must include a BMP that identifies specific individual(s) by name or by title within the plant organization responsible for developing the SWPPP and assisting the plant manager in its implementation, maintenance, and modification. The activities and responsibilities of the team must address all aspects of the facility's SWPPP.

(d) Good Housekeeping

The SWPPP must include a BMP(s) that defines ongoing maintenance and cleanup, as appropriate, of areas which may contribute pollutants to discharges of stormwater runoff. The SWPPP must include the schedule/frequency for completing each housekeeping task.

(e) Preventive Maintenance

The SWPPP must include a BMP(s) to inspect and maintain the stormwater drainage and treatment systems (if any), and equipment and systems that could fail and result in contamination of stormwater runoff. The SWPPP must include the schedule and frequency for completing each maintenance task and the person(s) or position(s) responsible for preventive maintenance. The Permittee must:

i. Clean catch basins when the depth of debris reaches 60% of the sump depth. In addition, the Permittee must keep the debris surface at least 6 inches below the outlet pipe. Records of this maintenance shall be kept as described in S9.B.

ii. Maintain ponds, tanks/vaults, catch basins, swales, filters, oil/water separators, drains, and other stormwater drainage/treatment facilities in accordance with the maintenance standards set forth in the applicable Stormwater Management Manual.

iii. Inspect all equipment and vehicles during weekly site inspections for leaking fluids such as oil, antifreeze, etc. Take leaking equipment and vehicles out of service or prevent leaks from spilling on the ground until repaired.

iv. Clean up spills and leaks immediately (e.g., using absorbents, vacuuming, etc.) to prevent the discharge of pollutants.

(f) Spill Prevention and Emergency Cleanup Plan (SPECP)

The SWPPP must include a BMP(s) to identify areas where potential spills can contribute pollutants to discharges of stormwater runoff. The BMP(s) must specify material handling procedures, storage requirements, and cleanup equipment and procedures, as appropriate. The SWPPP may include excerpts of plans prepared for other purposes (e.g., Spill Prevention Control and Countermeasure (SPCC) plans under Section 311 of the CWA), where those excerpts meet the intent of this requirement. This section must include:

i. A description of the reporting system which the Permittee plans to use to immediately alert facility managers and all appropriate legal authorities, in the event of a spill or unpermitted discharge which may endanger health or the environment. Condition S9 (Reporting and Recordkeeping Requirements) provides the contact information for those authorities.

(1) A description of preventive measures and facilities, including an overall facility plot plan showing drainage patterns, which prevent, contain, or treat spills or unpermitted discharges. The use of dispersants and emulsifiers is prohibited without specific approval from the Director of the Department of Ecology.

(2) A list of all oils and chemicals used, processed, or stored at the facility which may be spilled or discharged into waters of the State.

ii. The SPECP shall specify BMPs for material handling procedures, storage requirements, cleanup equipment and procedures, and spill logs, as appropriate. The Permittee shall:

(1) Store all hazardous substances, petroleum/oil liquids, and other chemical solid or liquid materials that have potential to contaminate stormwater on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10% of the total enclosed container volume or 110% of the volume contained in the largest container, whichever is greater, or use double-walled tanks.

(2) Prevent precipitation from accumulating in containment areas by using a roof or equivalent structure or include a plan on how it will manage and dispose of accumulated water if a containment area cover is not practical.

(3) Locate spill kits within 25 feet of all stationary fueling stations, fuel transfer stations, mobile fueling units, and used oil storage/transfer stations. At a minimum, spill kits shall include:

- Oil absorbents capable of absorbing 15 gallons of fuel. Facilities with a Spill Prevention, Control, and Countermeasures Plan (SPCCP) must have enough oil absorbents capable of absorbing the minimum anticipated spill amount or potential discharge volume identified in that plan if more than 15 gallons.
- A storm drain plug or cover kit.

- A non-water containment boom, a minimum of 10 feet in length with a 12-gallon absorbent capacity.
- A non-metallic shovel.
- Two 5-gallon buckets with lids.

(4) Not lock shut-off fueling nozzles in the open position. Do not "top-off" tanks being refueled.

(5) Block, plug or cover storm drains that receive runoff from areas where fueling, during fueling.

(6) Use drip pans or equivalent containment measures during all petroleum transfer operations.

(7) Locate materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas).

(8) Use drip pans and absorbents under or around leaky vehicles and equipment or store indoors where feasible. Drain fluids from equipment and vehicles prior to on-site storage or disposal.

(9) Maintain a spill log that includes the following information for chemical and petroleum spills: date, time, amount, location, and reason for spill; date/time cleanup completed, notifications made and staff involved.

iii. Employee Training: The SWPPP shall include BMPs to provide SWPPP training for employees who have duties in areas of industrial activities subject to this permit. At a minimum, the training plan shall include:

(g) The content of the training.

i. An overview of what is in the SWPPP.

ii. How employees make a difference in complying with the SWPPP and preventing contamination of stormwater.

iii. Spill response procedures, good housekeeping, maintenance requirements, and material management practices.

iv. How the Permittee will conduct training.

v. The frequency/schedule of training. The Permittee shall train employees annually, at a minimum.

vi. A log of the dates on which specific employees received training.

(h) Oversight of Do-It-Yourselfers and Independent Contractors

The SWPPP must include a BMP(s) that describes how the Permittee will ensure that all individuals ***not*** employed by the boatyard who service marine vessels or any other

motor-driven vehicle or otherwise conduct boatyard activities at its facility have been educated about required practices to control and prevent the release of pollutants to waters of the State, including at a minimum all the mandatory BMPs listed in Section S3 (Mandatory Best Management Practices). The Permittee must prohibit do-it-yourselfers and independent contractors who fail to implement all the required practices and BMPs from working at the boatyard.

The Permittee must document its compliance with this BMP by

i. Describing in the SWPPP the Permittee's procedures for communicating the required practices to non-boatyard individuals;

ii. Describing in the SWPPP the Permittee's procedures for providing oversight of non-boatyard individuals, e.g., by conducting regularly scheduled inspections of their work area(s) and activities;

iii. Maintaining written agreements with those non-boatyard individuals that they will implement all of the mandatory BMPs; and

iv. Describing in the SWPPP the process for excluding repeat offenders from its facilities.

(i) Inspections and Recordkeeping

The SWPPP must include documentation of procedures to assure compliance with permit requirements for inspections and recordkeeping. At a minimum, it must include all of the following:

i. Identify personnel who inspect designated equipment and areas as required in Condition S6 (Monitoring Requirements);

ii. Provide a tracking or follow-up procedure to ensure that a report is prepared and any appropriate action taken in response to visual monitoring;

iii. Define how the Permittee will comply with signature requirements and records retention identified in Condition S9 (Reporting and Recordkeeping Requirements); and

iv. Include certification of compliance with the SWPPP.

(j) Decontamination Documentation

The SWPPP must include documentation of procedures used to assure compliance with permit requirement S3.J (Wash Pad Decontamination) and S3.M (Dry Docks and Graving Docks). At a minimum the SWPPP must:

i. Identify personnel who are responsible for decontamination of wash pads, dry docks, or graving docks.

ii. Describe the procedure(s) used to thoroughly clean the pad, sump, dry docks, or graving docks.

iii. Identify equipment and materials to be used in the decontamination process.

(k) Illicit Discharges

The SWPPP must include measures to identify and eliminate the discharge of process wastewater, domestic wastewater, and other illicit discharges, to stormwater sewers, or to waters of the State. The Permittee can find BMPs to identify and eliminate the discharge of process wastewater, domestic wastewater, and other illicit discharges in Volume IV of Ecology's SWMM for Western Washington and Chapter 8 of the SWMM for Eastern Washington.

(l) Vessel Deconstruction BMPs

For facilities that deconstruct vessels, the SWPPP must include a description of the BMPs used when deconstructing vessels. This must include BMPs for in accordance with the requirements of the permit, beginning with initial deconstruction activity until all deconstruction activity is complete. For any deconstruction activity that takes place on a dry dock or barge, the SWPPP must include BMPs that demonstrate compliance with Condition S3.M.

S9. REPORTING AND RECORDKEEPING REQUIREMENTS

The Permittee must report in accordance with the following conditions. False reporting is a violation of this permit.

A. Reporting

Unless otherwise specified in this permit, the Permittee must use the on-line, "Water Quality Permitting Portal" to submit all permit-required reports by the specified due dates (more information is located at Ecology's WQWebPortal guidance webpage[6] Permittees unable to submit electronically (e.g., those who do not have an Internet connection) must contact their Washington State Department of Ecology regional permit administrator at the locations provided in Condition S9.E (Noncompliance Notification) to request a waiver and to obtain instructions on how to provide hardcopy paper versions of the required reports and documentation.

Where another condition of this permit requires submission of hardcopy paper documentation, the Permittee must ensure that the submission is postmarked or received by Ecology no later than the specified due date. The Permittee must submit hardcopy paper documentation to the water quality permit coordinator at the appropriate address provided in Condition S9.E (Noncompliance Notification).

The Permittee must submit a discharge monitoring report (DMR) for each calendar month during which monitoring is required, whether or not a discharge occurred. If the facility did not discharge during a given monitoring period, the Permittee must submit a completed DMR with

[6] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

"No Discharge" entered as the DMR Reporting Code. Submission of DMRs must be completed by no later than the 28th day of the month following the completed monitoring period.

All DMRs must contain the following information:

(a) Include data for each of the parameters for which monitoring is required by Condition S6 (Monitoring Requirements) and as required by the DMR entry screen or hardcopy paper form. Report a value for each day sampling occurred and for the monthly values.

(b) If the Permittee did not discharge wastewater or stormwater runoff during a given monitoring period, enter the "No Discharge" reporting code.

(c) Record onto the DMR those analytical values reported as "less than the detection limit" by entering "**<**" followed by the numeric value of the detection limit (e.g., **<** 2.0). If the method used did not achieve the detection limit or quantitation level identified in Condition S6.C (Analytical Procedures), report the actual detection limit and quantitation level in the DMR comments section or other location provided.

(d) Report the analytical test method used in the DMR comments section or other location provided if the laboratory used an alternate method not specified in the permit and as allowed in Condition S6.D (Analytical Procedures).

The Permittee must submit monitoring results in accordance with the minimum sampling frequencies specified in Conditions S2 (Discharge Limits) and S6 (Monitoring Requirements) and must submit all data collected to Ecology. If the permittee discharges process wastewater or stormwater runoff to a POTW and the POTW wishes to receive monitoring data, then DMRs must also be provided to the POTW at the same time they are sent to Ecology. The Permittee must summarize and report monitoring data collected during the previous month or sample period on a form provided, or otherwise approved, by Ecology. The Permittee must ensure that the report is postmarked or received by Ecology no later than the 28th day of the month following the sample collection month. Hardcopy written report(s) must be sent to the appropriate regional office of Ecology.

B. Records Retention

1. The Permittee shall retain the following documents onsite for a minimum of five years:

(a) A copy of this permit.

(b) A copy of the permit coverage letter.

(c) Records of all sampling information specified in Condition S9.C.

(d) Inspection reports including documentation specified in Condition S6. E.

(e) Any other documentation of compliance with permit requirements.

(f) All equipment calibration records.

(g) All BMP maintenance records.

(h) All original recordings for continuous sampling instrumentation.

(i) Copies of all laboratory reports as described in Condition S6.D.

(j) Copies of all reports required by this permit.

(k) Records of all data used to complete the application for this permit.

2. The Permittee shall extend the period of records retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee, or when requested by Ecology.
3. The Permittee shall make all plans, documents, and records required by this permit immediately available to Ecology or the local jurisdiction upon request; or within 14 days of a written request from Ecology.

C. Recording Results

For each measurement or sample taken, the Permittee must record all of the following information:

(a) Date, exact place, method, and time of sampling;

(b) Name of the individual who performed the sampling or measurement;

(c) Dates the analyses were performed;

(d) Name of the person(s) who performed the analyses;

(e) Analytical techniques or methods used; and

(f) Results of all analyses.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant at a designated sampling point (addressed in Condition S6 (Monitoring Requirements)) more frequently than required by this general permit using test procedures specified by Condition S6.C (Analytical Procedures), then it must include the results of this monitoring along with the data submitted in its monthly DMRs, as an electronic attachment or submittal to the Ecology Water Quality Permitting Portal. A Permittee with a waiver due to its inability to submit electronically must submit the additional monitoring data on a paper hardcopy to the appropriate address provided in Special Condition S9.E (Noncompliance Notification).

E. Noncompliance Notification

In the event of a spill or a discharge not authorized by this general permit which may endanger health or the environment, the Permittee must immediately notify:

(a) The appropriate Ecology regional office,

(b) The Washington Military Department, Emergency Management Division, at (800) 258-5990, and

(c) The United States Coast Guard, National Response Center, at (800) 424-8802.

This notification procedure must be included in the SWPPP as noted in Condition S8.B.3(f) (Spill Prevention and Emergency Cleanup Plan). The phone numbers of Ecology regional permit administrators are provided below.

Table 6: Ecology Office Locations

Ecology Office Location	Counties
Ecology Central Regional Office Water Quality Program 1250 West Alder Street Union Gap, WA 98903-0009 509-575-2490 TDY: 711 or 1-800-833-6341	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, and Yakima
Ecology Eastern Regional Office Water Quality Program North 4601 Monroe Spokane, WA 99205-1295 509-329-3400 TDY: 711 or 1-800-833-6341	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, and Whitman
Ecology Northwest Regional Office Water Quality Program 15700 Dayton Ave. N. Shoreline, WA 98133 206-594-0000 TDY: 711 or 1-800-833-6341	Island, King, Kitsap, San Juan, Skagit, Snohomish, and Whatcom
Ecology Southwest Regional Office Water Quality Program P.O. Box 47775 Olympia, WA 98504-7775 360-407-6300 TDY: 711 or 1-800-833-6341	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, and Wahkiakum

In addition to a spill or unauthorized discharge, in the event the Permittee is unable to comply with any of the other permit terms and conditions due to any cause, the Permittee must:

(a) Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the violation, correct the problem and, if applicable, repeat sampling and analysis of any noncompliance and submit the results to Ecology within 5 days after becoming aware of the violation;

(b) Notify the regional Ecology facility inspector orally of the failure to comply within 24 hours from the time the Permittee becomes aware of the noncompliance; and

(c) Submit a detailed written report electronically via the Water Quality Permitting Portal to Ecology within 5 days from the time the Permittee becomes aware of the noncompliance. The report should describe the nature of the violation, including exact dates and times, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of the additional sampling, and any other pertinent information. Permittees who are unable to submit electronically (e.g., those who do not have an Internet connection) must contact their Ecology regional permit administrator at the locations provided above to request a waiver. Permittees with waivers must submit hardcopy paper reports to be

received by Ecology no later than within 5 days of the time the Permittee became aware of the noncompliance.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

F. Discharges to a Delegated Municipal Sanitary Sewer System

Permittees who discharge treated pressure-wash wastewater to a delegated municipal sanitary sewer system must maintain records of their contractual agreement with the municipality, including the conditions of discharge. These records must be available for Ecology inspection.

S10. BYPASS

A. Bypass Procedures

This permit prohibits a bypass which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for Essential Maintenance without the Potential to Cause Violation of Permit Limits or Conditions.

   Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limits or other conditions of this general permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least 10 days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance with this general permit.

   This bypass is permitted only if all three of the following conditions are met:

   (a) Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   (b) No feasible alternatives to the bypass exist, such as:

      i. The use of auxiliary treatment facilities.

      ii. Retention of untreated wastes.

      iii. Stopping production.

iv. Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.

v. Transport of untreated wastes to another treatment facility.

(c) Ecology is properly notified of the bypass as required in Condition S9E (Noncompliance Notification).

3. If bypass is anticipated and has the potential to result in noncompliance with this general permit.

(a) The Permittee must notify Ecology at least 30 days before the planned date of bypass. The notice must contain:

i. A description of the bypass and its cause.

ii. An analysis of all known alternatives that would eliminate, reduce, or mitigate the need for bypassing.

iii. A cost-effectiveness analysis of alternatives, including comparative resource damage assessment.

iv. The minimum and maximum duration of the bypass under each alternative.

v. A recommendation as to the preferred alternative for conducting the bypass.

vi. The projected date of bypass initiation.

vii. A statement of compliance with SEPA.

viii. A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.

ix. Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

(b) For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report, facility plan, and plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

(c) Ecology will consider the following prior to approving or denying the request:

i. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

ii. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

iii. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. The public must be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by Ecology under RCW 90.48.120.

B. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S11. SOLID WASTE MANAGEMENT

The Permittee must manage all solid waste materials to prevent the release of leachate into waters of the State.

S12. REPORTING FOR INVASIVE SPECIES CONTROL

The Permittee must quarantine a boat/vessel identified as a carrier of any prohibited invasive species (level 1, 2, or 3) listed under Chapter 220-640 WAC or quarantined plants listed in Chapter 16-752 WAC. This list includes zebra mussels and quagga mussels, which represent a significant threat to the integrity of Waters of the State. The permittee must notify the appropriate Washington Fish and Wildlife Regional Office within 24 hours when these species are identified on a vessel. The boat/vessel must not be released, re-launched, pressure washed, or have its bilge pumped until it has been cleared by the U.S. Fish and Wildlife Service or the Washington State Department of Fish and Wildlife.

S13. TERMINATION OF COVERAGE UNDER THIS PERMIT

A. Conditions Required for Ecology Approval

Ecology may approve a Permittee's request for termination of its coverage under this permit when the Permittee meets either condition 1 or 2:

1. All discharges of process wastewater, including pressure-wash wastewater, have been eliminated because the facility no longer generates process wastewater, or the facility has

redirected its process wastewater to a sanitary sewer system operated by a municipality with a delegated pretreatment program, provided the Permittee has received a discharge authorization from the delegated municipality and authorization from all other applicable local sewerage authorities.

AND

All discharges of stormwater runoff from areas with industrial activity have been eliminated because the facility has redirected that stormwater runoff to a sanitary sewer system operated by a municipality with a delegated pretreatment program, provided the Permittee has received a discharge authorization from the delegated municipality and authorization from all other applicable local sewerage authorities.

2. The Permittee sells or otherwise legally transfers responsibility for the industrial activity at the boatyard.

B. Procedure for Obtaining Termination of Coverage

1. The Permittee shall complete a Notification of Termination (NOT) request form provided by Ecology or available from the website at Notice of Termination Request Boatyard General Permit (wa.gov)[7].

   (d) The Permittee shall sign the NOT Request form in accordance with the signatory requirements specified in General Condition G17 (Signatory Requirements).

2. The Permittee shall submit the completed NOT request form to Ecology either:

   (a) Electronically through the Ecology Water Quality Permitting Portal; or

   (b) If Ecology has issued a waiver due to the Permittee's inability to submit electronically, on a paper hardcopy sent to the appropriate address provided in Special Condition S9.E (Noncompliance Notification).

[7] https://apps.ecology.wa.gov/publications/SummaryPages/ECY070549.html

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this general permit must be consistent with the terms and conditions of this general permit. The discharge of any pollutant more frequently than, or at a concentration in excess of that authorized by this general permit, must constitute a violation of the terms and conditions of this general permit.

G2. PROPER OPERATION AND MAINTENANCE

The Permittee must, at all times, properly operate and maintain all facilities or systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

G3. RIGHT OF ENTRY

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

(a) To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit;

(b) To have access to and copy at reasonable times any records that must be kept under the terms of this permit;

(c) To inspect at reasonable times any monitoring equipment or method of monitoring required in this permit;

(d) To inspect at reasonable times any collection, treatment, pollution management, or discharge facilities; and

(e) To sample at reasonable times any discharge of pollutants.

G4. PERMIT COVERAGE REVOKED

Pursuant with Chapter 43.21B RCW and Chapter 173-226 WAC, the Director of Ecology may require any discharger authorized by this permit to apply for and obtain coverage under an individual permit or another more specific and appropriate general permit. Cases where revocation of coverage may be required include, but are not limited to, the following:

(a) Violation of any term or condition of this permit;

(b) Obtaining coverage under this permit by misrepresentation or failure to disclose fully all relevant facts;

(c) Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090;

(d) A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations;

(e) Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC; or

(f) Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable; or Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within 90 days from the time of revocation and is submitted along with a complete individual permit application form.

G5. GENERAL PERMIT MODIFICATION AND REVOCATION

This permit may be modified, revoked and reissued, or terminated in accordance with the provisions of Chapter 173-226 WAC. Grounds for modification or revocation and reissuance include, but are not limited to, the following:

(a) When a change which occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this permit;

(b) When effluent limitation guidelines or standards are promulgated pursuant to the Federal Water Pollution Control Act or Chapter 90.48 RCW, for the category of dischargers covered under this permit;

(c) When a water quality management plan containing requirements applicable to the category of dischargers covered under this permit is approved; or

(d) When information is obtained which indicates that cumulative effects on the environment from dischargers covered under this permit are unacceptable.

G6. REPORTING A CAUSE FOR MODIFICATION

A Permittee who knows, or has reason to believe, that any activity has occurred or will occur which would constitute cause for modification or revocation under Condition G5 (General Permit Modification and Revocation) or 40 CFR 122.62, must report such plans, or such information, to Ecology so that a decision can be made on whether action to modify coverage or revoke coverage under this permit will be required. Ecology may then require submission of a new application for coverage under this, or another general permit, or an application for an individual permit. Submission of a new application does not relieve the Permittee of the duty to comply with all the terms and conditions of the existing permit until the new application for coverage has been approved and corresponding permit has been issued.

G7. TOXIC POLLUTANTS

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G8. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this general permit by reference.

G9. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit excuses the Permittee from compliance with any applicable Federal, State, or local statutes, ordinances, or regulations.

G10. ADDITIONAL MONITORING

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G11. PAYMENT OF FEES

The Permittee must submit payment of fees associated with this permit as assessed by Ecology. Ecology may revoke this permit coverage or take enforcement, collection, or other actions, if the permit fees established under Chapter 173-224 WAC are not paid.

G12. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater must not be re-suspended or reintroduced for discharge to State waters.

G13. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER A GENERAL PERMIT

Any discharger authorized by this general permit may request to be excluded from coverage under this general permit by applying for an individual permit. The discharger must submit to the Director of Ecology an application as described in WAC 173-220-040 or WAC 173-216-070,

whichever is applicable, with reasons supporting the request. These reasons must fully document how an individual permit will apply to the applicant in a way that the general permit cannot. Ecology may make specific requests for information to support the request. The Director will either issue an individual permit or deny the request with a statement explaining the reason for the denial. When an individual permit is issued to a discharger otherwise subject to this general permit, the applicability of this general permit to that Permittee is automatically terminated on the effective date of the individual permit.

G14. DUTY TO REAPPLY

All Permittees covered by this general permit who wish to continue their permitted activities and discharges beyond the expiration date of this general permit must submit a new application for coverage under this general permit, or an application for an individual permit, at least 180 days prior to the expiration date of this general permit. When a Permittee has submitted a timely and sufficient application for the renewal of coverage under this general permit, the expiring general permit remains in effect and enforceable until Ecology:

(a) Denies the application;

(b) Issues a replacement permit; or

(c) Cancels the expired general permit.

Coverage under an expired general permit for Permittees who fail to submit a timely and sufficient application expires on the expiration date of the general permit.

G15. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit will be deemed guilty of a crime, and upon conviction be punished by a fine of up to ten thousand dollars and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation. Any person who violates the terms and conditions of a waste discharge permit incurs, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars for every such violation. Each and every such violation is considered a separate and distinct offense, and in case of a continuing violation, every day's continuance will be deemed to be a separate and distinct violation.

G16. SIGNATORY REQUIREMENTS

(a) All permit applications and requests for permit modification, transfer, or termination must be signed and certified when submitted to Ecology by:

i. In the case of a municipal, State, or other public facility, by either a principal executive officer or ranking elected official.

ii. In the case of a corporation, by a responsible corporate officer of at least the level of vice president.

iii. In the case of a partnership, by a general partner.

iv. In the case of a sole proprietorship, by the proprietor.

(b) All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

i. The authorization is made in writing by a person described above and submitted to Ecology.

ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

(c) Changes to authorization. If an authorization under Paragraph B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Paragraph B.2 above must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) Certification. Any person signing a document under this section must make the following certification:

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G17. APPEALS

The terms and conditions of the boatyard general permit are subject to appeal. There are two different appeal categories.

(a) The permit terms and conditions as they apply to the appropriate class of dischargers are subject to appeal within 30 days of issuance of this general permit in accordance with Chapter 43.21B RCW and Chapter 173-226 WAC; and

(b) The applicability of the permit terms and conditions to an individual discharger are subject to appeal in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that discharger. An appeal of the coverage of the boatyard general permit to an individual discharger is limited to the applicability or non-applicability of the boatyard general permit to that same discharger. Appeal of permit coverage of an individual discharger will not affect the coverage of any other individual dischargers. If the terms and conditions of the boatyard general permit are found to be inapplicable to any discharger(s), the matter will be remanded to Ecology for consideration of issuance of an individual permit or permits.

G18. SEVERABILITY

The provisions of this permit are severable, and if any provision of this general permit or application of any provision of this general permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this general permit, will not be affected thereby.

G19. REPORTING OTHER INFORMATION

When the Permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to Ecology, the Permittee must promptly submit such facts or information.

G20. DUTY TO COMPLY

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and may be grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of permit renewal.

DEFINITIONS

When used in this permit, the following terms have the meanings as given below.

303(d) list means the list of Category 5 waterbodies periodically prepared by Ecology and approved by the U.S. EPA. This list specifies the waters of the State of Washington that are not meeting the water quality standards as given in Chapter 173-201A. This list is available at Assessment of state waters 303d - Washington State Department of Ecology [8]. The list applicable to discharges covered by this permit is the list approved by the U.S. EPA at the time of facility coverage under this permit.

Approved Stormwater Management Manual means a stormwater manual produced by Ecology or the U.S. EPA that contains best management practices appropriate for the discharges covered by this permit. Manuals produced by trade organizations may be approved if reviewed by Ecology, subjected to public comment, and posted on the appropriate Ecology web site.

AKART is an acronym for "all known, available, and reasonable methods of prevention, control, and treatment." AKART represents the most current methods of preventing, controlling, or abating the pollutants associated with a discharge that can be installed or used at a reasonable cost. AKART is a process of engineering and economic decision-making.

Arithmetic average means the sum of a list of numbers divided by the number of numbers in the list.

Benchmark means a pollutant concentration based on performance of source control best management practices (BMPs), treatment BMPs, or water quality criteria. Benchmarks are set to achieve AKART and meet water quality standards. Benchmark as used in this permit allows a period of adaptive management with increasing levels of effort or treatment to comply with the permit values.

Best Management Practices (BMPs) means 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: facility site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage. In this permit BMPs are further categorized as operational source control, structural source control, and treatment BMPs.

Bilge water means water from a boat's bilge spaces, whether single- or double-hulled.

Clean Water Act (CWA) means 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, and 100-4; and 33 USC 1251 et seq.

Composite sample means a homogenous mixture of material that reasonably characterizes the nature or quality of a monitored discharge or environmental medium that varies over time or space. Creation of the sample from a temporally varying source (e.g., a wastewater stream) may involve continuous sampling or collection of discrete samples and their combination on a

[8] https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d.

"time-composited" or "flow-proportional" basis. A time-composited sample consists of identical volumes of wastewater collected from constant time intervals. A flow-proportional sample may consist of a combination of either variable sample volumes, collected over constant time intervals, or constant sample volumes, collected over variable sampling intervals, proportional to the stream flow.

Daily discharge means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for the purposes of sampling. For pollutants with limits expressed as concentration, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Date of coverage means the date that an individual boatyard is authorized to discharge under the conditions of this general permit.

Deconstruction activity means dismantling of a vessel so that no part is left intact or undisturbed or otherwise not impacted, to the extent that it cannot be reconstructed or readily identified as an existing portion of the original hull or superstructure. The vessel is reduced such that it has no value except for its basic material content. Deconstruction Activity does not include disturbance incidental to vessel retrieval.

Discharge [of a pollutant] means any addition of any pollutant or combination of pollutants to waters of the State of Washington from any point source. This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

Discharge Monitoring Report (DMR) is the report that the Permittee must send to Ecology on a periodic basis set by the permit to report on the monitoring requirements of the permit.

Ecology means the Washington State Department of Ecology.

Existing facility means a facility that is not a "new facility."

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

Groundwater means water in a saturated zone or stratum beneath the land surface or a surface waterbody.

Hazardous substance means any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the physical, chemical, or biological properties described in WAC 173-303-090 or 173-303-100.

Hot work means riveting, welding, burning or fire or spark producing operations (29 CFR 1915.4).

Hull means the body or frame of a ship or boat. It is a central concept in water vessels. The hull is essentially what keeps the water from entering the boat and acts as the walls and floor of the vessel.

Illicit discharge means any discharge that is not composed entirely of stormwater except; (1) discharges authorized pursuant to a separate NPDES permit, or (2) conditionally authorized non-stormwater discharges identified in Condition S5.

Industrial activity means any of the activities among (1) The ten categories of industrial activities identified in 40 CFR 122.26 (b) (14) (i to ix; and xi); or (2) any activities identified by Ecology as significant contributors of pollutants. Industrial activities include, but are not limited to: manufacturing; processing; and raw, intermediate, and finished materials handling and storage areas at an industrial plant.

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

(a) Inhibits or disrupts a publicly-owned treatment works (POTW), its treatment processes or operations, or its sludge processes, use, or disposal; and

(b) 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); the Clean Air Act; the Toxic Substances Control Act; and the Marine Protection, Research, and Sanctuaries Act. (40 CFR 403.3)

Leachate means water or other liquid that has been contaminated by dissolved or suspended materials due to contact with a solid material or a gas.

Maximum daily discharge limit means the highest allowable "daily discharge."

Method detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure set forth in Appendix B of 40 CFR Part 136.

Minimum performance standards [for vacuum sanding] means:

(a) Sander or Rotary Tool–

i. 98% dust extraction

i. Suitable for lead abatement work

ii. Electric or air powered

(b) Vacuum –

i. Static water lift = 60 inches minimum

ii. Air flow = 116 cfm minimum

iii. Power = 900 watts minimum

iv. Filter = 1-micron cartridge minimum

(1) Recommended = 5-micron bag filter, plus a 1-micron cartridge filter, plus a 0.5-micron filter

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking, and reissuing, terminating, and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the State from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington State Department of Ecology.

New discharge(r) means a facility from which there is a discharge, that did not commence the discharge at a particular site prior to August 13, 1979, which is not a new source, and which has never received a finally effective NPDES permit for discharges at that site. See 40 CFR 122.2.

New facility means a boatyard facility that begins activities that result in a discharge or a potential discharge to waters of the State on or after the effective date of this general permit.

Non-delegated POTW means a publicly-owned treatment works (POTW) for which Ecology authorizes the industrial discharges to the POTW.

Operational source control BMP means 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. Not included are BMPs that require construction of pollution control devices.

Pass through means a discharge to a publicly-owned treatment works (POTW) which exits the POTW into waters of the United States 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). (40 CFR 403.3)

Permittee means a boatyard facility that has obtained coverage under this general permit.

Pollutant means discarded dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, domestic sewage sludge (biosolids), munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste. This term does not include dredged or fill material discharged in accordance with a permit issued under Section 404 of the Federal Water Pollution Control Act.

Pollution means contamination or other alteration of the physical, chemical, or biological properties of waters of the State; including change in temperature, taste, color, turbidity, or odor of the waters; or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the State as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety, or welfare; or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wild animals, birds, fish, or other aquatic life.

Pressure washing means the use of a water pressure washer to remove paint, grime, or biological growth from the hull of a vessel. Pressure washing includes the practice of mechanical or hand scrubbing and rinsing with low-pressure water from a hose.

Pressure-wash wastewater means the wastewater resulting from pressure washing.

Process wastewater means any water which during manufacturing or processing comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. Stormwater that commingles with process wastewater becomes process wastewater. This definition of process wastewater does not include non-stormwater discharges conditionally approved under Condition S5 (Non-Stormwater Miscellaneous Discharges).

Publicly-Owned Treatment Works (POTW) means a treatment works as defined by Section 212 of the Clean Water Act (CWA), which is owned by a state or municipality (as defined by Section 502(4) of the CWA). This definition includes any devices and systems used in the storage, treatment, recycling, or reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW. The term also means the municipality, as defined in Section 502(4) of the CWA, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

Puget Sound Sediment Cleanup Site means Category 4B (Sediment) portions of Budd Inlet (Inner), Commencement Bay (Inner), Commencement Bay (Outer), Dalco Passage and East Passage, Duwamish Waterway (including East and West Waterway), Eagle Harbor, Elliot Bay, Hood Canal (North), Liberty Bay, Rosario Strait, Sinclair Inlet, and Thea Foss Waterway; Category 5 (Sediment) portions of the Duwamish Waterway; Category 4A (Sediment) portions of Bellingham Bay (Inner); and the Everett/Port Gardener and Port Angeles Harbor sediment cleanup areas, as mapped on Ecology's BYGP website.

Reasonable potential means a process in which an effluent is projected or calculated to cause an excursion of a water quality criterion at the point of compliance in the receiving water based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

Receiving water means the waterbody at the point of discharge. If the discharge is to a stormwater conveyance system, either surface or subsurface, the receiving water is the waterbody into which the stormwater conveyance system discharges.

Representative [sample] means a sample of the discharge that accurately characterizes stormwater runoff generated in the designated drainage area of the facility.

Responsible Corporate Officer means either:

(a) 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

(b) The manager of one or more manufacturing, production, or operating facilities, provided:

i. The manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations and initiating

and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations;

ii. The manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and

iii. Where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 CFR 122.22)

Runoff means that portion of rainfall or snowmelt water not absorbed into the ground that becomes surface flow.

Sediment means the fragmented material that originates from the weathering and erosion of rocks, unconsolidated deposits, or unpaved yards, and is transported by, suspended in, or deposited by water.

Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

Significant amount means an amount of a pollutant in a discharge that is amenable to AKART; or an amount of a pollutant that has a reasonable potential to cause a violation of surface or groundwater quality standards or sediment management standards.

Significant contributor of pollutant(s) means a facility determined by Ecology to be a contributor of a significant amount of pollutant(s) to waters of the State.

Significant process change means any modification of the facility that would:

(a) Add different pollutants of a significant amount to the discharge; or

(b) Increase the pollutants in the stormwater discharge by a significant amount; or

(c) Add a new industrial activity (SIC) that was not previously covered; or

(d) Add additional impervious surface or acreage such that stormwater discharge volume would be increased by 25% or more; or

(e) Change significantly the frequency of an activity from that specified on the application for coverage of this permit.

Source control BMP means operational activities, or physical, structural, or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater.

Sheet flow means runoff which flows over the ground surface as a thin, even layer, and not concentrated in a channel.

SIC means the U.S. Standard Industrial Classification code assigned to businesses by the U.S. Department of Labor. SIC codes are being replaced by the NAICS code system.

Site means the location of the activity that is defined as a boatyard (see Condition S1.A).

Solid waste means all putrescible and non-putrescible solid and semisolid wastes, including but not limited to garbage, rubbish, ashes, industrial wastes, swill, demolition and construction wastes, abandoned vehicles or parts thereof, and discarded commodities. This includes all liquid, solid, or semisolid materials which are not the primary products of public, private, industrial, commercial, mining, or agricultural operations. Solid waste includes but is not limited to sludge from wastewater treatment plants, septage from septic tanks, wood waste, dangerous waste, and problem wastes.

Staging area means an industrial area where materials, including trucks, boats, autos, and other heavy equipment, are temporarily placed for convenience before or immediately following work activities.

Storm drain means an engineered opening for stormwater to enter a storm sewer system.

Storm sewer means a sewer that is specifically designed to carry stormwater.

Stormwater runoff means 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 waterbody or a constructed infiltration facility.

Superstructure means the structure consisting of the part of a vessel above the main deck.

SWMM means Ecology's *Stormwater Management Manual for Western Washington* (July 2019, Ecology Publication Number 19-10-021) and *Stormwater Management Manual for Eastern Washington* (August 2019, Ecology Publication Number 18-10-044).

Stormwater Pollution Prevention Plan (SWPPP) means a written plan to implement measures to identify, prevent, and control the contamination from point source discharges of stormwater.

Structural source control BMPs means physical, structural, or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater.

Substantially identical discharge point means a discharge point that shares all the following characteristics with another discharge point:

(a) The same general industrial activities conducted in the drainage area of the discharge point.

(b) The same type of exposed materials located in the drainage area of the discharge point that are likely to be significant contributors of pollutants to stormwater discharges.

(c) The same type of impervious surfaces in the drainage area that could affect the percolation of stormwater runoff into the ground (e.g., asphalt, crushed rock, grass).

(d) The same best management practices conducted in the drainage area of the discharge point.

Topside means that part of a vessel above the wales (horizontal members that aid in wall/form reinforcement and distribution of forces).

Tidal grid means a series of wooden or concrete beams laid on tidal land near the high tide line. The grid is used with blocking to support the boat during low tide. Tidal grids should be used only for emergency work on the hull or steering mechanism, and not for refinishing hull paint.

Treatment BMP means best management practices that are intended to remove pollutants from stormwater.

Turbidity means the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through a water sample. Turbidity in water is caused by suspended matter, such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, and plankton and other microscopic organisms.

Upset means:

(a) An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits due to 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, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of Paragraph (3) of this definition are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is a final administrative action subject to judicial review.

(c) Conditions necessary for a demonstration of upset. A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i. An upset occurred and that the Permittee can identify the cause(s) of the upset;

ii. The permitted facility was at the time being properly operated;

iii. The Permittee submitted notice of the upset as required in 40 CFR 122.41(1)(6)(ii)(B)
(24-hour notice); and

iv. The Permittee complied with any remedial measures required in the permit.

(d) Burden of proof. In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof. (40 CFR 122.41(n))

Vacuum sanding means:

(a) Sander or Rotary Tool

i. 98% dust extraction

ii. Suitable for lead abatement work

iii. Electric or air powered

(b) Vacuum

i. Static water lift = 60 inches minimum

ii. Air flow = 116 cfm minimum

iii. Power = 900 watts minimum

iv. Filter = 1-micron cartridge minimum

(1) Recommended filtration = 5-micron bag filter, plus a 1-micron cartridge filter, plus a 0.5-micron filter

Visual monitoring means an inspection by the Permittee of the permitted facility to determine, to the extent that can be determined visually, that BMPs are in place and effective at controlling pollutants in stormwater runoff. Visual monitoring includes observations to detect the presence of an oil sheen in stormwater runoff.

Water quality standards means the Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC; Ground Water Quality Standards (Chapter 173-200 WAC); Sediment Management Standards (Chapter 173-204 WAC); and human health-based criteria in the National Toxics Rule (40 CFR 131.36).

Water's edge means the ordinary high water mark (freshwater), or the mean higher high tide level (marine water).

Waters of the State means 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.

DEPARTMENT OF ECOLOGY
State of Washington

Small Business Economic Impact Analysis

Boatyard General Permit

National Pollutant Discharge Elimination System
and State Waste Discharge Permit

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Small Business Economic Impact Analysis

Boatyard General Permit

National Pollutant Discharge Elimination System and State Waste Discharge General Permit

by

Shon Kraley, Ph.D.

for the

Water Quality Program

Washington State Department of Ecology

Olympia, Washington

Table of Contents

List of Tables

List of Acronyms

AKART	All known, available, and reasonable methods of prevention, control, and treatment
BMP	Best Management Practices
EIA	Economic impact analysis
EPA	United State Environmental Protection Agency
MSD	Marine sanitation device
NMTA	Northwest Marine Trade Association
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and maintenance
PCHB	Pollution Control Hearings Board
POTW	Publicly owned treatment works
PSA	Puget Soundkeeper Alliance
RCW	Revised Code of Washington
SBEIA	Small Business Economic Impact Analysis
SPECP	Spill prevention and emergency cleanup plan
SWPPP	Stormwater pollution prevention plan
TMDL	Total maximum daily load
WAC	Washington Administrative Code

Executive Summary

This Small Business Economic Impact Analysis (SBEIA) estimates the costs of complying with the Boatyard General Permit ("permit"). It compares the costs of complying with the permit for small businesses to the costs of complying for the largest 10 percent of businesses, to determine whether the permit disproportionately impacts small businesses. This analysis is required by state rule in Washington Administrative Code (WAC) 173-226-120, which directs Ecology to determine if the permit imposes disproportionate burden on small businesses, and if it does, to mitigate the disproportion to the extent that is legal and feasible.

The type of work done in boatyards (build, repair, and paint boats) releases pollutants that may be carried by stormwater or wastewater into ground water and surface waters. This stormwater and process wastewater contains pollutants, which are very harmful to the environment. The Boatyard General Permit regulates stormwater and wastewater discharges from boatyards to groundwater and surface water bodies.

A boatyard, as defined for the purposes of this permit, is a commercial business engaged in the construction, repair, and maintenance of small vessels, 85 percent of which are 65 feet or less in length, or revenues from which constitute more than 85 percent of gross receipts. This definition includes mobile boatyards.

Services typically provided in a boatyard include, but are not limited to:

- Pressure washing hulls
- Painting and coating
- Engine and propulsion systems repair and replacement
- Hull repair
- Joinery
- Bilge cleaning
- Fuel and lubrication systems repair and replacement
- Welding and grinding of hulls
- Buffing and waxing
- Marine sanitation device (MSD) repair and replacement
- Other activities necessary to maintain a vessel

The costs for boatyards to comply with the draft general permit depend on the size of the boatyard. While it seems appropriate to assume that boatyards that are smaller in geographic size will be those with fewer employees, from comments received on previous versions of the permit, this is not always the case. In this chapter, Ecology estimated ranges of costs for most requirements - a low cost and a high cost. The low cost estimate is for small boatyards and the high cost estimate is for large boatyards. Some requirements have the same cost for small and large boatyards, while other costs are presented as a range.

The table below presents the total costs of compliance for boatyards under the draft General Permit for Boatyards.

Table i: Total Compliance Costs

Requirements	Small Boatyards		Large Boatyards	
	Low	High	Low	High
STORMWATER TREATMENT TECHNOLOGY	$23,161	$62,079	$46,322	$124,162
MONITORING				
Stormwater- Copper, Zinc Lead	$2,465	$2,465	$4,928	$4,928
Stormwater- Visual Monitoring	$1,200	$1,200	$2,400	$2,400
BEST MANAGEMENT PRACTICES				
Vacuum sander	$3,261	$3,261	$3,261	$3,261
Tidal grids	$0	$0	$0	$0
In-water vessel maintenance repair	$69	$344	$172	$1,374
Upland vessel maintenance repair	$69	$344	$172	$1,374
Solids management	$2,526	$5,618	$5,618	$21,080
Paint and solvent use	$69	$344	$172	$1,374
Oils and bilge water management	$109	$109	$438	$438
Sacrificial anode (zincs) management	$55	$55	$109	$109
Chemical management	$172	$172	$172	$172
Wash pad decontamination	$37	$3,425	$77	$6,839
Sewage and gray water discharges	$0	$0	$0	$0
REPORTING				
Stormwater	$138	$138	$138	$138
ANNUALIZED TOTALS	$33,330	$79,553	$63,979	$167,652

Table ii below, shows the cost range per employee for small and large businesses.

Table ii: Cost per Employee for Small and Large Businesses

Estimate	Small Businesses	Large Businesses
Average number of employees	9.1	150
Low Estimate	$3,663	$427
High Estimate	$8,742	$1,118

While the capital costs are based on geographic scale of the boatyard, which is not universally associated with the number of employees, it is likely that the costs of compliance with the draft permit are disproportional.

In general, the impact of the draft general permit on small boatyards cannot be mitigated significantly. Because most boatyards are small businesses, the economic impact of the draft general permit on small boatyards cannot be reduced without reducing the effectiveness of the permit in controlling water pollution

Ecology has determined there is no opportunity to significantly reduce the costs of this permit to small businesses.

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Chapter 1: Introduction to the Economic Impact Analysis

This Small Business Economic Impact Analysis (SBEIA) estimates the costs of complying with the Boatyard General Permit ("permit"). It compares the costs of complying with the permit for small businesses to the costs of complying for the largest 10 percent of businesses, to determine whether the permit disproportionately impacts small businesses. This analysis is required by state rule in Washington Administrative Code (WAC) 173-226-120, which directs Ecology to determine if the permit imposes disproportionate burden on small businesses, and if it does, to mitigate the disproportion to the extent that is legal and feasible.

1.1 Scope

WAC 173-226-120 requires the SBEIA to include:

- A brief description of the compliance requirements of the general permit.
- The estimated costs of complying with the permit, based on existing data for businesses intended to be covered under the general permit, including:
    - The minimum technology based treatment requirements identified as necessary under WAC 173-226-070.
    - The monitoring requirements contained in the general permit.
    - The reporting and recordkeeping requirements.
    - Plan submittal requirements.
    - Equipment.
    - Supplies.
    - Labor.
    - Increased administrative costs.
- A comparison, to the greatest extent possible, of the cost of compliance for small businesses with the cost of compliance for the largest ten percent of businesses intended to be covered under the permit.
- A summary of how the permit provides mitigation to reduce the effect on small businesses (if a disproportionate impact is expected), without compromising the mandated intent of the permit.

1.2 Definitions of small and large businesses

For the purposes of the SBEIA, a small business is an independent entity with 50 or fewer employees. Government enterprises are excluded. Employment is typically based on the highest available level of ownership data.

1.3 Permit Coverage

The type of work done in boatyards (build, repair, and paint boats) releases pollutants that may be carried by stormwater or wastewater into ground water and surface waters. This stormwater and process wastewater contains pollutants which are very harmful to the environment. The Boatyard General Permit regulates stormwater and wastewater discharges from boatyards to groundwater and surface water bodies.

A boatyard, as defined for the purposes of this permit, is a commercial business engaged in the construction, repair, and maintenance of small vessels, 85 percent of which are 65 feet or less in length, or revenues from which constitute more than 85 percent of gross receipts. This definition includes mobile boatyards.

Services typically provided in a boatyard include, but are not limited to:

- Pressure washing hulls
- Painting and coating
- Engine and propulsion systems repair and replacement
- Hull repair
- Joinery
- Bilge cleaning
- Fuel and lubrication systems repair and replacement
- Welding and grinding of hulls
- Buffing and waxing
- Marine sanitation device (MSD) repair and replacement
- Other activities necessary to maintain a vessel

There are currently, in Washington State, about 63 boatyard facilities covered by the boatyard general permit.

1.3.1 History of the permit

Task P-20 of the Puget Sound Water Quality Authority Plan, directed Ecology to carry out a program to detect and identify unpermitted discharge sources. Under this program, the Elliott Bay and Lake Union Urban Bay Action Teams found a significant unpermitted point source discharge - the boatyard industry.

Memorandum of Agreement with the Environmental Protection Agency
In 1990, Ecology signed a Memorandum of Agreement with the Environmental Protection Agency (EPA) agreeing to develop and issue a general permit for small shipyards. During the development of the permit, Ecology decided to describe facilities in this segment of the Ship and Boat Building and Repairing industry as boatyards. Shipyards receive individual permits. A

general permit for boatyards was issued in 1992, reissued in 1997, 2005, 2011, and 2016 (current permit). The 2005 permit was modified in 2006 to correct an error.

Appeal of 2005 and 2006 permit modification
The Northwest Marine Trade Association (NMTA) and the Puget Soundkeeper Alliance (PSA) appealed the 2005 permit and 2006 permit modification. The Pollution Control Hearings Board (PCHB) heard the appeal in July 2006, and they issued a decision in January 2007. The NMTA and PSA then appealed the PCHB decision to Superior Court.

Draft permit submitted by NMTA and PSA
In 2008, environmental consultants ARCADIS performed a general economic analysis to estimate the cost of installing the treatment devices. In August 2008, the NMTA and PSA sent a draft permit to Ecology that they said was mutually acceptable. The draft permit was released for public comment in November 2008. The draft contained benchmarks for copper and zinc that were based on the pilot study performance of multimedia filtration in the treatment of boatyard stormwater. Ecology believes the benchmarks in the 2008 draft permit were achievable only with stormwater treatment.

2011 Permit Revisions
In the period since the release of the 2008 draft, several boatyards have installed multimedia filtration stormwater treatment devices. The data from these were combined with the pilot test data from the boatyards and Pacific Fishermen pilot test to derive new benchmarks.[1] The data are presented in Appendix C of the April 21, 2010, fact sheet, which is available on the Ecology boatyard web site.[2] The benchmarks were calculated in the same manner as the effluent limit derivation presented in the U.S. EPA Technical Support Document.[3] The copper data were not normally distributed, so they were transformed by the log normal transformation to derive benchmarks. The zinc data were normally distributed after removal of the outliers. Since lead in treated effluent was typically at or below a measureable concentration, no benchmarks were calculated. The 2011 permit did continue to require monitoring for lead in boatyards that discharge stormwater to unimpaired waterbodies.

1.3.2 Discharge limitations in the draft permit

Discharging pressure wash wastewater to delegated or non-delegated publicly owned treatment works
Boatyards may discharge treated pressure wash wastewater to a municipal sanitary sewer, in accordance with effluent limitations and a monitoring schedule and upon acceptance of the municipality. The boatyard cannot introduce into the publicly owned treatment works (POTW)

[1] CH2M Hill, 2008.
[2] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Boatyard-general-permit
[3] U.S. EPA, 1991.

any pollutant(s), which cause Pass Through, Upset or Interference.[4] Boatyards cannot dilute the wastewater discharge with stormwater or attempt to dilute an effluent as a substitute for adequate treatment.

Discharging stormwater to a non-delegated publicly owned treatment works
Boatyards may discharge stormwater to a non-delegated POTW only with special approval from Ecology. They must also demonstrate:

- There is no other feasible option.
- The POTW has excess wet season hydraulic capacity.
- The POTW is willing to accept the discharge.
- How the hydraulic loading to the POTW will be reduced by eliminating clean water.
- All applicable Best Management Practices (BMPs) are practiced routinely.

Discharge limits and monitoring requirements are the same for stormwater as for pressure wash wastewater, unless the POTW has more stringent monitoring requirements.

Discharging treated pressure wash wastewater or stormwater to a delegated POTW
Boatyards may discharge pressure wash wastewater or stormwater to a sanitary sewer system operated by a municipality with a delegated pretreatment program provided they receive discharge authorization from the municipality. The municipality will determine limitations, monitoring and reporting requirements, which are expected to be at least as stringent as the requirements of the draft permit. Boatyards must also comply with any applicable sewer use ordinances adopted by the municipality.

Discharging stormwater to waters of the state
All boatyards must manage stormwater discharges to prevent:

- The discharge of synthetic, natural, or processed oil.
- The discharge of floating materials.
- A visible change in turbidity or color in the receiving water.
- The discharge of process wastewater.

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[4] **Pass Through**- A discharge to a POTW which exits the POTW into waters in quantities or concentrations in violations of the POTW's permit.
Upset- An incident where there is an unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the boatyard.
Interference- A discharge which inhibits or disrupts the POTW and is therefore a cause of a violation of any requirement of the POTW's permit or of the prevention of sewage sludge use or disposal.

Boatyards have specific limitations and/or benchmarks listed in the draft permit depending on location or status. They are:

- Boatyards discharging stormwater to other fresh and marine waters.
- Boatyards discharging stormwater to an infiltration basin lined with absorptive media.
- New and existing dischargers discharging stormwater to 303(d)-listed impaired waters before a total maximum daily load (TMDL) study and allocation.

Some of these limitations for surface discharges are more stringent than the current permit. The specific limitations are discussed below in the monitoring section.

Boatyards must comply with:

- Washington State surface water quality standards (Chapter 173-201A WAC)
- Sediment management standards (Chapter 173-204 WAC)
- Ground water quality standards (Chapter 173-200 WAC)
- Human health-based water quality criteria in the National Toxics Rule (40 CFR 131.36)

1.3.3 Mandatory best management practices

Boatyards must ensure that all individuals at the facility implement the following mandatory best management practices (BMPs) as well as any BMPs included in the boatyard's stormwater pollution prevention plan (SWPPP). Specific requirements for the mandatory BMP's can be found in S3 of the Permit. The mandatory BMPs include:

- Use of vacuum sander and grinders
- Tidal grid restriction
- In-water vessel maintenance repair
- Upland vessel maintenance and repair
- Solids Management
- Paint and solvent use
- Oils and bilge water management
- Sacrificial anode (zincs) management
- Chemical management
- Wash pad decontamination
- Sewage and gray water discharges
- Dry Dock and Graving Dock use

1.3.4 Monitoring and sampling requirements

The monitoring requirements outlined in the table below are similar to the current permit. Samples must be collected from location(s) affected by boatyard related activities.

Table 1: Monitoring and Sampling Requirements

Category	Parameter	Minimum Sampling Frequency
Pressure washer wastewater or stormwater runoff to non-delegated POTWs	Total copper, zinc, lead, and pH	One time in each of the months of June, July, August, and September
Stormwater discharges from areas with industrial activity to surface waters	Turbidity, pH, Oil Sheen, Petroleum Hydrocarbon, Total copper, and zinc	Once in each of the months of October, November, January, March, April, and May
	Visual monitoring	Once a week
Stormwater discharges from areas with industrial activity to Ground waters	Total Copper and Zinc	Once in each of the months of October, November, January, March, April, and May
Stormwater discharges from areas with industrial activity to 303(d) listed surface waters	pH, total suspended solids, total copper, lead, and zinc	Once in each of the months of October, November, January, March, April and May

Boatyards must sample stormwater according to the permit instructions unless Ecology approves an alternative plan. The boatyard must follow the sampling requirements below but is not required to sample outside regular business hours or when it is unsafe.

- The boatyard may take:
  - A grab sample.
  - A time-proportionate sample.
  - A flow proportionate sample.
- Boatyards must take all samples when it is reasonable and safe.
- During a given sampling period, permittees must collect samples within the first 12 hours of stormwater discharge events.
- Boatyards collect samples to capture stormwater with the greatest exposure to significant sources of pollution. If offsite discharging points are likely to result in different concentration or types of pollutants, each point must be separately sampled and analyzed. If discharge points do not vary, sampling may occur only at the discharge point with the highest concentration.

- Besides visual monitoring, a boatyard is only required to sample once per month and use its best efforts to achieve the storm event sampling criteria.

1.3.5 Required analytical procedures

Sampling and analytical methods used to meet the water and wastewater monitoring requirements specified in the permit must conform to the latest version of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136.

1.3.6 Laboratory accreditation

All monitoring data required by Ecology, in the permit or by order, must be prepared by a laboratory registered or accredited under the provisions of, *Accreditation of Environmental Laboratories*, Chapter 173-50 WAC.

1.3.7 Stormwater Pollution Prevention Plan (SWPPP)

New and existing owners of every boatyard covered by the boatyard general permit must prepare and maintain a Stormwater Pollution Prevention Plan (SWPPP) specifically designed for their boatyard. The SWPPP must be:

- Consistent with permit requirements.
- Fully implemented before operating.
- Updated as necessary to maintain compliance with permit conditions.

The SWPPP must include BMPs necessary to meet the indicated benchmarks.

The SWPPP must document the:

- Technical basis for how stormwater BMPs were selected.
- Pollutant removal performance expected from the BMP selected.
- Technical basis that support the performance claims for the BMPs selected.

The SWPPP must also provide an assessment of how each of the selected BMPs will:

- Comply with state water quality standards.
- Satisfy the state all known, available, and reasonable methods of prevention, control, and treatment (AKART) requirements and the federal technology-based treatment required under 40 CFR Part 125.3.

At minimum, the SWPPP must include:

- Facility assessment
- Monitoring plan
- BMPs
- Measures taken to identify and eliminate illicit discharges

Many BMPs are common to all boatyards and the categories listed below are a minimum set of BMPs that must be included in the SWPPP:

- Operational source control
- Structural source control
- Pollution prevention team
- Good housekeeping
- Preventive maintenance
- Spill prevention and emergency cleanup plan (SPECP)
- Employee training
- Oversight of Do-It-Yourselfers and Independent Contractors
- Notification of vessel owner of prohibited discharges
- Inspections and recordkeeping
- Decontamination documentation
- Illicit discharges
- Vessel deconstruction BMPs

1.3.8 Reporting and recordkeeping

The draft general permit sets requirements for reporting and recordkeeping.

Reporting
Boatyards must:

- Submit monitoring results according to the minimum sampling frequencies specified in the permit.
- Submit all data collected to Ecology. Electronic submittal is strongly encouraged.[5]
- Summarize and report data collected during the previous month or sample period.
- Use the Discharge Monitoring Report form provided by Ecology.

Records retention
Boatyards must retain records of all monitoring information for a minimum of five years. Such records shall include:

1. A copy of this permit.

[5] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

2. A copy of the permit coverage letter.
3. Records of all sampling information specified in Condition S9.C.
4. Inspection reports including documentation specified in Condition S6. E.
5. Any other documentation of compliance with permit requirements.
6. All equipment calibration records.
7. All BMP maintenance records.
8. All original recordings for continuous sampling instrumentation.
9. Copies of all laboratory reports as described in Condition S6.D.
10. Copies of all reports required by this permit.
11. Records of all data used to complete the application for this permit.

Recording of results
For each measurement or sample taken, the boatyard must record all of the following:

1. Date, exact place, method, and time of sampling.
2. The individual who performed the sampling or measurement.
3. Dates the analysis were performed.
4. Name of the person(s) who performed the analyses.
5. The analytical techniques or methods used.
6. The results of the analysis.

Results from additional monitoring
If the boatyard monitors any pollutant with more frequency than required using test procedures that conform to the latest version of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136, then the results must be included in the calculation and data they submit in the discharge monitoring report.

Discharges to a delegated municipal; sanitary sewer system
Boatyards who discharge treated pressure wash wastewater to a delegated municipal sanitary sewer system must maintain records of their contractual agreement with the municipality, including conditions of discharge. These records must be available for inspection.

1.3.9 Bypass

Bypass is the intentional diversion of waste streams from any portion of a treatment facility. It is illegal to use this practice for stormwater events unless it meets the approved design criteria for stormwater management. Ecology may take enforcement action unless one of the following circumstances applies:

1. Bypass for Essential Maintenance without the Potential to Cause Violation of Permit Limits or Conditions. Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limits or other conditions of this general permit,

or adversely impact public health as determined by Ecology before the bypass. The Permittee must submit prior notice, if possible, at least 10 days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance with this general permit. This bypass is permitted only if all three of the following conditions are met:
    a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage.
    b. No feasible alternatives to the bypass exist.
    c. Ecology is properly notified of the bypass as required in Condition S9E (Noncompliance Notification).
3. If bypass is anticipated and has the potential to result in noncompliance with this general permit. The Permittee must notify Ecology at least 30 days before the planned date of bypass.

1.3.10 Solid waste management

The boatyard must manage all solid waste materials to prevent release of leachate into waters of the state. Leachate is defined as water or other liquid that has been contaminated by dissolved or suspended materials due to contact with solid waste or gases.

1.3.11 Reporting for zebra/quagga mussel control

Boatyards who identify a vessel as a carrier of zebra/quagga mussels must quarantine the vessel and notify the appropriate Washington Fish and Wildlife Regional Office within 24 hours.[6] The vessel must not be released, re-launched, pressure washed, or have its bilge pumped until it has been cleared by the U.S. Fish and Wildlife Services or the Washington State Department of Fish and Wildlife.

1.4 Excluded costs

This SBEIA does not include the costs of complying with existing laws and rules, as permittees would be required to comply with requirements regardless of whether the permit reiterated or referenced them, or if the permit did not exist. Costs excluded from all SBEIAs include the costs of complying with:

- State ground water quality standards (WAC 173-200).
- State surface water quality standards (WAC 273-201A).
- State sediment management standards (WAC 173-204).

[6] https://wdfw.wa.gov/about/regional-offices

- Wastewater discharge permit fees (WAC 173-224).
- Federal laws and rules, including but not limited to the Clean Water Act and federal National Pollutant Discharge Elimination System (NPDES) regulations if discharging to surface waters.

1.5 Compliance costs included in the SBEIA

According to WAC 173-226-120, the EIA must estimate the costs of the following:

- Minimum treatment technology
- Monitoring
- Reporting
- Recordkeeping
- Plan submittal
- Equipment
- Supplies
- Labor
- Administrative costs

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Chapter 2: Costs of Compliance with the General Permit

The costs for boatyards to comply with the draft general permit depend on the size of the boatyard. While it seems appropriate to assume that boatyards that are smaller in geographic size will be those with fewer employees, from comments received on previous versions of the permit, this is not always the case. In this chapter, Ecology estimated ranges of costs for most requirements - a low cost and a high cost. The low cost estimate is for small boatyards and the high cost estimate is for large boatyards. Some requirements have the same cost for small and large boatyards, while other costs are presented as a range.

Most of the major assumptions used to estimate compliance costs are in this chapter. In particular, assumptions used to estimate capital costs are included. Capital costs and their associated operation and maintenance (O&M) costs are annualized to compare them to the services boatyards provide annually.

It is necessary to annualize costs because some costs are annual (incurred every year), while other costs are capital costs (incurred once). For example, installing a stormwater treatment technology is a one-time capital cost, while recordkeeping includes annual costs that must be incurred every year. In addition, some of the treatment options have different project life expectations and therefore it is necessary to annualize costs to compare them.

2.1 Meeting discharge limits

The draft general permit proposes benchmark/limits for copper, lead, pH, and zinc for stormwater discharges to waters of the state. To meet these benchmarks, each boatyard will need to employ source control BMP's and likely install a stormwater treatment technology.[7] For a detailed discussion of the costs associated with implementing this technology, please see Ecology publication no. 10-10-018.[8]

Ecology estimates the range of annualized costs for installing stormwater treatment technology at $23,161 to $62,079 for small boatyards and $46,332 to $124,162 for large boatyards.[9]

[7] While current permittees will have already installed the necessary technology, these costs are included because potential new permittees will have to incur them in order to comply.

[8] *Economic Impact Analysis AKART Analysis: Draft National Pollutant Discharge Elimination System (NPDES) Wastewater Discharge General Permit for Boatyards* Washington State Department of Ecology, Publication no. 10-10-018. https://fortress.wa.gov/ecy/publications/summarypages/1010018.html

[9] Values taken from Ecology publication no. 10-10-018 and adjusted by inflationary factor of 19.9% for period of 2009 to 2020 based on the GDP deflator.

2.2 Monitoring and analysis costs

Monitoring requirements are specific to the type of stormwater or wastewater treatment and disposal methods used by the permit holder. Samples must be monitored and analyzed according to the general permit. We assume large boatyards will have twice the number of monitoring points that small boatyards have. The draft general permit requires boatyards to monitor:

- Wastewater discharges to a POTW from pressure washing.
- Stormwater discharges to waters of the state.

2.2.1 Wastewater discharged to sanitary sewers from pressure washing

Monitoring pressure washer wastewater discharged to a POTW is a federal pretreatment requirement and therefore is exempt from the analysis of this permit.

2.2.2 Stormwater discharged to waters of the state

Stormwater discharged to waters of the state must be monitored at all boatyards. Samples must be collected from a location or locations affected by boatyard related activities. Based on comments received of the skill level of employees and public yards having to pay the prevailing wage, Ecology assumes a wage rate of $46.15 per hour.[10] The costs for monitoring and analyzing stormwater for large boatyards are assumed to be twice as large as small boatyards. Costs for small boatyards are shown in the following table:

Table 2: Total Costs for Stormwater Monitoring

Category	Parameter	Hours	Minimum Monitoring	Cost of Analysis	Annual Cost
Stormwater	Turbidity, pH, Oil Sheen, Petroleum Hydrocarbon, Total copper, zinc, and lead	5	Once in each of the months of October, November, January, March, April, and May	$180	$2,465
Stormwater	Visual Monitoring	0.5	1/week	$0	$1,200

[10] Washington State Department of Labor & Industries- Prevailing Wage Rates for Public Works Contracts for Shipbuilding & Ship Repair in King County – https://secure.lni.wa.gov/wagelookup/

Category	Parameter	Hours	Minimum Monitoring	Cost of Analysis	Annual Cost
Non Stormwater Misc. Discharges	Copper, Total Zinc, Total	Nobody is currently reporting they have these	1/month		$0
Total Costs	**$3,664**				

Monitoring costs for large boatyards will be twice that of small boatyards or $7,328.

2.3 Stormwater Pollution Prevention Plan

Every boatyard covered by the draft boatyard general permit must prepare a Stormwater Pollution Prevention Plan (SWPPP) specifically designed for their boatyard. Each SWPPP must include the BMPs necessary to meet the benchmarks or limits in the draft general permit. The SWPPP is a requirement of EPA Multisector Stormwater General Permit and therefore exempt from this analysis as a federal requirement. Additionally, the BMPs listed in the EPA's Multisector Stormwater General Permit are exempt from analysis. However, the additional BMPs that are mandatory for all boatyards in Washington but are not required by EPA must be included in this analysis.

2.3.1 Federal BMPs exempt form analysis

1. Pollution prevention team
2. Good housekeeping
3. Preventive maintenance
4. Spill prevention and emergency cleanup
5. Employee training
6. Inspections and recordkeeping

2.3.2 BMPs Included in analysis

1. **Use of a vacuum sander**- Boatyards must use a vacuum sander or rotary tool meeting minimum performance standards for all paint removal where a sander is appropriate. Boatyards may recover the costs of this equipment by renting the units to people refinishing their own boats.

2. **Tidal grids**- Boatyards are allowed to use tidal grids only for emergency repair and marine surveying. They cannot use tidal grids for surface preparation, painting, routine maintenance, or other non-emergency uses. This requirement has zero cost.

3. **In-water vessel maintenance repair**- Boatyards cannot clean, repair, modify, prepare surfaces, or coat a vessel's hull while the vessel is afloat. Repairs, modifications, surface preparation, or coating of topside or superstructure is limited to 25 percent of the topside or superstructure surface. Equipment required: drop cloths, tarpaulins, drapes, shrouding or other protective devices.

4. **Upland vessel maintenance repair**- Boatyards must collect and manage material from maintenance and repair to prevent their release into the environment and entry into waters of the state. Equipment required: drop cloths, tarpaulins, structures, drapes, shrouding or other protective devices.

5. **Solids management**- Boatyards should cleanup debris and paint a minimum of once a day when solid-generating activity is occurring. Boatyards must install sediments traps in all storm drains to intercept and retain solids before being discharged.

6. **Paint and solvent use**- Boatyards should use paints and solvents in a manner that prevents their release into the environment and entry into waters of the state. Equipment required: drip pans, drop cloths, tarpaulins or other protective devices.

7. **Oils and bilge water management**- Boatyards must not discharge Hydraulic fluids, oily wastes and petroleum products in to waters of the state. Bilge water discharges must not cause any visible sheen in waters of the state. Large boatyards typically use an oil water separator,[11] while small boatyards will let bilge water set for separation in a large drum.

8. **Sacrificial anode (zincs) management**- Boatyards must not dispose of Zincs into the water and they must store spent zinc in a covered container.

9. **Chemical management**- Boatyards must store all chemicals under cover on an impervious surface.

10. **Wash pad decontamination**- Before a boatyard discharges any stormwater from pressure wash pads, they must clean the pad. The pad must then be pressure washed into the collection sump and the sump cleaned of all debris. Depending on how busy the boatyard is and the time of year, this may occur as much as daily or as little as twice a year. This requirement is all labor costs. Ecology assumes a wage rate of $40.19 and that it takes 30 minutes. We assume large boatyards do this twice as often.
    - Small boatyards range: twice a year to every other day (183 days a year)
    - Large boatyards range: four times a year to once a day (365 days a year)

[11] Ecology estimates oil water separators cost $5,000 and last about 15 years. The annualized cost using a 3.19% interest rate is about $400 a year.

11. **Sewage and gray water discharges**- Boatyards must not discharge sewage from boats to the Puget Sound (Chapter 173-228 WAC). This is a requirement of existing state and federal law and therefore, the compliance cost is zero.

The cost estimates for some of these BMPs are taken from the analysis from the original permit and brought up to date by applying a 70.57 percent inflationary factor for 1992-2020.[12,13] The following table shows the total costs for BMPs.

Table 3: Total Costs for Best Management Practices (BMPs)

Best Management Practices (BMP)	Small Boatyards		Large Boatyards	
	Low	High	Low	High
Vacuum sander[14]	$3,261	$3,261	$3,261	$3,261
Tidal grids	$0	$0	$0	$0
In-water vessel maintenance repair	$69	$344	$172	$1,374
Upland vessel maintenance repair	$69	$344	$172	$1,374
Solids management	$2,526	$5,618	$5,618	$21,080
Paint and solvent use	$69	$344	$172	$1,374
Oils and bilge water management	$109	$109	$438	$438
Sacrificial anode (zincs) management	$55	$55	$109	$109
Chemical management	$172	$172	$172	$172
Wash pad decontamination	$37	$3,425	$77	$6,839
Sewage and gray water discharges	$0	$0	$0	$0
Total	$6,367	$13,671	$10,190	$36,023

[12] It is reasonable to expect prices to grow at the same rate as the economy as the technologies needed for the BMPs has not changed drastically and we are not aware of any supply disruptions or significant demand increases in the relevant markets.

[13] U.S. Department of Commerce: Bureau of Economic Analysis. Gross National Product: Implicit Price Deflator. http://research.stlouisfed.org/fred2/data/GNPDEF.txt

[14] See Appendix A of Ecology publication no. 10-10-018 for vacuum sander calculations taken from the 1997 Fact Sheet for NPDES General Permit for Boatyards. Costs were brought up to date by applying a 53.61% inflationary factor for 1997-2020.

2.4 Reporting and recordkeeping costs

2.4.1 Reporting

Boatyards must submit monitoring results in accordance with the minimum sampling frequencies specified in the draft General Permit for Boatyards. All data must be collected and submitted to Ecology. Electronic submission is allowed.

Costs for reporting include labor costs to summarize monitoring results. Ecology assumes that all monitoring done at the same frequency can be reported at the same time. Ecology assumes it takes 30 min at $46.15 per hour wage rate to summarize and prepare the results for reporting. The following table shows the costs for reporting:

Table 4: Total Costs for Monitoring Results Reporting

Type of Monitoring Reported	Hours	Frequency	Annual Cost
Stormwater	0.5	6/year	$138
Total	-	-	$138

2.4.2 Records retention

Boatyards must retain records of all monitoring information for a minimum of five years. The cost of complying with this provision is the cost of storing records. This cost is likely very low or close to zero, particularly as records can be maintained electronically.

2.5 Total compliance costs

This section presents the total costs of compliance for boatyards under the draft General Permit for Boatyards.

Table 5: Total Compliance Costs

Requirements	Small Boatyards		Large Boatyards	
	Low	High	Low	High
STORMWATER TREATMENT TECHNOLOGY	$23,161	$62,079	$46,322	$124,162
MONITORING				
Stormwater- Copper, Zinc Lead	$2,465	$2,465	$4,928	$4,928
Stormwater- Visual Monitoring	$1,200	$1,200	$2,400	$2,400

Requirements	Small Boatyards		Large Boatyards	
	Low	**High**	**Low**	**High**
BEST MANAGEMENT PRACTICES				
Vacuum sander	$3,261	$3,261	$3,261	$3,261
Tidal grids	$0	$0	$0	$0
In-water vessel maintenance repair	$69	$344	$172	$1,374
Upland vessel maintenance repair	$69	$344	$172	$1,374
Solids management	$2,526	$5,618	$5,618	$21,080
Paint and solvent use	$69	$344	$172	$1,374
Oils and bilge water management	$109	$109	$438	$438
Sacrificial anode (zincs) management	$55	$55	$109	$109
Chemical management	$172	$172	$172	$172
Wash pad decontamination	$37	$3,425	$77	$6,839
Sewage and gray water discharges	$0	$0	$0	$0
REPORTING				
Stormwater	$138	$138	$138	$138
ANNUALIZED TOTALS	**$33,330**	**$79,553**	**$63,979**	**$167,652**

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Chapter 3: Relative Compliance Costs for Small and Large Businesses

This chapter compares the annual costs of compliance per employee for small businesses to the compliance cost per employee at the largest ten percent of businesses covered by the permit. The governing rule (WAC 173-226-120) allows for this comparison to be made on one of the following bases:

- Cost per employee.
- Cost per hour of labor.
- Cost per one hundred dollars of sales.

We use cost per employee, because this data is readily and most comprehensively available for businesses operating in Washington State.

3.1 Facility size data

RCW 19.85.020(4) defines a small business as any business entity, including a sole proprietorship, corporation, partnership, or other legal entity, that is owned and operated independently from all other businesses, and that has fifty or fewer employees. There are both small and large businesses in the boatyard industry. We were able to find employment information for 57 of the 63 permitted businesses. Small boatyards average 9.1 employees, and the large boatyards average 150 employees.

The following table shows the number of businesses covered under the current boatyard general permit with 50 or fewer employees, and with more than 50 employees.

Table 6: Average number of employees by business size

Employees	Number of Businesses	Average Employees
50 or Fewer	55	9.1
More than 50	2	150

3.2 Relative costs of compliance

Table 7 below, shows the cost range per employee for small and large businesses.

Table 7: Cost per Employee for Small and Large Businesses

Estimate	Small Businesses	Large Businesses
Low Estimate	$3,663	$427
High Estimate	$8,742	$1,118

While the capital costs are based on geographic scale of the boatyard, which is not universally associated with the number of employees, it is likely that the costs of compliance with the draft permit are disproportional.

Chapter 4: Mitigation of Disproportionate Impacts

The general permit likely imposes disproportionate costs on small businesses. The general permit rule (WAC 173-226-120) requires that disproportionate economic impacts of general permits on small businesses be reduced, when it is both legal and feasible to do so. Ecology has determined that there is no opportunity to significantly reduce the costs of this permit to small businesses.

4.1 Mitigation options under WAC 173-226-120

The governing rule states the following options should be considered to reduce the impact of the permit on small businesses.

- Establishing differing compliance or reporting requirements or timetables for small businesses.
- Clarifying, consolidating, or simplifying the compliance and reporting requirements under the general permit for small businesses.
- Establishing performance rather than design standards.
- Exempting small businesses from parts of the general permit.

4.2 Mitigation actions

Mitigation actions must comply with state and federal requirements. The general permit rule requiring economic impact analysis (WAC 173-226-120) states that mitigation only needs to be undertaken when it is legal and feasible in meeting the stated objectives of the:

- Federal Clean Water Act
- State Water Pollution Act - Chapter 90.48 RCW.

The draft general permit conditions are based on federal law and rule requirements. Significant mitigation of these conditions would be a violation of federal NPDES program rules, which establish effluent standards. Therefore, the compliance costs associated with them cannot be reduced. The draft general permit must contain effluent limits that are at least as strict as federal effluent standards, to mitigate their impact on small businesses.

Ecology also places conditions in general permits to ensure discharges do not violate the state:

- Water quality standards for surface waters of the state (WAC 173-201A)
- Water quality standards for ground waters of the state (WAC 173-200)
- Sediment management standards (WAC 173-204)
- Wastewater discharge fees (WAC 173-224)

These conditions are legal requirements that Ecology cannot allow permittees to violate. Compliance costs associated with these conditions of the draft general permit cannot be mitigated.

The above circumstances severely limit Ecology's ability to reduce cost impacts on small businesses.

4.2.1 Impact of mitigation on effectiveness of general permit

In general, the impact of the draft general permit on small boatyards cannot be mitigated significantly. Because most boatyards are small businesses, the economic impact of the draft general permit on small boatyards cannot be reduced without reducing the effectiveness of the permit in controlling water pollution.

4.2.2 Mitigation

Ecology has determined there is no opportunity to significantly reduce the costs of this permit to small businesses.

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References

RCW 34.05.272 requires Ecology to categorize sources of information used in significant agency actions made in the Water Quality Program.

Independent peer review: Review is overseen by an independent third party.

US Treasury Department, 2020. Fixed rate of return to inflation-indexed I-Bonds. http://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm

CH2M Hill. 2008. "Pacific Fishermen Shipyard & Electric, LLC, Stormwater Treatment System and Outfall Diffuser Engineering Report."

Internal peer review: Review by staff internal to Ecology.

N/A

External peer review: Review by persons that are external to and selected by Ecology.

N/A

Open review: Documented open public review process that is not limited to invited organizations or individuals.

WA Department of Ecology (2010) Economic Impact Analysis AKART Analysis: Draft National Pollutant Discharge Elimination System (NPDES) Wastewater Discharge General Permit for Boatyards, Publication no. 10-10-018. https://apps.ecology.wa.gov/publications/summarypages/1010018.html

WA Department of Ecology (2011). Water quality program permit Writer's Manual. Publication no. 92-109.

Legal and policy documents: Documents related to the legal framework for the significant agency action, including but not limited to: federal and state statutes, court and hearings board decisions, federal and state administrative rules and regulations, and policy and regulatory documents adopted by local governments.

40 CFR 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

40 CFR 131.36 Toxics criteria for those states not complying with Clean Water Act section 303(c)(2)(B).

Chapter 173-200 WAC Water Quality Standards For Groundwaters Of The State Of Washington

Chapter 173-201A WAC Water Quality Standards For Surface Waters Of The State Of Washington

Chapter 173-204 WAC Sediment Management Standards

Chapter 173-224 WAC Water Quality Permit Fees

Chapter 173-226 WAC Waste Discharge General Permit Program

Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under independent, internal, or external peer review.

U.S. Department of Commerce: Bureau of Economic Analysis. Gross National Product: Implicit Price Deflator. http://research.stlouisfed.org/fred2/data/GNPDEF.txt

U.S. Environmental Protection Agency. 1991. "Technical Support Document for Water Quality- Based Toxics Control." EPA/505/2-90-001.

Washington State Department of Labor & Industries- Prevailing Wage Rates for Public Works Contracts for Shipbuilding & Ship Repair in King County https://secure.lni.wa.gov/wagelookup/

Records of the best professional judgment of Ecology employees or other individuals.

N/A

Other: Sources of information that do not fit into other categories.

N/A

FACT SHEET FOR THE BOATYARD DRAFT GENERAL PERMIT

A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND STATE WASTE DISCHARGE GENERAL PERMIT

REISSUANCE: JULY 20, 2022

EFFECTIVE: SEPTEMBER 1, 2022

DEPARTMENT OF ECOLOGY
State of Washington

PURPOSE OF THIS FACT SHEET

This fact sheet is a companion document to the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Boatyards (boatyard general permit). It explains the nature of the proposed discharges, summarizes the history of the permit, documents the Washington State Department of Ecology's (Ecology) decisions for limiting the pollutants in the wastewater discharges, provides the regulatory and technical bases for those decisions, and fulfills the requirements of Washington Administrative Code (WAC) Section 173-226-110.

On February 17, 2021, Ecology prepared and made available a draft permit for boatyards and this accompanying fact sheet for public evaluation during a minimum 30-day review period (WAC 173-226-130). Copies of the draft general permit and this fact sheet were available at Ecology regional offices and via the Internet for public review and comment from March 3, 2021, through April 16, 2021. Details about how to prepare and submit comments are in Appendix C (Public Involvement Information).

SUMMARY

The boatyard general permit provides coverage for discharges of treated pressure-wash/process wastewater and stormwater runoff from certain boatyards to waters of the State. The general permit provides coverage for boatyards that:

Engage in the construction, repair, or maintenance of small vessels (boats or ships), where 85% of those vessels are 65 feet or less in length; or

Generate more than 85% of their gross receipts from revenues returned from the construction, repair, or maintenance of those small vessels (65 feet or less).

The proposed Boatyard General Permit includes both technology-based and water quality-based limits or benchmarks depending on the source of the wastewater and the receiving water.

Aside from clarifying and typographical changes, the proposed Boatyard General Permit contains the following changes from the current permit (effective August 8, 2016 through July 31, 2021):

1) Clarification that boatyard activites on a floating drydock are not authorized under this permit unless within the boundaries of the permitted facility. (Permit Section S1.B)
2) Decrease in the maximum daily limit for total lead and total zinc in wastewater discharged to non-delegated POTW's. Total lead decreased from 1.2 mg/L to 0.69 mg/L and total zinc decreased from 3.3 mg/L to 2.61 mg/L (Permit Section S2. A)
3) Replace the requirement for a seasonal benchmark for stormwater runoff discharged to surface waters of the state with an additional month of required sampling. (Permit Section S2.D.)
4) Decrease in the maximum daily benchmark value for total copper in stormwater runoff discharged to surface waters of the state from 147ug/L to 15ug/L for marine water and western freshwater and 20 ug/L for eastern freshwater. (Permit Section S2. D)

5) Addition of a maximum daily benchmark value of 25 NTU for turbidity in stormwater runoff discharged to surface waters of the state. (Permit Section S2. D)
6) Addition of a daily benchmark value range of 6.0-11.0 for pH in stormwater runoff discharged to waters of the state. (Permit Section S2. D)
7) Addition of a maximum daily benchmark value of 10 mg/L for Petroleum Hydrocarbons (Diesel Fraction) in stormwater runoff discharged to waters of the state. (Permit Section S2. D)
8) Significant rewrite of Permit Section S2.E to update the requirements of Permittees that discharge into impaired waters. This section incorporates impaired water bodies for the entire state according to the 303(d) listing. (Permit Section S2. E)
9) Addition of a maximum daily limit value of 30 mg/L for Total Suspended Solids (TSS) in stormwater runoff discharged to 303(d)-listed waters of the state impaired for TSS. (Permit Section S2. E)
10) Addition of a daily limit value range for pH in stormwater runoff discharged to 303(d)-listed waters of the state impaired for pH. The exact range limits are dependent on the water body the permittee will discharge into. (Permit Section S2. E)
11) Addition of a maximum daily limit value for total copper in stormwater runoff discharged to 303(d)-listed waters of the state impaired for copper. The exact limits will be determined based on the water body the permittee will discharge into. (Permit Section S2. E)
12) Addition of a maximum daily limit value for total zinc in stormwater runoff discharged to 303(d)-listed waters of the state impaired for zinc. The exact limits will be determined based on the water body the permittee will discharge into. (Permit Section S2. E)
13) Addition of a new section that describes discharge of wastewater to evaporation ponds/tanks in Eastern Washington. (Permit Section S2. F)
14) Additional requirements for work done on dry docks and graving docks. (Permit Section 3. M)
15) Additional requirements and details for stormwater and wastewater sampling. (Permit Section 6. A)
16) Clarification that the benchmark respons system is to be repeated until benchmarks are achieved. (Permit Section 7. A. 3(a))
17) Additional requirements to be included in the permittee's SWPPP. (Permit Section 8).
    a) Significant rewrite of Permit Section 8 B.1 to expand permittee site map requirements. (S8. B1).
    b) Additional requirements include that permittee's clean out catch basins and maintain all stormwater management/treatment facilities (Permit Section 8 B.3(e)).
    c) Additional material handling requirements in the SPECP (Permit Section 8 B.3(f)).
    d) Additional documentation requirement for decontamination procedues to be included in

the permittee's SWPPP (Permit Section 8 B.3(i)).

e) Additional documentation requirement for vessel deconstruction procedues to be included in the permittee's SWPPP (Permit Section 8 B.3(k)).

18) Significant re-write of Reporting For Invasive Species Control (Permit Section 12) to include a complete list of prohibited invasive species.

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ADA ACCESSIBILITY

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For document translation services, call Water Quality Reception at 360-407-6600. Por publicaciones en espanol, por favor llame Water Quality Reception al 360-407-6600.

[1] https://ecology.wa.gov/About-us/Accessibility-equity/Accessibility/

INTRODUCTION

The Federal Clean Water Act (CWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the CWA is the National Pollutant Discharge Elimination System (NPDES) permit program, administered by the U.S. Environmental Protection Agency (EPA). The U.S. EPA has delegated the administration of the NPDES permit program to the State of Washington. The Washington State Legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to the Washington State Department of Ecology (Ecology). The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in Chapter 90.48 of the Revised Code of Washington (RCW).

The Washington Administrative Code (WAC) requires that boatyards obtain coverage under an NPDES general permit before discharging wastewater to the waters of the State. The following regulations apply to NPDES general permits:

- Water quality criteria for groundwaters, bases for effluent limits, and other requirements (Chapter 173-200 WAC)
- Water quality criteria for surface waters, bases for effluent limits, and other requirements (Chapter 173-201A WAC)
- Sediment management standards, bases for effluent limits, and other requirements (Chapter 173-204 WAC)
- Whole effluent toxicity testing and limits (Chapter 173-205 WAC)
- Determination and payment of fees (Chapter 173-224 WAC)
- Procedures for issuing and administering NPDES general permits (Chapter 173-226 WAC)
- Plans and reports for construction of wastewater facilities (Chapter 173-240 WAC)

A general permit is designed to provide environmental protection under conditions typical for the covered industrial group. This permit regulates pollutant discharge primarily through: best management practices (BMPs) designed to minimize or eliminate the discharge of pollutants, stormwater treatment, numeric benchmarks or limits to assure pollutant control, and prohibition of all pressure-wash or process wastewater discharges to waters of the state. This permit may not be appropriate for every facility. When site-specific conditions at a facility are not typical of the industrial group or they are beyond the scope of the general permit, an individual permit may be required. The establishment of a general permit for the small shipyard industry is appropriate because:

- The wastewater characteristics among facilities are similar.
- A standard set of permit requirements can effectively provide environmental protection.
- Facilities in compliance with permit conditions will be in compliance with water quality

standards.

Appendix B of this fact sheet identifies the legal or technical bases underlying each of the special and general conditions of the proposed boatyard general permit.

ACTIVITIES, DISCHARGES, AND FACILITIES THAT REQUIRE THIS PERMIT

The discharge of stormwater or wastewater from boatyards to surface water requires an NPDES permit. In addition, no pollutants may be discharged from any commercial or industrial operation into waters of the State except as authorized under a wastewater discharge permit. Boatyards meet the legal definition of commercial or industrial operation, the process wastewater contains pollutants, and boatyards are point source dischargers. This general permit satisfies the legal requirement for an NPDES permit for boatyards that employ pressure washing to clean boats, particularly their hulls, or that produce stormwater runoff from areas where industrial activities occur which then discharges to waters of the State.

Both the current boatyard general permit (effective August 8, 2016, through July 31, 2021) and the draft Boatyard General Permit for the subsequent term (proposed to be issued June 16, 2021; to be effective August 1, 2021, through July 31, 2026) provide coverage for facilities that:

- Engage in the construction, repair, or maintenance of small vessels (boats or ships), where 85% of those vessels are 65 feet or less in length; or
- Generate more than 85% of their gross receipts from revenues returned from the construction, repair, or maintenance of those small vessels(65 feet or less).

Application Requirements

40 CFR 122.21(a)(1) requires any facility that “discharges or proposes to discharge pollutants” to surface waters to apply for permit coverage. 40 CFR 122.22 specifies the person or persons within the applicant's organization who may sign the application. WAC 173-226-200 describes the application process to obtain coverage. The regulation explains public notice requirements, SEPA compliance, and the effective date of coverage. There are some differences in application requirements for new facilities versus existing facilities. New facilities seeking to obtain coverage under this permit must notify the public of this intent in a newspaper of general circulation within the geographical area of the draft discharge or change in discharge. Chapter 173-226 WAC defines “new operation” as one that begins activities on or after the effective date of the permit. For purposes of this permit, “new operation” and “new facility” have the same meaning . The draft permit defines existing facilities as those that were in operation prior to the permit effective date so, under the draft permit, these facilities would not be subject to public notice requirements. WAC 173-226-130 requires facilities under permit that are increasing or altering their discharge, to notify the public of this intent in a newspaper of general circulation within the geographical area of the draft discharge or change in discharge.

ACTIVITIES, DICHARGES, AND FACILITIES EXCLUDED FROM COVERAGE UNDER THIS PERMIT

Facilities that provide only the following boatyard services, whether conducted by the vessel's owner or by an agent or contractor hired by the owner, do not require coverage under this permit:

- Use of tidal grids solely for emergency repair or for inspection by marine surveyors.
- Minor engine repair or maintenance within the engine space without vessel haul-out.
- Topsides cleaning, detailing, and bright work.
- Electronics servicing and maintenance.
- Marine sanitation device (MSD) servicing and maintenance that does not require haul-out.
- Minor repairs or modifications to the vessel rigging or superstructure (topside).

These activities, which do not require coverage under this permit, are often conducted in marinas. Marinas or boat owners conducting boatyard activities may be subject to penalty if they discharge pollutants without a permit. In addition, marinas must follow the in-water hull cleaning instructions in the Ecology Divers Advisory (Ecology, 1999). Marinas on aquatic lands leased from the Washington Department of Natural Resources have additional requirements defined by RCW 90.48.386.

The permit does not provide coverage for related or ancillary industrial or commercial facilities, such as a repair shop for marine engines. Those facilities may require coverage under the industrial stormwater general permit.

Discharges from facilities located on "Indian Country" as defined in 18 U.S.C. §1151, except portions of the Puyallup Reservation as noted in the permit, are not covered by the boatyard permit.

The following "federal facility" discharges are not covered by this permit:

- Discharges from activities operated by any department, agency, or instrumentality of the Federal Government of the United States.
- Discharges from activities (i) Located on federally-owned sites; and (ii) Operated by an entity, such as a private contractor, performing industrial activity on behalf of or under the direction of any department, agency, or instrumentality of the Federal Government of the United States.

This general permit does not cover vessel deconstruction activities that take place in the water or on a floating drydock or barge, unless within the boundaries of the covered facility. For vessel deconstruction activities that take place outside the boundaries of a permittee's facility, the boatyard must obtain either an individual permit or the Vessel Deconstruction General Permit. This is a change from the current permit which did not allow any work on a floating drydock or barge. This prohibition was unneccesarily restrictive and potentially required a permittee to receive two separate NPDES permits at single facility. This was not the intention of Ecology. The

Vessel Deconstruction General Permit was designed to cover deconstruction acitivites that do not take place at a fixed facility that does regular boatyard activites.

BACKGROUND INFORMATION

HISTORY

Under Task P-20 of the Puget Sound Water Quality Authority Plan (1989), Ecology was directed to carry out a program for detection and identification of unpermitted discharge sources. One of the significant unpermitted point source discharge groups found by the Elliott Bay and Lake Union Urban Bay Action Teams was the boatyard industry.

Ecology signed a Memorandum of Agreement with the U.S. EPA for development and issuance of a general permit for small shipyards. During the development of the permit it was decided to describe facilities in this segment of the Ship and Boat Building and Repairing industry as boatyards. A general permit was issued in 1992, reissued in 1997, and again in December 2005. The 2005 permit was modified in 2006 to correct an error. The 2005 permit and 2006 modification were appealed by the Northwest Marine Trade Association (NMTA) and the Puget Soundkeeper Alliance (PSA). The appeal was heard by the Pollution Control Hearings Board in July 2006, and the Board issued a decision in January 2007 (PCHB, 2007). That decision was appealed to Superior Court by NMTA and PSA. The appeal to Superior Court was conditionally settled by incorporating some of the PCHB judgment orders into a second permit modification (January 2008) and conducting a pilot test of three stormwater treatment devices during the winter of 2007-2008. The pilot test was funded by PSA, NMTA, and Ecology. A Settlement Steering Committee (steering committee) consisting of NMTA, PSA, their technical consultants, and Ecology directed the study. A project manager was hired to oversee day-to-day operation of the pilot test. A contractor was hired to conduct the sampling of the pilot treatment apparatus.

The pilot test was conducted for seven storm events, and the contractor presented the data in a report to the steering committee (Taylor Associates, Inc. 2008). An order-of-magnitude economic analysis was conducted by the NMTA technical consultant to estimate cost of installing treatment at a typical boatyard (Arcadis, 2008).

A draft permit modification produced by PSA and NMTA was conveyed to Ecology August 2008 as an agreement between those two parties. Ecology released the draft modification for public comment November 2008. The draft contained benchmarks based on the pilot stormwater treatment data. Based on the comments received, Ecology determined a small business and AKART economic analysis was required to proceed with the permit. That analysis showed some boatyards could not install stormwater treatment and remain in business (Ecology, 2010). The economic analysis was released as a separate but supporting document. Based on the economic analysis, Ecology imposed technology-based limits on boatyards that could afford it and water quality-based limits with a compliance schedule for the others to allow time to fund installation of treatment systems. Those boatyards with water quality-based limits had performance-based limits during the compliance period until treatment system(s) were to be installed. This third iteration of the boatyard general permit was to expire on November 2, 2010, but Ecology extended its coverage until Ecology could complete the next version, which became effective on June 1, 2011.

By the end of the term of the current boatyard general permit, in late 2020, Ecology had issued

coverage to 63 boatyards. A list of the boatyards currently covered under this general permit is provided in Table 1 of this fact sheet.

The draft permit published March 3, 2021, is the sixth version of the boatyard general permit. The proposed substantive changes from the current general permit are:

1) Clarification that boatyard activites on a floating drydock are not authorized under this permit unless within the boundaries of the permitted facility. (Permit Section S1.B)
2) Decrease in the maximum daily limit for total lead and total zinc in wastewater discharged to non-delegated POTW's. Total lead decreased from 1.2 mg/L to 0.69 mg/L and total zinc decreased from 3.3 mg/L to 2.61 mg/L (Permit Section S2. A)
3) Replace the requirement for a seasonal benchmark for stormwater runoff discharged to surface waters of the state with an additional month of required sampling. (Permit Section S2.D.)
4) Decrease in the maximum daily benchmark value for total copper in stormwater runoff discharged to surface waters of the state from 147ug/L to 15ug/L for marine water and western freshwater and 20 ug/L for eastern freshwater. (Permit Section S2. D)
5) Addition of a maximum daily benchmark value of 25 NTU for turbidity in stormwater runoff discharged to surface waters of the state. (Permit Section S2. D)
6) Addition of a daily benchmark value range of 6.0-11.0 for pH in stormwater runoff discharged to waters of the state. (Permit Section S2. D)
7) Addition of a maximum daily benchmark value of 10 mg/L for Petroleum Hydrocarbons (Diesel Fraction) in stormwater runoff discharged to waters of the state. (Permit Section S2. D)
8) Significant rewrite of Permit Section S2.E to update the requirements of Permittees that discharge into impaired waters. This section incorporates impaired water bodies for the entire state according to the 303(d) listing. (Permit Section S2. E)
9) Addition of a maximum daily limit value of 30 mg/L for Total Suspended Solids (TSS) in stormwater runoff discharged to 303(d)-listed waters of the state impaired for TSS. (Permit Section S2. E)
10) Addition of a daily limit value range for pH in stormwater runoff discharged to 303(d)-listed waters of the state impaired for pH. The exact range limits are dependent on the water body the permittee will discharge into. (Permit Section S2. E)
11) Addition of a maximum daily limit value for total copper in stormwater runoff discharged to 303(d)-listed waters of the state impaired for copper. The exact limits will be determined based on the water body the permittee will discharge into. (Permit Section S2. E)
12) Addition of a maximum daily limit value for total zinc in stormwater runoff discharged to 303(d)-listed waters of the state impaired for zinc. The exact limits will be determined based on the water body the permittee will discharge into. (Permit Section S2. E)
13) Addition of a new section that describes discharge of wastewater to evaporation

ponds/tanks in Eastern Washington. (Permit Section S2. F)

14) Additional requirements for work done on dry docks and graving docks. (Permit Section 3. M)

15) Additional requirements and details for stormwater and wastewater sampling. (Permit Section 6. A)

16) Clarification that the benchmark respons system is to be repeated until benchmarks are achieved. (Permit Section 7. A. 3(a))

17) Additional requirements to be included in the permittee's SWPPP. (Permit Section 8).

    a. Significant rewrite of Permit Section 8 B.1 to expand permittee site map requirements. (S8. B1).

    b. Additional requirements include that permittee's clean out catch basins and maintain all stormwater management/treatment facilities (Permit Section 8 B.3(e)).

    c. Additional material handling requirements in the SPECP (Permit Section 8 B.3(f)).

    d. Additional documentation requirement for decontamination procedues to be included in the permittee's SWPPP (Permit Section 8 B.3(i)).

    e. Additional documentation requirement for vessel deconstruction procedues to be included in the permittee's SWPPP (Permit Section 8 B.3(k)).

18) Significant re-write of Reporting For Invasive Species Control (Permit Section 12) to include a complete list of prohibited invasive species.

This draft permit continues the requirement for certain best management practices and the prohibition of direct discharge of pressure-wash wastewater to waters of the state.

DESCRIPTION OF THE INDUSTRY

Industry Processes

The applicable Standard Industrial Classifications (SICs) are:

SIC No. 3731 (NAICS No. 336611) Ship Building and Repairing: "Establishments primarily engaged in building and repairing all types of ships, barges, and lighters whether propelled by sail or motor power or towed by other craft. This industry also includes the conversion and alteration of ships."

SIC No. 3732 (NAICS No. 336612) Boat Building and Repairing: "Establishments primarily engaged in building and repairing all types of boats."

A boatyard, as defined for the purpose of this permit, is a facility engaged in the construction, repair, and maintenance of small vessels, where 85% of those vessels are 65 feet or less in length or the boatyard generates more than 85% of its gross receipts working on those vessels. Services provided may include, but are not limited to: pressure washing; bottom and topside painting; engine, prop, shaft, and rudder repair and replacement; hull repair; joinery; bilge cleaning; fuel and lubrication system repair or replacement; welding and grinding on the hull; buffing and

waxing; topside cleaning; MSD repair or replacement; and other activities necessary to maintain a vessel. This document will use the generic terms pressure washing and pressure- wash wastewater for all pressure-washing activities at boatyards.

A boatyard may employ one or more of the following to remove or return a vessel to the water: marine railway, drydock, crane, hoist, ramp, or vertical lift. Some yards may build a limited number of custom boats usually constructed of fiberglass or aluminum. Permanent moorage facilities are not usually a feature of a boatyard although a few boatyards do have such facilities.

Historically, boat repair has been done outdoors on the waterfront. The vessel was supported in a cradle, on barrels, or in a sling while work was done on the hull. Some boatyard facilities are endeavoring to change operations in order to do the boat repair under cover. This will contribute to quality control, reduce or eliminate pollutant discharges from stormwater, and improve worker safety. If all activities are performed indoors, under cover, with no outside activities or exposure except haul-out, coverage under this permit may not be required.

Wastewater Treatment Processes

Boatyards covered by this general permit are prohibited from discharging pressure-wash wastewater or any other process water directly to waters of the State.

While this general permit does not explicitly require treatment of stormwater runoff from boatyards, some treatment may be required to comply with discharge limits and to ensure that pollutant concentrations in the runoff do not exceed benchmark concentrations. The permit also requires the implementation of several best management practices (BMPs) to prevent violation of water quality standards.

Discharge Outfall

Typically, the outfalls through which boatyards discharge their stormwater runoff to the environment discharge to either the adjacent surface waterbody or to an infiltration area that must be located at least 200 feet from the edge of the nearest surface waterbody.

Solid Wastes

Boatyards that accumulate solid wastes from treatment of pressure-wash wastewater or stormwater runoff must handle and dispose of those wastes in compliance with relevant solid waste regulations. Boatyards covered by this general permit generally employ the local municipality or a local contractor to haul solid wastes offsite and dispose of them properly.

DESCRIPTION OF THE RECEIVING WATERS

Boatyards covered by this permit may discharge stormwater runoff to the following three different types of receiving waters: fresh water(eastern and western), marine water, and groundwater. Some of these waterbodies may be impaired by specific pollutants. The type and condition of the particular receiving water to which a given boatyard discharges constitute the basis for permit-specified limits, benchmarks, and required BMPs.

Ecology conducted a receiving water study during the winter of 2008 and 2009 in Lake Union and Puget Sound (Ecology, 2009). The study was mandated by the PCHB in its 2007 decision. The

study parameters, sample sizes, and locations were determined by the steering committee. The study focused on copper, zinc, and lead in the receiving water (total and dissolved), total suspended solids, and hardness (fresh water). The results from all Lake Union and Lake Washington Ship Canal samples were below the acute and chronic criteria for copper, lead, and zinc. Lake Union and Lake Washington Ship Canal sampling stations yielded equivalent concentrations for the parameters measured. The marine stations in Puget Sound showed some differences, with urban bay stations typically showing the highest concentration of metals. All sampling locations met water quality criteria for the three metals, and lead was typically below detection or quantitation levels.

WASTEWATER CHARACTERIZATION

Wastes generated by boatyard activities include spent abrasive grit, spent solvent, spent oil, pressure-wash wastewater, paint over-spray, paint drips, various cleaners and anti-corrosive compounds, paint chips, scrap metal, welding rods, wood, plastic, resin, glass fibers, and miscellaneous trash such as paper and glass. If not adequately controlled, these pollutants can enter the wastewater stream through the application and preparation of paints and the painted surface; the handling, storage, and accidental spills of chemicals, leaks, or drips of paints, solvents, or thinners; the fracturing and breakdown of abrasive grits; and the repair and maintenance of mechanical equipment. Hull preparation for painting is commonly done by pressure washing, sanding, grinding or scraping, and some abrasive blasting.

The two main wastewater streams from boatyards are: (1) Pressure-wash wastewater; and (2) Stormwater runoff. Other minor potential sources are cooling water, pump testing, gray water, sanitary waste, wash-down of the work area, and engine bilge water. Gray water and sanitary waste go to municipal treatment or on-site treatment. Engine room bilge water and oily wastes are typically collected and disposed of through a licensed contracted disposal company.

Pressure-Wash Wastewater

In 1992, raw pressure-wash wastewaters were sampled by Ecology, local shipyards, boatyards, and the Municipality of Metropolitan Seattle (METRO) (Hart Crowser, 1997). The METRO data, summarized in Table 2, showed that the concentrations of copper, lead, and zinc in the untreated pressure-wash wastewater exceeded the typical standards for discharge to sanitary sewer systems by about a factor of 10, and exceeded surface water quality ambient standards by factors of about 9,000; 30; and 80, respectively.

During the current term of the boatyard general permit (2016-2021), permittees provided discharge monitoring reports (DMRs) to Ecology that characterized the pressure-wash wastewater that they discharged to their local publicly-owned treatment works (POTWs). The data on this treated wastewater are summarized in Table 3. The data showed a median pH value of 8.1 standard units (S.U.), with 35 values greater than 9.0 S.U. All the median concentrations for each of the metals were less than their respective allowed limits. The average concentration of copper(18.21 mg/L) and zinc(3.61 mg/L) exceeded their respective allowed limits.

Stormwater Runoff

The permit modification in 2008 required additional monitoring of stormwater for lead and zinc.

These monitoring data are for stormwater runoff controlled solely by best management practices (BMPs). A summary of some of the monitoring data reported by the boatyards on their discharge monitoring reports from 1998 through 2014 is presented in Table 4.

The median reported copper value for the period of 1998 to 2002 was 410 ug/L, which is about four times higher than the median value reported between 2006 and 2008. These results showed a continued reduction in copper concentration (not tested for statistical significance).

A full characterization of toxic pollutants in stormwater runoff from three representative boatyards in the spring of 2006 is summarized in Table 5 (Ecology, 2006). The freshwater and marine water quality criteria (if available) are shown after the name of the pollutants.

Organotins are a group of chemical compounds are used in biocides such as some antifouling paints. The results of analyzing organotins in boatyard stormwater runoff collected during April and May of 2006 is summarized in Table 6. The U.S. EPA-recommended acute criteria for tributyltin are 0.46 µg/L for fresh water and 0.37 µg/L for marine water. Except for the April sampling at the Seaview Boatyard East (6.0 ug/L), the concentrations of all tributyltin results were less than the criteria.

During the current term of the boatyard general permit (2016-2021), permittees provided to Ecology discharge monitoring reports that characterized the stormwater runoff that they discharged to either the ground or the nearby surface waterbody. The data on this stormwater runoff is presented in Table 4 for total copper, lead, and zinc from 2016 through 2020.

COMPLIANCE WITH THE STATE ENVIRONMENTAL POLICY ACT

State law exempts the issuance, reissuance, or modification of any wastewater discharge permit from the State Environmental Policy Act (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 and WAC 197-11-855). This exemption applies only to existing discharges, not to new discharges. New facilities must demonstrate compliance with SEPA as part of project authorization and approval in order to be eligible for coverage under the boatyard general permit.

PROPOSED PERMIT LIMITS

Federal and State regulations require that effluent limits set forth 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 and are cost modified. Technology-based limits are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). State laws (RCW 90.48.010; 90.52.040; and 90.54.020) require the use of all known, available, and reasonable methods (AKART) to prevent and control the pollution of waters of the State.

Water quality-based limits are based upon compliance 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 National Toxics Rule (40 CFR 131.36). The more stringent of these two limits (technology or water quality-based) must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

Technology-based effluent limits for discharges consisting of process wastewater typically are based on some type of treatment technology to reduce the pollutants in that wastewater.

Stormwater differs from process wastewater in that it is not a continuous discharge, the pollutant sources are not continuous, and the pollutant concentrations are highly variable. The U.S. EPA, in their stormwater permits, has determined that the use of structural controls and best management practices (BMPs) to prevent the discharge of pollutants via stormwater runoff may be equivalent to the "best conventional pollutant control technology" (BCT) and the "best available technology economically achievable" (BAT), which are the federally mandated technology-based treatment levels.

Title 40 CFR 122.2 defines BMPs as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce pollution of waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs are techniques for pollution prevention or, in other words, preventing the pollutants from getting into the wastewater (e.g., stormwater runoff).

The U.S. EPA has defined shipyards as a point source category. This category includes the facilities that Ecology has separated out and calls "boatyards." The U.S. EPA draft document "Development Document for Shipbuilding and Repair" (U.S. EPA, 1978) recommended BMPs as the primary method of controlling waste discharges from shipyards to waters of the State. BMPs achieve pollution control through careful management of the product streams, segregation of potential pollutants in waste streams, and preventing or minimizing contact between water and waste material. Shipyards and boatyards have similar operations.

The Development Document for Shipbuilding and Repair also determined that BMPs constitute the "best practicable control technology currently available" (BPT) for the shipyard industry. Ecology concluded that BMPs constituted BCT for stormwater discharges in the boatyard industry and that collection, recycling, and treatment of pressure-wash wastewaters constituted BAT.

METRO TREATMENT STUDY

METRO (Municipality of Metropolitan Seattle) received a National Estuary Grant to do a treatment study of Puget Sound shipyard and boatyard wastewater and storm water. The study involved sampling of pressure-washing wastewater from a number of these facilities, and testing prototype collection and treatment systems to determine which methods could consistently meet state and local water quality standards.

METRO produced an analytical report of their findings and developed a guidance manual which was distributed to shipyards, boatyards, and publicly-owned treatment works (POTW). The manual includes options for treatment and discharge of pressure-wash wastewater, bilge and ballast water, and contaminated stormwater to receiving waters, municipal treatment plants, or off-site treatment facilities.

BMPs to collect and contain wastes and minimize waste generation during vessel repair and maintenance work have been researched, compiled, and distributed in Washington by Ecology, the Lake Union Association Water Quality Committee, and the Puget Sound Shipbuilders Association (1990), with funding assistance from the Puget Sound Water Quality Authority.

Many of the sources discussed in the Wastewater Characterization section of this fact sheet can be contained, controlled, or substantially reduced by the implementation of BMPs. BMPs are an essential component of this proposed NPDES general permit. BMPs include structural controls, such as catch basins and drains, berms, dikes, and appropriate containment for oils, chemicals, and wastes; roofed storage areas; and wastewater treatment facilities. Facilities covered by this general permit are required to implement the BMPs described in Special Condition S3 (Mandatory Best Management Practices) of the permit.

TECHNOLOGY-BASED LIMITS FOR PRESSURE-WASH WASTEWATER

The primary source of the heavy metals in pressure-wash wastewater is from paint removed from boat hulls. As noted previously, the copper concentration in this untreated wastewater exceeded the water quality criteria by several orders of magnitude. The next most common metals, by frequency and in magnitude, in boatyard and shipyard wastewater (or contaminated stormwater), were zinc and lead.

METRO's work clarified and expanded the list of options for treatment and disposal of boatyard wastewaters. The treatment study project was closely aligned with the initial development of the first general NPDES permit for boatyards. The study's project manager and project coordinator made valuable contributions to the general permit development by assisting Ecology in establishing standards for best available technology practices for boatyards.

More specifically, the alternatives for managing pressure-wash wastewater are:

1) Recycling it and conserving its use.
2) Collection and discharge (with pretreatment as necessary) of the wastewater to the sanitary sewer, which may include chemical addition followed by sedimentation and possibly evaporation.
3) For boatyards in Eastern Washington, evaporation from an evaporation pond or tank.

Option 1 - Recycle/Conservation

The preferred means of preventing pollution from pressure washing hulls is recycling the pressure-wash wastewater. The typical configuration is multi-stage filtration with some storage capacity. Water lost from evaporation during pressure washing can be made up from rain water falling on the wash pad or from tap water. The solids collected from the filters or from sedimentation in the storage tank are air-dried under cover and handled as solid waste. The recycled water may eventually become contaminated, requiring disposal or treatment. In that case the wastewater may be collected by a licensed waste hauler and treated off-site.

Option 2 - Discharge to a Publicly-Owned Treatment Works

For boatyard facilities which have the ability to connect to a publicly-owned treatment works (POTW), recycling, with occasional discharge of contaminated recycle water to the POTW, is the best treatment method. The recycled water may have to be treated with a polymer and settled before discharge in order to meet the discharge limits of the permit.

For facilities with excess contaminated water, the contaminated water must be hauled to a treatment facility for proper treatment and disposal. METRO's guidance manual gives a more detailed discussion of recycling options for pressure-wash wastewaters.

Since all boatyards have eliminated direct discharges of pressure-wash wastewater to waters of the state, Ecology has determined that AKART for pressure-wash wastewater is recycling, evaporation, or treatment and discharge to the sanitary sewer. Discharges to the sanitary sewer must meet the discharge requirements included in this permit for non-delegated POTWs or the requirements specified by delegated POTWs. Delegated POTWs are municipal wastewater treatment systems that have received Federal pretreatment delegation by a permit system through Ecology, to restrict the pollutant loading or concentration of pollutants to their system.

Option 3 – Evaporation from a pond or tank

For boatyard facilities located in Eastern Washington, facilities may choose to construct and discharge to an approved evaporation pond or tank. Prior to beginning construction or operation of a evaporation pond or tank, boatyards must submit an engineering report and Operations and Maintenance manual that meets all the applicable requirements in Chapter 173-240 WAC. Boatyards who receive approval to construct and operate an evaporation pond or tank are not authorized to discharge from these structures to Waters of the State.

Ecology has released guidance for domestic wastewater ponds in "Criteria for Sewage Works Design (Orange Book)", section G3-3.5. While this guidance is specifically designed for domestic wastewater treatment ponds, the technical information contained could be applicable and used in the design and operation of evaporation ponds receiving other non-domestic wastewater.

DISCHARGES TO NON-DELEGATED PUBLICALLY OWNED TREATMENT WORKS

The permit requires all Permittees who discharge wastewater to a non-delegated publically owned treatment works(POTW), to conduct sampling for four pollutant paramters. As previously mentioned, these parameters were selected because they commonly occur in boatyard wastewater in high levels and can exceed pre-treatment standards. The representative

parameters are pH, total copper, total zinc, and total lead.

- **Ph.** The permit retains the previous permits limits within the range of 5 to11 SU. These limits are based on federal rules at 40 CFR 403.5(b) and state rules at Chapter 173-216-060 WAC.
- **Total Copper.** The permit retains the previous permits limit on total copper at 2.4 mg/l.
- **Total Zinc.** The permit reduces the previous permits limit on total zinc from 3.3 mg/l to 2.61 mg/l. This limit is based on the federal effluent limitation standards found at 40 CFR 433.15 and 40 CFR 433.17.
- **Total Lead.** The permit reduces the previous permits limit on total lead from 1.2 mg/l to 0.69 mg/l. This limit is based on the federal effluent limitation standards found at 40 CFR 433.15 and 40 CFR 433.17.

TECHNOLOGY-BASED LIMITS FOR STORMWATER RUNOFF

As previously noted, the U.S. EPA has determined that BMPs are BPT for stormwater discharges under the U.S. EPA Multi-sector Stormwater General Permit and in their draft effluent guidelines for shipyards. Ecology required BMPs beginning in 2005 and incorporated a process for additional BMPs when benchmarks were exceeded.

The Northwest Marine Trade Association, Puget Soundkeeper Alliance, and Ecology conducted a pilot treatment study at several boatyards during the October-May season. Three differenttypes of treatment devices were installed at three boatyards in the Seattle area, and multiple storm events were sampled. The results of the study are in a report Boatyard Stormwater Treatment Technology Study[2]dated March 2008. The cost of installing and operating each of the three treatment devices was estimated for the three model boatyards. The net present value of the most cost-effective treatment device of the three pilot treatment devices was $255,000 per acre (Arcadis, 2008). The estimated cost for treatment and the preparation work (grading and repaving) for a 2-acre boatyard was $400,000 to $900,000. This document is available at: Final Boatyard Cost Analysis Report[3].

The 2005 permit was modified as required by the settlement agreement in 2008 to incorporate PCHB orders numbered 2, 3, 7, and 8. This permit modification, as noted above, was appealed by the PSA (appeal 2). The appeal was on the permit modification Section S3.C *Receiving Water Studies*. This section was added according to the PCHB order 7.

Annual monitoring of stormwater was required in the first issuance of the Boatyard Permit (1992) to verify the effectiveness of best management practices. Compliance with the monitoring requirement was poor. The few discharges sampled at each boatyard failed to provide the feedback necessary to verify the effectiveness of best management practices or to characterize discharges. Ecology then determined that more than one sample per year was necessary.

Therefore, Ecology required four samples per year in the 1997 permit. The 2005 permit required

[2] https://www.stormwaterx.com/boatyard-stormwater-treatment-technology-study/
[3] https://www.stormwaterx.com/wp-content/uploads/2016/11/StormwateRx_Boatyard_Cost_Analysis.pdf

five samples per year. Four samples were required during the times the boatyard activity was highest (spring and fall) and one sample was required in January, the time of highest rainfall. The current draft permit (2021) replaces the seasonal benchmark requirement with an additional month of sampling. Ecology has determined that the additional month of sampling in March is necessary to verify the effectiveness of best management practices during a month that typically sees high boatyard activity and rainfall.

Boatyards covered under this permit are required to adopt the BMPs listed in the permit if appropriate for their facility. Other BMPs which are specific for the facility are expected to be developed as required by the facility to meet the permit benchmark values. Special condition S8 (Stormwater Pollution Prevention Plan) of the permit requires these BMPs be listed in a facility-specific document called the Stormwater Pollution Prevention Plan (SWPPP). This plan is expected to be updated as necessary, and it is a public document. The SWPPP also incorporates a monitoring plan, a spill plan, and weekly visual monitoring, as required in the previous permit.

The draft permit released for public comment in November 2008 contained benchmarks of 14.7 and 29 µg/L copper based on the demonstrated average concentration and variance observed during the pilot study of multimedia filtration. Comments received on these benchmarks disputed that they represented the performance expected when the apparatus was in actual operation as opposed to a test situation. In the period since the release of the 2008 draft, several boatyards have installed multimedia filtration stormwater treatment devices. The data from these were combined with the pilot test data from the boatyards and Pacific Fishermen pilot test (CH2M Hill, 2008) to derive new benchmarks. The data are presented in Appendix C of the April 21, 2010, fact sheet, which is available on the Ecology Boatyard General Permit webpage[4]. The benchmarks were calculated in the same manner as the effluent limit derivation presented in the U.S. EPA Technical Support Document, (U.S. EPA, 1991). The copper data were not normally distributed, so they were transformed by the log normal transformation to derive benchmarks. The zinc data were normally distributed after removal of the outliers.

Since lead in treated effluent was typically at or below a measureable concentration, no benchmarks were calculated. The 2011 permit did continue to require monitoring for lead. Beginning in 2005, copper and zinc limits were imposed in the permit as benchmarks. Benchmarks have been used instead of limits because adaptive management has been a useful process in stormwater management. This is evident in the declining copper concentrations in the boatyard data. Some boatyards may be able to consistently meet the current benchmarks with source control BMPs or with additional alternative treatment devices. Effluent limits, as used in this permit, consist of benchmarks plus adaptive management. In this permit, any exceedance of a benchmark requires a Level 1 response. This response is an examination by the boatyard of the probable cause of the exceedance and an action to be instituted that will cause the stormwater runoff to meet the benchmark in the next monitoring period. After 3 exceedances of a benchmark, the boatyard must submit and implement a Level 2 Structural Control Report.

After four exceedances, the boatyard must begin its Level 3 Response. The Permittee must submit an engineering report to Ecology within 3 months of reporting the sixth benchmark exceedance. The Level Three Engineering Report must also include an analysis of how the treated

[4] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Boatyard-general-permit

wastewater will be conveyed to the receiving water or sanitary system, and the characteristics of the receiving water. If the Permittee believes that additional treatment is not feasible or not necessary, the Permittee must request a permit modification, fulfill all the requirements in Condition S1.C (Modification of Permit Coverage), and convince Ecology that either:

1) Installation of necessary treatment BMPs is not feasible by the Level 3 deadline, up to a maximum of 15 months following reporting the sixth benchmark exceedance; or
2) Installation of treatment BMPs is not feasible or not necessary to prevent discharges that may cause or contribute to violation of a water quality standard.

The determination that a treatment BMP is "not feasible" may not be based on financial limitations or distress. Examples of situations where the installation of treatment BMPs may actually be "not feasible" are where the requirements of a local permitting authority delay or prevent the installation, where the local fire marshal has imposed land or building use restrictions, or where the Permittee's lease agreement with the site owner precludes the installation.

The permit also contains sections addressing the circumstance of boatyards currently at the Level Two or Three Response stages.

If a permittee completes the required level 3 response and installs the approved treatment, that permittee is still subject to the applicable benchmarks. This means that a permittee who installs treatment as part of a level 3 response and continues to exceed the relevant benchmark, shall continue the adaptive management responses required in the permit.

WATER QUALITY-BASED EFFLUENT LIMITS

In order to protect existing water quality and preserve the designated beneficial uses of Washington surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will not cause a violation of Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the State.

Mixing Zones

The Water Quality Standards allow the Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Ecology may authorize both "acute" and "chronic" mixing zones for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving AKART and in accordance with other mixing zone requirements of WAC 173-201A-400.

RCW 90.48.555(12) applies to this permit and addresses mixing zones. It states: "The department may authorize mixing zones only in compliance with and after making determinations mandated by the procedural and substantive requirements of applicable laws and regulations."

The applicable laws and regulations include federal Clean Water Act, RCW 90.48, WAC 173- 200, WAC 173-201A, WAC 173-204, and human health based criteria in the National Toxics Rule (40

CFR 131.36).

No mixing zones are authorized in this permit. Since a general permit must apply to a number of different sites, precise mixing zones and the resultant dilution are not applicable to facilities covered under a general permit.

Any discharger may request a mixing zone through an application for an individual permit in accordance with WAC 173-220-040 or WAC 173-216-070.

Numerical Criteria for The Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving waters to be protective of aquatic life.

Numerical criteria set forth in the water quality standards are used 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, they must be used in a permit.

The State water quality criteria, WAC 173-201A, for acute toxic effects due to copper in marine water is 4.8 µg/L (dissolved) and in fresh water is 7.2 µg/L (dissolved) at a receiving water hardness of 40 mg/L.

The State water quality criterion, WAC 173-201A, for acute toxic effects due to lead in marine water is 210 µg/L (dissolved), and the fresh water acute criterion is 24 µg/L (dissolved) at a receiving water hardness of 40 mg/L.

The State water quality criteria, WAC 173-201A, for acute toxic effects due to zinc in marine water is 90.0 µg/L (dissolved), and the fresh water acute criterion is 53 µg/L (dissolved) at a receiving water hardness of 40 mg/L.

Numerical Criteria For The Protection Of Human Health

Numerical criteria for the protection of human health are promulgated in Chapter 173-201A WAC and 40 CFR 131.45. These criteria are designed to protect human health 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.

DISCHARGES TO NON-IMPAIRED SURFACE WATERS

The permit requires all Permittees with stormwater discharges to surface water to conduct sampling for five pollutant parameters. Ecology does not attempt to address all the possible pollutants from each industrial facility. Instead, a basic set of parameters was selected to provide an indication of how well the facilities BMPs are functioning to prevent violations of the state surface water quality standards. The representative parameters are pH, TSS, total copper, total zinc, Petroleum Hydrocarbons, and oil and grease. Ecology selected these parameters to reasonably indicate the overall effectiveness of each facility's BMPs to reduce and prevent stormwater discharges that could cause a violation of water quality standards. A secondary

objective was to minimize the level of laboratory expenses to what is necessary to reasonably ensure compliance with permit conditions. Based upon Ecology's best professional judgment, experience under previous permit cycles, the available science, and the "Boatyard Stormwater Treatment Study" (Taylor Associates, Inc., 2008), Ecology has determined that in order to meet the proposed benchmarks, permittees will be required to fully apply AKART, and many will be required to install active stormwater treatment systems.

- **Turbidity** of water is related to the amount of suspended and colloidal matter contained in the water. Increasing turbidity reduces the clarity and penetration of light, negatively impacting aquatic organisms. Suspended solids can settle out, covering up gravel beds and suffocating or driving off benthic organisms. Fish may be harmed by suspended particles which can irritate the gills. In addition, many of the pollutants that are found in stormwater are attached to the small particles that become suspended in the stormwater, increasing their potential toxicity. Turbidity is an indirect measure of total suspended solids (TSS). For these reasons, high turbidity is a useful indicator of stormwater contamination. Turbidity was also chosen as a core parameter, in part, because Chapter 173-201A WAC includes a turbidity standard, and Ecology studies have demonstrated a poor statistical correlation between turbidity and TSS. Turbidity sampling provides a more direct basis for determining compliance with water quality standards. Turbidity sampling can be conducted on-site if the Permittee purchases a turbidity meter. Ecology also believes turbidity is an indicator of good housekeeping practices.
- **pH**. The permit requires all Permittees to sample for pH to determine the acidity/alkalinity of the discharge. Extremes in pH are toxic to fish and unsuitable for ground water used as a drinking water source. Rainfall is typically slightly acidic as it hits the ground, but buffers quickly, achieving near neutral pH. Stormwater discharges with significantly higher or lower pH values strongly indicate that the stormwater has been contaminated. The permit authorizes the use of paper or a calibrated pH meter for measuring pH, unless the discharge is subject to a pH effluent limitation (Condition S5.C). Permittees subject to a pH effluent limitation must use a pH meter.

  The permit assigns Permittees a pH benchmark of between 6.0 and 9.0. This benchmark reflects the federal technology-based secondary treatment standards applied to discharges from wastewater treatment plants. In addition, this benchmark corresponds to the water quality criterion applied to many water bodies that specifies: pH shall be in the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.5 units. [WAC 173-201A-200(1)(g)] This benchmark value is assigned to most industrial categories in the EPA's 2015 MSGP and is recommended for all categories by the National Academies of Sciences, Engineering, and Medicine (2019).
- **Visible Oil Sheen.** Ecology retained the visible oil sheen requirement from the previous permit. If visible oil sheen is observed by the permittee at a sampling location during a stormwater discharge event, it is considered an excursion of the benchmark. This benchmark is based on Ecology's best professional judgment that stormwater associated with industrial activity with a visible petroleum oil sheen is likely to discharge cancer causing pollutants including, but not limited to, benzene, metals, and polycyclic aromatic

hydrocarbons (PAH)

- **Total Copper.** The total copper benchmark was derived using a Monte Carlo simulation as the statistical method. The methodology for the Monte Carlo simulation was adapted from a similar analyses that was performed by Herrera Consultants to calculate the total copper benchmark in the Industrial Stormwater General Permit (Herrera 2009). The major change in our methodology is that instead of fitting the data to a distribution we used an empirical distribution. This Monte Carlo simulation draws from the empirical distribution, which is the observed data. The Monte Carlo simulation explores the likelihood of exceeding the relevant water quality standard for discharges at different levels of copper at the relevant dilution factor. 100,000 iterations or trials were run to calculate each benchmark. For each trial, the application independently selects:
    - A record from the receiving water data,
    - A record from the benchmark data,
    - A record from the hardness data(for freshwater only, hardness is not used in marine calculations).

  The total copper in the receiving water (Ct.tot) is calculated using a dilution factor (DF), the total copper from the receiving water (AMB) and the benchmark total copper (BM) using the equation:

  $$Ct.tot = \frac{1}{DF * BM} + \left(1 - \frac{1}{DF}\right) * AMB$$

  The dissolved copper (Ct.dis) is calculated using the translator observed ratio of dissolved copper to total copper.

  The use of a dilution factor in deriving the benchmark is not considered the authorization of a mixing zone, but Ecology has determined that a modest dilution factor 5 is protective and consistent with WAC 173-201A-400. The conservative dilution factor of 5 used in this calculation is consistent with the dilution factor used in similar calculations in the previous BYGP and for calculations in the ISGP.

- **Total Zinc.** Ecology retained from the current permit the benchmarks for total zinc. The maximum daily benchmarks for total zinc in discharges of stormwater runoff to both fresh and marine waters is 90 ug/L.
- **Petroleum Hydrocarbons (Diesel Fraction).** Ecology added sampling requirements for total petroleum hydrocarbons (NWTPH-Dx). Ecology based the requirements to sample for these parameters on its best professional judgment that these pollutants are reasonably likely to be present in stormwater discharges from boatyards. The 10 mg/L benchmark for TPH has based upon the TPH-Dx effluent limitation used in industrial stormwater permits in Washington State.

DISCHARGES TO IMPAIRED SURFACE WATERS

Section 303(d) of the Federal Clean Water Act requires Washington State periodically to prepare

a list of all surface waters in the State for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These waterbodies are water quality-limited estuaries, lakes, and streams that fall short of State surface water quality standards, and are not expected to improve within the next 2 years.

Waters placed on the 303(d) list require the preparation of total maximum daily loads (TMDLs), a key tool in the work to clean up polluted waters. TMDLs identify the maximum amount of a pollutant to be allowed to be released into a waterbody so as not to impair uses of the water, and allocate that amount among various sources.

Ecology's assessment of which waters to place on the 303(d) list is guided by Federal laws, State water quality standards, and the State 303(d) policy. This policy describes how the standards are applied, requirements for the data used, and how to prioritize TMDLs, among other issues. The goal is to make the best possible decisions on whether each body of water is impaired by pollutants, to ensure that all impaired waters are identified and that no waters are mistakenly identified.

The previous version of the BYGP addressed discharges to impaired surface waters by listing specific impaired water bodies and effluent limits. This method of applying limits proved to be ineffective at addressing the current list of impaired water bodies. Therefore, the new version of the BYGP is consistent with the method of addressing discharges to these waters found in the Industrial Stormwater General Permit. Current information about Washington States 303(d) list can be found on Ecology's Assessment of state waters and 303d list[5].

This draft permit applies water quality-based numeric effluent limitations for facilities discharging to impaired water bodies that are "listed" due to pollutants typically present in Boatyard stormwater discharges. Facilities discharging to any waterbodies with 303(d)-listings (Category 5) would be subject to numeric effluent limitations for the 303(d)-listed parameter (e.g., if receiving waterbody listed for total copper, the facility would be subject to a numeric effluent limitation for total copper), or in the case of a sediment quality impairment (Category 5 and/ or Puget Sound Sediment Cleanup Site), a numeric effluent limitation for Total Suspended Solids (30 mg/L). The technical basis for these limitations is described below.

- **pH.** Facilities with outfalls to freshwater on the 303(d) list for pH are subject to a water quality based numeric effluent limitation, applied end-of-pipe, as follows:
    - Between 6.0 and 8.5 if the 303(d) listing was for high pH only;
    - Between 6.5 and 9.0 if the 303(d) listing was for low pH only; and
    - Between 6.5 and 8.5 if the 303(d) listing was for both low and high pH.

These limitations are based upon the aquatic life criteria in WAC 173-201A-200(1)(g).

Facilities with outfalls to marine waters on the 303(d) list for pH are subject to a water quality based numeric effluent limitation of between 7.0 and 8.5, applied end-of-pipe. This effluent limitation is based on the aquatic life criteria in WAC 173-201A-210(1)(f).

- **Total Copper**. Facilities with outfalls to waterbodies on the 303(d) list for Total Copper

[5] https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d

are subject to a water quality based numeric effluent limitation. This effluent limitation will be derived as the dissolved copper criteria at the time of permit coverage, based upon receiving water type (freshwater or marine) and hardness, and a total/dissolved translator factor, in accordance with WAC 173-201A-240(3), applied end-of-pipe as a "daily maximum" limit.

- **Total Zinc**. Facilities with outfalls to waterbodies on the 303(d) list for Total Zinc are subject to a water quality based numeric effluent limitation. This effluent limitation will be derived and assigned at the time of permit coverage based upon receiving water type (freshwater or marine) and hardness, and total/dissolved conversion factor, in accordance with WAC 173-201A-240(3), applied end-of-pipe as a "daily maximum" limit.
- **Total Lead**. Facilities with outfalls to waterbodies on the 303(d) list for Total lead are subject to a water quality based numeric effluent limitation. This effluent limitation will be derived and assigned at the time of permit coverage based upon receiving water type (freshwater or marine) and hardness, and total/dissolved conversion factor, in accordance with WAC 173-201A-240(3), applied end-of-pipe as a "daily maximum" limit.
- **Sediment Quality Impairment**. Facilities with outfalls to Category 5 sediment impaired waterbodies (Sediment Management Standards, Chapter 173-204 WAC) are subject to a water quality based numeric effluent limitation of 30 mg/L Total Suspended Solids (TSS). This limitation is based upon a best professional judgment determination that stormwater discharges with less than 30 mg/L TSS will not cause or contribute to a violation of sediment management standards.

Discharges to sediment-impaired waterbodies defined as a Puget Sound Sediment Cleanup Sites are also subject to numeric and narrative effluent limitations. These sites are, or will be, undergoing cleanup under the authority of the Model Toxics Control Act (MTCA) and/or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund.

In addition to meeting the 30 mg/L TSS numeric effluent limit, Permittees discharging to a Puget Sound Sediment Cleanup Site must also implement additional storm drain line cleaning BMPs, solids sampling, and reporting, per Condition S2.E.4.

Effluent Limitations for Discharges to Waterbodies with Approved TMDLs

Ecology plans to continue implementing a permit application review process to identify discharges to impaired waters with an approved or established Total Maximum Daily Load (TMDL). Where an operator indicates on its application for coverage form that the discharge is to one of these waters, Ecology will review the applicable TMDL to determine as a threshold matter whether the TMDL includes requirements that apply to the individual discharger or its industrial sector. Ecology will determine whether any more stringent requirements are necessary to comply with the WLA, whether compliance with the existing permit limits is sufficient, or, alternatively, whether an individual permit application is necessary. If Ecology determines that additional requirements are necessary, Ecology will incorporate the final limits as site-specific terms to the facilities general permit coverage.

Condition S2.E is intended to implement the requirements of 40 CFR 122.44(d)(1)(vii)(B), which requires that water quality based effluent limits "are consistent with the assumptions and requirements of any available wasteload allocation for the discharge ... ." Because WLAs for stormwater discharges may be specified in many different formats, Ecology plans to ensure that these requirements are properly interpreted and communicated to the Permittee in a way that can be implemented.

DISCHARGES TO THE GROUND

A treatment technology identified as an economical treatment method in an engineering report for shipyard stormwater was discharging to an infiltration basin or trench lined with metal-absorbent material. This treatment was called "enhanced filtration" (Hart Crowser, 1997). Any discharge to an infiltration basin or trench must be located far enough from surface water so as not to be deemed a surface discharge due to hydraulic continuity. In addition, the discharge must comply with the groundwater standards. This permit continues to require that this type of discharge be at least 200 feet from the nearest surface water and meet maximum daily limits of 1,000 µg/L for total copper; and 1,020 ug/L for total zinc. The limit for copper is the groundwater criterion for copper, and the limit for zinc is technology-based. Both limits should be obtainable with proper BMPs at the facility. Meeting the limits at the point of discharge to the infiltration basin or trench (the treatment device) eliminates the need for groundwater sampling. This condition is continued from the current permit.

Sediment Quality Criteria

There is little data to judge the impact of boatyard activity on sediment quality. One study found that sediment quality in two Puget Sound boatyard/marinas was well below current sediment quality criteria for copper, lead, and zinc (Crecelius, E. et al, 1989). Ecology collected sediment samples at three boatyards in 2006 to determine the impact of boatyard stormwater runoff to sediment quality (Ecology, 2006). Sediment contamination appeared to correlate with stormwater runoff contamination. Ecology believes that controlling the sources of the pollutants in stormwater will cause a reduction of pollutants in the sediments.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

ANTI-DEGRADATION

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330) is to:

1) Restore and maintain the highest possible quality of the surface waters of Washington.
2) Describe situations under which water quality may be lowered from its current condition.

3) Apply to human activities that are likely to have an impact on the water quality of surface water.
4) 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).
5) 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.

Tier I and Tier II are considered in this permit. Ecology has determined that no BYGP-covered facilities discharge to Tier III waters.

Tier I Antidegradation Plan

Protection and Maintenance of Existing and Designated Uses (WAC 173-301A-310) states:

1) Existing and designated uses must be maintained and protected. No degradation may be allowed that would interfere with, or become injurious to, existing or designated uses, except as provided for in this chapter.
2) For waters that do not meet assigned criteria, or protect existing or designated uses, the department will take appropriate and definitive steps to bring the water quality back into compliance with the water quality standards.
3) Whenever the natural conditions of a water body are of a lower quality than the assigned criteria, the natural conditions constitute the water quality criteria. Where water quality criteria are not met because of natural conditions, human actions are not allowed to further lower the water quality, except where explicitly allowed in this chapter.

[Statutory Authority: Chapters 90.48 and 90.54 RCW]

To comply with Tier I, the draft BYGP applies water quality-based limitations to stormwater discharges, as discussed earlier in this section. To comply with Tier II, the draft BYGP proposes to continue implementing the Tier II Antidegradation Plan that was reviewed by the Pollution Control Hearings Board and affirmed in on April 25, 2011in *Findings of Fact, Conclusions of Law, and Order PCHB Nos. 09-135 through 09-141*, excerpted below:

"After hearing on the merits, the Board concludes that Ecology has complied with the Tier II antidegradation requirements, and that the previously issued Stay should be dissolved. In 2009, after discontinuance of the TAPE program, the Legislature directed Ecology to create a Stormwater Technical Resource Center to provide tools for stormwater management, as funding becomes available. RCW 90.48.545. Initial funding has allowed this effort to proceed through TAPE, and the process described in the original Fact Sheet and public notice has resumed after an initial delay. We also give deference to Ecology's interpretation of WAC 173-201A-320(6) and

how it should be applied in the context of general permits. It is reasonable and valid for Ecology to conclude that this rule allows the adaptive management scheme of the permit, combined with regular updates of the SWMM which capture new and emerging technologies, to stand as the method to comply with antidegradation requirements in the general permit context."

Tier II Antidegradation Plan

***Background*:** Federal regulations and the Water Quality Standards for Surface Waters of the State of Washington establish a water quality antidegradation program. WAC 173-201A-320 contains the Tier II antidegradation provisions for the state's surface water quality standards.

A Tier II analysis is required when new or expanded actions are expected to cause a measurable change in the quality of a receiving water that is of a higher quality than the criterion designated for that waterbody in the water quality standards. WAC 173-201A-320(1). WAC 173-201A-320(3) defines a measureable change as specific reductions in water quality, and defines "new or expanded actions" as "human actions that occur or are regulated for the first time, or human actions expanded such that they result in an increase in pollution, after July 1, 2003[.]" This definition includes facilities that first began to discharge pollutants, or increased the discharge of pollutants after July 1, 2003. The definition also applies to those facilities that discharged pollutants prior to July 1, 2003, but were regulated by Ecology for the first time after July 1, 2003. This Antidegradation Plan applies to those applicants for coverage under the BYGP that are subject to a Tier II antidegradation analysis.

Formal Adaptive Process to comply with WAC 173-201A-320(6):

WAC 173-201A-320(6) states that "the antidegradation requirements of this section can be considered met for general permits and programs that have a formal process to select, develop, adopt, and refine control practices for protecting water quality and meeting the intent of this section. This adaptive process must:

1) Ensure that information is developed and used expeditiously to revise permit or program requirements.
2) Review and refine management and control programs in cycles not to exceed five years or the period of permit reissuance,
3) Include a plan that describes how information will be obtained and used to ensure full compliance with this chapter. The plan must be developed and documented in advance of permit or program approval under this section."

Permit Development Process

Ecology uses a formal process to develop and reissue the BYGP every five years. The process includes selecting, developing, adopting, and refining control practices to protect water quality and meet the intent of WAC 173-201A-320. All NPDES permits, including the BYGP, are effective for a fixed term not to exceed five years (40 CFR §122.25). Each time Ecology reissues the BYGP, it evaluates the effluent limits and permit conditions to determine if it should incorporate additional or more stringent requirements.

Ecology's evaluation includes a review of information on new stormwater pollution prevention and treatment practices. Ecology may incorporate these practices into the BYGP as permit

conditions or in support of effluent limits. This approach works to reduce the discharge of pollutants incrementally during each successive new five-year permit cycle. Sources of such information include, but are not limited to:

- **Public comments and testimony** provided during listening sessions and the public comment period on the draft permit. Ecology encourages the public to share what is working and what is not. Ecology uses this formal public process to review and refine stormwater management and control requirements in each successive permit.
- **Ecology's Stormwater Management Manuals (SWMMs)**. Ecology updates the SWMMs periodically based on new information and science. The updates include a public involvement process. The BYGP requires Permittees to select BMPs from the most recent edition of the SWMMs (or approved equivalent SWMMs). Therefore, the BMPs contained in the updated SWMMs are adopted and used expeditiously to refine and improve the effectiveness of these stormwater controls to protect water quality and meet the intent of the anti-degradation provisions in the water quality standards.
- **Technology Assessment Protocol – Ecology (TAPE) process**. This formal process involves reviewing and testing treatment technologies for eventual adoption into Ecology's Stormwater Management Manuals. The TAPE – Emerging Technologies Program of the Washington Stormwater Center[6] provides assistance to Ecology's TAPE Program by:
    - Coordinating and reviewing applications, sampling plans, and technical reports submitted to Ecology
    - Coordinating and compiling reviews by the Board of External Reviewers (BER).
    - Working with the Stakeholder Advisory Group (SAG) to revise guidance documents and provide direction and input

The TAPE process stimulates the development and use of innovative stormwater technologies, used at facilities covered under the BYGP.

- **Ecology stormwater staff** (inspectors, enforcement staff, permit writers and engineers) attend training and conferences, confer with regulatory agency staff nationally and locally; and review professional journals and scientific literature. Ecology conducts research on stormwater management practices and the effect of stormwater discharges on water quality. Ecology uses its expertise in the field of stormwater management to adopt and refine stormwater controls and management practices in the SWMMs and BYGP.
- **BYGP requires adaptive management**. In addition to the formal programmatic improvements to the SWMM and BYGP described above, the BYGP contains an

[6] https://www.wastormwatercenter.org/stormwater-technologies/tape/

adaptive management process. The process requires Permittees to implement timely revisions to their Stormwater Pollution Prevention Plans (SWPPPs) when stormwater discharges exceed benchmarks. As such, stormwater controls on individual projects are subject to ongoing refinement (i.e., addition of new BMPs and/or enhancement of existing BMPs) that reduces the amount of pollutants that would otherwise be discharged to receiving waterbodies.

Public Notice of the General Permit Antidegradation Plan and Individual Actions

Since Ecology has chosen to address Tier II anti-degradation in accordance with WAC 173-201A-320(6), Ecology will not perform site-specific analyses of each "new or expanded action" proposed for coverage under the permit. However, it is important that the public be able to weigh in on whether individual actions are "necessary and in the overriding public interest". The antidegradation rule establishes a refutable presumption that they do, but only through a public notice process does the general public have an opportunity to question individual actions.

Ecology will require the general permit applicant's public notice to include language regarding Tier II antidegradation. Specifically, when an applicant runs the public notice per WAC 173-226-130(5), the notice will include all public notice information currently required on the BYGP application form including name/location of the facility and the receiving water.

MONITORING REQUIREMENTS

DISCHARGES OF PRESSURE-WASH WASTEWATER

Discharges of pressure-wash wastewater are restricted from discharging to waters of the state. Ecology requires monitoring by those boatyards that discharge to non-delegated POTWs. The monitoring schedule for discharges of pressure-wash wastewater will be the same as the schedule in the current permit: Once monthly in June, July, August, and September. The POTW limits and monitoring frequency in this permit were originally adopted from METRO's pretreatment limits. However the latest version of this permit has been updated to include the minimum federal standards for pretreatment programs for non-delegated POTW's (40 CFR 433.15 and 40 CFR 433.17). Therefore, the maximum daily limits for total zinc and total lead have been updated to comply with the minimum limits set in 40 CFR 433. Pretreatment limits established by delegated POTWs have similar limits and monitoring requirements for discharge into their systems.

Samples and measurements taken to meet the requirements of this general permit must represent the volume and nature of the monitored discharge within the monthly monitoring period, including representative sampling of any unusual discharge or discharge condition such as bypasses, upsets, and maintenance-related conditions affecting effluent quality.

DISCHARGES OF STORMWATER RUNOFF TO WATERS OF THE STATE

The Permittee must monitor discharges of stormwater runoff from the areas of the facility where industrial activity occurs. The Permittee must collect samples from a location or locations affected by boatyard-related activities and as noted on the application for coverage. If stormwater runoff from the industrial areas of a facility occurs as sheet flow, then the Permittee must construct a collection point to collect an adequate sample volume that is representative of the entire industrial area. If stormwater runoff discharges do not occur during a monthly sampling period, then the Permittee must indicate that on the discharge monitoring report (DMR) for that monitoring period.

The monitoring schedule for discharges in the permit retains the previous permit's requirement to sample once monthly in October, November, January, April, and May. However the new permit has replaced the "seasonal average" measurement and benchmark and replaced it with an additional sampling month of March. The "seasonal average" benchmark was confusing to permittees and did not provide any new information regarding discharge of pollutants from the site. The additional month of March was selected to capture a month of relatively high boatyard activity during the wet season.

Permittee's must use appropriate methods and procedures when collecting samples and reporting data to ecology. Detailed guidance on how to correctly sample stormwater can be found in the Stormwater Sampling Manual[7]. The use of inappropriate sampling methods can result in inaccurate results and may not "represent the volume and nature of the monitored discharge". Permittees must ensure that they use appropriate methods and procedures in order

[7] https://apps.ecology.wa.gov/publications/SummaryPages/1503044.html

to meet this permit requirement.

The proposed permit includes additional sampling requirements. Under the proposed permit, Permittees would be required to sample within 12 hours of a stormwater discharge that occurs during a sampling period. This change is intended to capture the "first flush" of contaminants from a site. This change does not require permittees to sample outside of business hours or during unsafe conditions. The proposed permit also includes requirements that are intended to clarify standard sampling procedures. These clarifying changes include:

1) Allowing single grab samples, time-proportional samples, or flow-proportional samples
2) If a permittee takes multiple samples in a sampling period, they should calculate and report the monthly average.
3) Where possible, Permittees should collect samples at the point of discharge.

Permittees must sample each discharge point unless from substantially identical areas.

ANALYTICAL PROCEDURES

Analytical methods used to meet the monitoring requirements specified in this general permit must conform to the latest revision of the "Guidelines Establishing Test Procedures for the Analysis of Pollutants" contained in 40 CFR 136. However, if an alternate method from 40 CFR 136 is sufficient to produce measurable results in the sample, the Permittee may use that method for analysis. If the Permittee uses an alternate method, it must report the test method and quantitation level on the DMR. If the Permittee is unable to obtain the required quantitation level due to matrix effects, the Permittee must report the matrix-specific method detection limit and quantitation level on the DMR.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

Ecology based Special Condition S9 (Reporting and Recordkeeping Requirements) on its authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-226-090). The reporting and recordkeeping requirements are based on the federal and state authorities, which allow Ecology to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges. Section 308(a)(3)(A)(v) of the Clean Water Act and 40 CFR 122.41(h) provide federal authority. RCW 90.48 and WAC 173-226-090 provide state authority. Keeping records and reporting provide practical measures that allow the Permittee and Ecology to assess compliance with the requirements of this permit.

Permittees must submit discharge monitoring reports (DMRs) to Ecology by the 28th day of the month immediately following every month during which monitoring is required. Unless authorized by a written waiver from Ecology, Permittees must submit their DMRs electronically using the online Ecology WebDMR program[8]. Their data will then be automatically stored in Ecology's Permitting and Reporting Information System (PARIS). Permittees unable to submit electronically (e.g., those who do not have an Internet connection) must contact their Ecology regional permit administrator to request a waiver and to obtain instructions on how to provide hardcopy paper versions of the required reports and documentation. Since about the year 2010, Ecology has been asking NPDES and state waste discharge Permittees to provide their monitoring data electronically to expedite their required reporting and minimize errors in the transfer of their data into PARIS.

NON-ROUTINE AND UNANTICIPATED WASTEWATER

Non-routine and unanticipated wastewater consists of process wastewater not identified in Special Condition S1 (Permit Coverage Required), not routinely discharged, and not anticipated at the time of permit application, such as waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems. The Permittee must address any such wastewaters in accordance with the terms of Special Condition S5 (Non-Stormwater Miscellaneous Discharges).

STORMWATER POLLUTION PREVENTION PLAN

In accordance with 40 CFR 122.44(k) and 40 CFR 122.44 (s), the reissued permit includes requirements for the development and implementation of a stormwater pollution prevention plan (SWPPP) along with best management practices (BMPs) to minimize or prevent the discharge of pollutants via stormwater discharged from areas associated with industrial activity to waters of the State.

BMPs constitute best conventional pollutant control technology (BCT) and best available

[8] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

technology economically achievable (BAT) for stormwater discharges. Facilities that discharge stormwater from their site to a surface waterbody or to a stormwater conveyance system that discharges to a surface waterbody must prepare a SWPPP. Ecology has determined that each Permittee must develop a SWPPP and implement adequate BMPs in order to meet the requirements of "all known, available, and reasonable methods of prevention, control, and treatment" (AKART).

The purpose of a SWPPP is to prevent the contamination of stormwater to the maximum extent practical. The SWPPP must identify the potential contaminants to stormwater, the potential sources of stormwater contamination from industrial activities, and the actions that the facility must implement to manage stormwater and the sources of contamination to comply with the requirement under Chapter 90.48 RCW to prevent or minimize contamination of stormwater to protect the beneficial uses of waters of the State.

The proposed permit includes additional required SWPPP sections. These changes include:

1) SWPPP Map requirements. The new permit includes more specific map requirements. The SWPPP map is an important tool to help permittees and inspectors understand the interaction between pollution sources and stormwater on a facility. These map requirements are included in order to insure that the SWPPP map will contain suffiecient information about site operations, layout, stormwater flow, and contaminant sources.
2) Catch Basin Cleaning. Permittees must implement a variety of source control BMP's to effectively prevent stormwater contamination. The new permit requires that permitees clean stormdrain catch basins when they become at least 60% full of debris. This additional BMP will prevent contamination of stormwater in catch basins.
3) Spill Prevention and Emergency Cleanup Plan(SPECP): The proposed permit includes expanded requirements in the SPECP and requires permittees to include additional information in their SPECP. These updates will help protect stormwater from spills and hazardous substances.
4) The SWPPP now requires that Permittees include a description of how they will notify vessel owners at the facility that state and federal regulations prohibit the discharge of sewage and gray water into waters of the state.
5) The SWPPP now requires that Permittees include documentation of washpad or dry dock decontamination procedures, personnel, and equipment that will be used to comply with S3.J and S3.M.
6) The SWPPP now requires that any permittee who conducts vessel deconstruction activities onsite under the BYGP document the BMP's that they plan to implement to protect stormwater and to comply with S3.M.

Each Permittee must continuously review and revise its SWPPP as necessary to assure that stormwater discharges do not degrade water quality. Each Permittee must retain the SWPPP on site or within reasonable access to the site and make it available for review by Ecology when requested.

BEST MANAGEMENT PRACTICES

Best management practices (BMPs) are the actions identified to manage, prevent contamination of, and treat stormwater. BMPs identify 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 identify 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. Permittees must ensure that their SWPPP includes the operational and structural source control BMPs listed as "applicable" in the applicable Ecology stormwater management manual.

While Permittees that provide areas at their facilities for individual boat owners and operators to service their own vessels themselves ("do-it-yourselfers" or their independent contractors) may not be held directly responsible for the bad practices of those individuals, Permittees remain liable for the water quality of discharges of stormwater runoff from those do-it-yourself areas.

Therefore, Permittees should require do-it-yourselfers and independent contractors to adhere to the same BMPs as those required for boatyards by the general permit. Do-it-yourselfers and independent contractors who fail to implement all the required or appropriate BMPs must be prohibited from working at the boatyard. The Permittee may document its compliance with this BMP by (1) Maintaining written agreements with those non-boatyard individuals that they will implement all of the mandatory BMPs, and (2) Excluding repeat offenders from its facilities.

The proposed permit includes the following additional Mandatory BMP's or changes to existing BMP's:

1) The permit now requires that all solvent, paint, and chemical containers be securely closed when not in use. (S3 F. and S3. I)
2) The permit now includes specific BMP's for permittee's that use a dry dock or graving dock. These BMP's include thoroughly cleaning the dry dock or graving dock of all contaminants and pressure wash the area into a wastewater collection system prior to flooding the area or discharging stormwater from the dry dock or graving dock.

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 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 onto the ground. Good housekeeping and maintenance schedules help prevent incidents that could result in the release of pollutants. Operational BMPs are cost-effective methods to control pollutants and protect the environment. The SWPPP must identify all the operational BMPs and how and where they are to be implemented. For example, the SWPPP must identify the subject

matter of applicable training, when training will take place, and who is responsible to assure that employee training occurs.

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 structural 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.

Volume and Flow Control BMPs

Ecology recognizes the need to include specific BMP requirements for stormwater runoff quantity control to protect beneficial water uses, including fish habitat. Controlling the rate and volume of stormwater discharge maintains the health of the watershed. New facilities and existing facilities undergoing redevelopment must implement the requirements for peak runoff rate and volume control identified in the applicable "Stormwater Management Manual for Western [or Eastern] Washington (2019)". Permittees should identify volume and flow control measures that they can implement over time to reduce the impact of uncontrolled release of stormwater.

Ecology-Approved Stormwater Management Manuals

Consistent with RCW 90.48.555(5) and (6), the reissued permit requires each Permittee to implement BMPs described in the applicable "Stormwater Management Manual for Western [or Eastern] Washington (2019)", or practices that are demonstrably equivalent to practices contained in stormwater technical manuals approved by Ecology. The SWPPP must document that the BMPs not selected from Ecology-approved manuals provide an equivalent level of pollution prevention, compared to the applicable stormwater management manuals, including the technical basis for the selection of the stormwater BMPs (scientific, technical studies, and/or modeling) which supports the performance claims for the selected BMPs.

PERMIT TERM

Ecology is issuing this permit for a term of 5 years, as allowed by WAC 173-226-220 and 40 CFR 122.46.

ECONOMIC IMPACT ANALYSIS

Ecology's State Waste Discharge General Permit Program rule (WAC 173-226-120) requires an economic impact analysis (EIA) of any draft wastewater general permit intended to directly cover small businesses. The analysis is required to serve the following purposes:

- A brief description of the compliance requirements of the draft general permit.
- The estimated costs for complying with the permit, based on existing data for facilities to be covered under the general permit.
- A comparison, to the greatest extent possible, of the cost of compliance for small businesses with the cost of compliance for the largest ten percent of the facilities to be covered under the general permit.
- A discussion of what mitigation the permit provides to reduce the effect on small businesses (if a disproportionate impact is expected), without compromising the mandated intent of the permit.

RCW 19.85.020(4) defines a small business as any business entity, including a sole proprietorship, corporation, partnership, or other legal entity, that is owned and operated independently from all other businesses, and that has fifty or fewer employees.

In 2010, Ecology deemed the level of performance from multimedia filtration as AKART. The term AKART has been defined as an engineering and economic decision process, which is equivalent to the Federal BCT, BAT determination. (Chapter 4 in Ecology, 2015). Therefore, Ecology combined the EIA with an economic evaluation of AKART and summarized the evaluations in Ecology Publication Number 10-10-018, in April 2010.

The 2015 EIA determined the general permit had a disproportionate impact on small business, but there were no opportunities for mitigation without compromising the mandated intent of the permit.

The 2021 EIA (Ecology, 2021) again determined the general permit had a disproportionate impact on small business, but there were no opportunities for mitigation without compromising the mandated intent of the permit.

INVASIVE SPECIES CONTROL

The permit contains reporting and treatment requirements for Level 1, 2, or 3 prohibited invasive species(Chapter 220-640 WAC) and designated quarantined plant species(Chapter 16-752 WAC). Zebra Mussels((*Dreissena polymorpha*) and Quagga Mussels (*Dreissena rostriformis*

bugensisare) are listed as prohibited level 1 species (WAC 220-640-030) and represent a threat to the biological integrity of Waters of the State. Therefore, the permit contains inspection, reporting, and quarantine requirements to minimize the potential for infestation of zebra mussels, quagga mussels, or other prohibited species.

Zebra mussels and Quagga mussels have spread throughout the Great Lakes and other waterways in several states. Two Canadian provinces believe they were accidentally introduced into Lakes Erie and St. Clair in the 1980s. This introduction has been attributed to a discharge of ballast water from a commercial freighter, but other introductions are known to have come from hull biofouling.

Zebra and Quagga mussels will likely continue to expand their range as naturally flowing water carries their young, known as veligers, downstream. Commercial and recreational vessels and equipment can also spread zebra mussels when they move from infested waters to uninfested waters. Adult mussels may attach to any hard surface and the veligers may be transported in water. Placing items in un-infested waters without following precautions may lead to an accidental introduction of mussels. Any boats or vessels from outside the State of Washington should be carefully examined, and all boats or vessels from east of the Rocky Mountains should be considered infected.

Potential carriers include:

- Boats, trailers and other equipment
- Scientific equipment
- SCUBA and snorkel gear
- Live wells
- Raw water
- Plants and animals

Vessels must be cleaned and drained after used in a water body (RCW 77.135.110).

Guidance for identifying Zebra and Quagga mussels[9] and cleaning vessels is provided by the Washington Invasive Species Council[10]. Additionally, permittee's can call WDFW's Aquatic Invasive Species hotline with any questions at 888-WDFW-AIS.

[9] https://invasivespecies.wa.gov/priorityspecies/zebra-and-quagga-mussels/
[10] https://invasivespecies.wa.gov/

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1) Peer review is overseen by an independent third party.
2) Review is by staff internal to Department of Ecology.
3) Review is by persons that are external to and selected by the Department of Ecology.
4) Documented open public review process that is not limited to invited organizations or individuals.
5) Federal and state statutes.
6) Court and hearings board decisions.
7) Federal and state administrative rules and regulations.
8) Policy and regulatory documents adopted by local governments.
9) Data from primary research, monitoring activities, or other sources, but that has not been
10) incorporated as part of documents reviewed under other processes.
11) Records of best professional judgment of Department of Ecology employees or other
12) individuals.
13) Sources of information that do not fit into one of the other categories listed.

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40 CFR 122.3: Exclusions. [7]

40 CFR 122.41: Conditions applicable to all permits. [7]

40 CFR 122.44: Establishing limitations, standards, and other permit conditions. [7]

40 CFR 125.3: Technology-based treatment requirements in permits. [7]

40 CFR 131.36: Toxics criteria for those states not complying with Clean Water Act section 303(c)(2)(B). [7]

40 CFR 131.45: Revision of certain Federal water quality criteria applicable to Washington. [7]

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Chapter 173-201A WAC: Water quality criteria for surface waters, bases for effluent limits, and other requirements. [5]

Chapter 173-204 WAC: Sediment management standards, bases for effluent limits, and other requirements. [5]

Chapter 173-205 WAC: Whole effluent toxicity testing and limits. [5]

Chapter 173-216 WAC: State waste discharge permit program. [5]

Chapter 173-220 WAC: Procedures for NPDES permits. [5]

Chapter 173-224 WAC: Determination and payment of fees. [5]

Chapter 173-226 WAC: Procedures for issuing and administering NPDES general permits. [5]

Chapter 173-240 WAC: Plans and reports for construction of wastewater facilities. [5]

Chapter 173-303 WAC: Dangerous Waste Regulations. [5]

Chapter 197-11-855 WAC: SEPA rules. [5]

Chapter 220-640 WAC: Invasive/Nonnative Species. [5]

Chapter 371-08 WAC: Environmental and Land Use Hearings Office (Pollution Control Hearings Board). [5]

Table 1: Facilities Currently Covered under this Permit

Facility Name	Permit Number	Receiving Waterbody (specific to general)	Waterbody Type
2440 West Commodore, LLC	WAG031055	Salmon Bay, Lake Washington Ship Canal	Fresh
Albert Jensen & Sons, Inc.	WAG994386	Friday Harbor, San Juan Channel	Marine
Bremerton Yacht Club	WAG030011	Phinney Bay, Dyes Inlet, Port Washington Narrows	Marine
Cap Sante Marine South Yard	WAG030022	Fidalgo Bay	Marine
CI McNeil Island Stewardship	WAG031038	Balch Passage, Puget Sound (South)	Marine
CSR Marine East - Shilshole; Seaview East Boatyard	WAG031052	Salmon Bay, Lake Washington Ship Canal	Fresh
CSR Marine South	WAG030009	Puget Sound (Central)	Marine
Dagmars Marina	WAG030059	Snohomish River, Possession Sound (North), Puget Sound	Fresh
Deer Harbor Boatworks	WAG030103	N/A	N/A
Delta Marine Industries, Inc.	WAG030091	Duwamish Waterway	Fresh
Endor Marine, LLC	WAG030047	Salmon Bay, Lake Washington Ship Canal	Fresh
Gig Harbor Boat Yard, Inc.	WAG031009	Gig Harbor, Colvos Passage, Puget Sound	Marine
Hilton Harbor Marina	WAG030024	I and J Street Waterway, Bellingham Bay (Inner)	Marine
Howard Moe Enterprises	WAG031048	Hoquiam River, Grays Harbor (Inner)	Fresh
Hylebos Marina	WAG031020	Hylebos Waterway, Commencement Bay (Inner)	Marine
Islands Marine Center	WAG030072	Fisherman Bay, San Juan Channel	Marine
Kitsap Marine Industries, Inc.	WAG030027	Sinclair Inlet	Marine
La Conner Maritime Services	WAG030074	Swinomish Channel, Padilla Bay, Skagit Bay	Marine
Landings At Colony Wharf	WAG030006	Whatcom Creek Waterway, Bellingham Bay	Marine

Facility Name	Permit Number	Receiving Waterbody (specific to general)	Waterbody Type
Lyles Boats and Motors	WAG994443	Wenatchee River	Fresh
Marine Servicenter	WAG030095	Flounder Bay, Burrows Bay, Rosario Strait	Marine
Marine Services & Assist	WAG030083	Cornet Bay, Puget Sound	Marine
Mariners Haven	WAG030070	Oak Harbor, Saratoga Passage, Skagit Bay	Marine
Modutech Marine, Inc.	WAG031016	Hylebos Waterway, Commencement Bay (Inner)	Marine
Nordlund Boat Company, Inc.	WAG031025	Upper Turning Basin, Hylebos Waterway, Commencement Bay (Inner)	Marine
North Harbor Diesel, Inc.	WAG030123	Fidalgo Bay, Guemes Channel, Rosario Strait	Marine
North Island Boat Company	WAG030139	Flounder Bay, Burrows Bay, Rosario Strait	Marine
North Lake Marina	WAG030014	Lake Washington	Fresh
Northern Marine Industries, Inc.	WAG030135	Salmon Bay, Lake Washington Ship Canal	Fresh
On-Board Marine Services LLC	WAG030053	Semiahmoo Bay, Strait of Georgia	Marine
Pacific Coast Yachting Services	WAG031053	Lake Union, Lake Washington Ship Canal	Fresh
Pacific Marine Center	WAG994368	Fidalgo Bay	Marine
Platypus Marine, Inc.	WAG031047	Port Angeles Harbor, Strait of Juan de Fuca (Central)	Marine
Point Roberts Resort, LP	WAG030037	Strait of Georgia	Marine
Port of Edmonds	WAG030034	Puget Sound (North Central)	Marine
Port of Everett Marina West	WAG030131	Possession Sound (North), Puget Sound	Marine
Port of Ilwaco Boatyard & Marina	WAG031017	Baker Bay, Columbia River	Fresh
Port of Port Angeles Boatyard	WAG031027	Port Angeles Harbor, Strait of Juan de Fuca (Central)	Marine
Port of Port Townsend	WAG031006	Port Townsend Bay, Admiralty Inlet, Puget Sound (North)	Marine

Facility Name	Permit Number	Receiving Waterbody (specific to general)	Waterbody Type
Reed Brothers Shipyard	WAG030038	Reads Bay, Lopez Sound, Rosario Strait	Marine
Roche Harbor Marine, Inc.	WAG994262	Roche Harbor, Haro Strait	Marine
Sea Marine	WAG031003	Admiralty Inlet, Puget Sound (North)	Marine
Seattle Mobile Marine Fisherman's Terminal	WAG994251	Salmon Bay, Lake Washington Ship Canal	Fresh
Seattle Yachts	WAG031051	Fidalgo Bay	Marine
Seaview Boatyard, Inc. North	WAG030118	Squalicum Harbor, Bellingham Bay (Inner)	Marine
Seaview Boatyard, Inc. West	WAG030043	Shilshole Bay, Puget Sound (Central)	Marine
Seaview Yacht Service Fairhaven	WAG030137	Bellingham Bay (Inner)	Marine
Shelton Yacht Club	WAG031010	Oakland Bay	Marine
Skyline Marina	WAG030039	Flounder Bay, Burrows Bay, Rosario Strait, Strait of Georgia	Marine
South Bend Boat, LLC	WAG031000	Willapa River	Fresh
South Park Marina	WAG030045	Duwamish Waterway	Fresh
Suldans Boat Works, Inc.	WAG030046	Sinclair Inlet	Marine
Sundance Yacht Sales	WAG030119	Semiahmoo Bay, Strait of Georgia	Marine
Swantown Boatyard	WAG031043	East Bay, Budd Inlet, Puget Sound	Marine
Swegle Boatworks	WAG031042	Willapa River	Fresh
Tacoma Marine Services	WAG031026	Thea Foss Waterway, Commencement Bay, Puget Sound	Marine
The Shipyard, LLC	WAG031039	Hoquiam River	Fresh
Union Marine	WAG030025	Lake Union	Fresh
West Sound Marina, Inc.	WAG030054	West Sound	Marine
Yacht Performance Center	WAG030106	Portage Bay, Lake Union / Lake Washington Ship Canal	Fresh

Facility Name	Permit Number	Receiving Waterbody (specific to general)	Waterbody Type
Yacht Fish Marine	WAG030076	Lake Union	Marine
Yachtfish Marine Port Orchard	WAG030016	Sinclair Inlet	Fresh
Zittels	WAG031012	Baird Cove, Nisqually Reach, Puget Sound	Marine

Table 2: Characteristics of Untreated Boatyard Pressure-Washing Wastewater (1992)

Parameter	Average Concentration	Greatest Reported Value or Range
Arsenic (µg/L)	80	100
Copper (µg/L)	55,000	190,000
Lead (µg/L)	1,700	14,000
Tin (µg/L)	490	1,400
Zinc (µg/L)	6,000	22,000
Oil and grease (mg/L)	None visible	None visible
pH (S.U.)	7.2	6.7 to 8.2
Total Suspended Solids (mg/L)	800	3,100
Turbidity (NTU)	469	1,700

The source of these data was the study conducted by METRO (1992).
µg/L = Micrograms per liter. mg/L = Milligrams per liter.
NTU = Nephelometric turbidity units.
S.U. = Standard units.

Table 3: Summary of Pressure-Washing Wastewater Monitoring Data for the Boatyard General Permit, 2016 through 2020

	Copper (Lim=2.4)	**Lead (Lim=1.2)**	**Zinc (Lim=3.3)**	**pH (5.0-11.0)**
Number of Permittees with Monitoring Data	10	10	10	10
Number of Values	206	188	202	173
Median of Values **(mg/L or S.U.)**	0.35	0.003	0.089	8.1
Average of **(mg/L or S.U.)**	18.21	0.14	3.61	NA
Number of pH Values Greater than 9.0	---	---	---	35
Number of pH Values less than 5.0	---	---	---	1

Lim = Discharge Limit.
mg/L = Milligrams per liter.
S.U. = Standard units. NA = Not applicable.

Table 4: Selected Statistics for Pollutants in Stormwater Runoff from Boatyards Reported in Discharge Monitoring Reports

onitoring Period Date Range (Notes)	Parameter	Number of Results	Average (ug/L)	Median (ug/L)	Maximum (ug/L)
1998 - 2002	Total Copper	na	na	410	na
2006 - 2008 (Excluding all values <1.0)	Total Copper	381	492	110	29,100
2006 - 2008	Oil & Grease	200	4,710	5,000	31,000
2006 - 2008	TSS	403	26,400	10,000	1,200,000
2008 - 2010 (Only boatyards without treatment)	Total Copper	239	192	72	5,650
2008 - 2010	Total Lead	133	20.6	4.0	550
2008 - 2010	Total Zinc	206	344	140	6,000
2011 - 2014	Total Copper	844	143	31.1	5,770
2011 - 2014	Total Lead	816	10.9	1.0	1,045
2011 - 2014 (Fresh waters only)	Total Lead	167	11.6	1.0	806
2011 - 2014	Total Zinc	845	157	49.0	5,100
2016 - 2020	Total Copper	1059	121.2	29.1	31,917
2016 - 2020	Total Lead	101	14.2	1.1	494
2016 - 2020	Total Zinc	1053	132.3	25.2	28,648

na = Data are not available.
ug/L = Micrograms per liter.
TSS = Total suspended solids.

Table 5: Toxic Pollutants in Stormwater Runoff - Selected Boatyards, April & May 2006

Parameter (ug/L)	Water Quality Criteria (fresh water / marine)	Swantown (marine)	Swantown (marine)	Port Townsend (marine)	Seaview (fresh water)
		04/08/06	04/13/06	05/23/06	04/08/06
1-Methylnaphthalene	na	0.06 U	2.9	0.06 U	0.19
2,4-Dimethylphenol	(380 / 850)	0.16	3	0.06 U	1.1
2-Methylnaphthalene	na	0.06 U	3.3	0.06 U	0.27
2-Methylphenol	na	0.19	0.54	0.07	1
2-Nitrophenol	na	0.25 J	0.25 U	0.26 U	0.26 U
4,6-Dinitro-2-methylphenol	na	0.59 J	0.63 U	0.64 U	0.64 U
4-Chloro-3-methylphenol	na	0.12 U	0.13 U	8.4	0.13 U
4-Methylphenol	na	0.85	0.06 U	1.2	3.1
Acenaphthene	(670 / 990)	0.06 U	0.11	0.06 U	0.22
Acenaphthylene	na	0.06 U	3.9	0.06 U	0.42
Anthracene	(9,600 / 110,000)	0.06 U	0.07	0.06 U	0.58
Benzo(a)anthracene	(0.0028 / 0.031)	0.06 U	0.05 J	0.14	0.24
Benzo(a)pyrene	(0.0028 / 0.031)	0.06 U	0.06 U	0.04 J	0.26
Benzo(b)fluoranthene	(0.0028 / 0.031)	0.06 U	0.05 J	0.2	0.39
Benzo(g,h,i)perylene	na	0.06 U	0.08	0.06 J	0.16
Benzo(k)fluoranthene	(0.0028 / 0.031)	0.06 U	0.07	0.15	0.4
Benzoic acid	na	5.8	1.3 U	0.74 J	1.3 U
Benzyl alcohol	na	0.64	0.13 U	0.13 UJ	4.5
bis(2-Ethylhexyl) phthalate	(1.8 / 5.9)	2.8	1.3 UJ	2.1	15
Butylbenzylphthalate	na	0.39	0.14	0.03 J	2.1
Caffeine	na	2.7	0.61	0.46	15
Carbazole	na	0.06 UJ	0.06 UJ	0.06 UJ	1.2 J
Chrysene	(0.0028 / 0.031)	0.07 J	0.08	0.26	0.82
Dibenzofuran	na	0.06 U	0.08	0.06 U	0.29
Diethylphthalate	na	0.28 J	0.05 J	0.09 J	1.2
Dimethylphthalate	(313,000 / 2,900,000)	1	0.22	0.68	13 E
di-N-Butylphthalate	na	2.6	0.54	0.16 J	4.3
Fluoranthene	(300 / 370)	0.12	0.35	0.42	2.4
Fluorene	(1,300 / 1,400)	0.06 U	0.29	0.06 U	0.33
Indeno(1,2,3-cd)pyrene	(0.0028 / 0.031)	0.06 U	0.06 U	0.05 J	0.12
Isophorone	(8.4 / 600)	0.06 U	0.06 U	0.06 U	0.35
Naphthalene	na	0.06 U	2.6	0.06 U	0.32
Phenanthrene	na	0.13	0.12	0.15	2.1
Phenol	(21,000 / 4,600,000	0.84	0.55	0.29	4.6
Pyrene	(960 / 11,000)	0.1	0.63	0.38 J	1.3
Retene	na	0.08	0.06 U	0.06 U	0.58

The source of these data was the study conducted by Ecology in 2006 (Ecology Pub. No. 06-03-041).
E = Exceeds calibration range.
J = Estimated concentration. na = None available.
U = Not detected at or above the reported value.
UJ = Not detected at or above the reported estimated value.

Table 6: Organotin in Stormwater Runoff from Selected Boatyards, April and May 2006

Parameter (ug/L)	Water Quality Criteria (freshwater / marine)	Swantown (marine) 04/08/06	Swantown (marine) 04/13/06	Swantown (marine) 05/31/06	Port Townsend (marine) 05/23/06	Port Townsend (marine) 04/08/06	Port Townsend (marine) 05/23/06
Dibutyltin	na	0.041 J	0.002 UJ	0.033 J	0.010	0.064 J	0.10
Monobutyltin	na	0.001 UJ	0.001 UJ	0.012 J	0.006 J	0.001 UJ	0.014
Tributyltin	(0.460 / 0.37)	0.22	0.13	0.010 J	0.18 J	6.0	0.36

The source of these data was the study conducted by Ecology in 2006 (Ecology Pub. No. 06-03-041).
J = Estimated concentration. na = None available
UJ = Not detected at or above the reported estimated value.

APPENDIX A - ACRONYMS AND UNITS OF MEASURE

Table 7: Acronyms

Acronym	Meaning
AKART	All known, available, and reasonable methods of prevention, control, and treatment
BAT	Best available technology economically achievable
BCT	Best conventional pollutant control technology
BMP	Best management practice
BPT	Best practicable control technology currently available
CFR	Code of Federal Regulations
CWA	Clean Water Act
DMR	Discharge monitoring report
Ecology	Washington State Department of Ecology
EIA	Economic Impact Analysis
EPA	Environmental Protection Agency
METRO	Municipality of Metropolitan Seattle
MSD	Marine sanitation device
NAICS	North American Industry Classification System
NMTA	Northwest Marine Trade Association
NPDES	National Pollutant Discharge Elimination System
PCHB	Pollution Control Hearings Board
POTW	Publicly-owned treatment works
PSA	Puget Soundkeeper Alliance
RCW	Revised Code of Washington State
SEPA	State Environmental Policy Act, RCW 43.21C
SIC	Standard Industrial Classification
SWPPP	Stormwater pollution prevention plan
TMDL	Total maximum daily load
TSD	Technical Support Document
TSS	Total suspended solids
WAC	Washington Administrative Code
WLA	Wasteload allocation

Table 8: Units of Measure

Unit of Measure		Meaning
cfm		Cubic feet per minute
Degree F		Degree Fahrenheit
mg/L		Milligrams per liter
µg/L		Micrograms per liter
S.U.		Standard units

APPENDIX B - LEGAL BASES FOR BOATYARD PERMIT CONDITIONS

Ecology bases the terms and conditions of its NPDES general permits on State and Federal law and regulations. The summary below identifies each of the conditions in the boatyard general permit, describes their content, and cites the laws and regulations upon which they are based.

Special Condition S1 Permit Coverage Required

Identifies the activities, discharges, and facilities that require coverage by the permit; the discharges that are authorized or conditionally authorized under the permit; the geographic area covered by the permit; discharges and facilities excluded from coverage under the permit; and conditions and requirements for permit modification.

40 CFR 122.26 (g)

40 CFR Part 122.41 (f)

RCW 90.48.195

WAC 173-226-050 (2), (3), and (4)

WAC 173-226-070 (1) (d)

WAC 173-226-080 (1) (a), (d), and (j) WAC 173-226-100 (2)

WAC 173-226-130 (5)

Special Condition S2 Discharge Limits

Identifies the standards and requirements for compliance with the permit, including discharge limits and other requirements for impaired waterbodies.

40 CFR Part 125.3

40 CFR Part 403

Chapter 173-201A WAC

WAC 173-226-070 (1), (2), (3), and (6) (a) and (c)

Chapter 173-303 WAC

Special Condition S3 Mandatory Best Management Practices

Identifies requirements for facility operation and maintenance, including operational restrictions that support compliance with the permit. This condition describes the 13 mandatory BMPs that are required at permitted boatyards for demonstrating that those boatyards have complied with AKART. These BMPs address the use of vacuum sanders, tidal grids, and paints and solvents; in-water maintenance and repair of vessels; management of solid residues, sacrificial anodes, chemicals, oils, and bilge water; decontamination of washing pads; discharge of sewage and gray water; and oversight of do-it-yourselfers.

40 CFR Part 122.2

40 CFR Part 122.41 (e)

RCW 90.48.555 (5) and (6) WAC 173-201A-110

WAC 173-226-070 (1) (d) and (3) (d)

Special Condition S4 Compliance with Water Quality Standards

Identifies the applicable State standards for compliance with the permit, including those for surface and groundwater quality and sediment management.

40 CFR Part 131.36

RCW 90.48.010

Chapter 173-200 WAC Chapter 173-201A WAC Chapter 173-204 WAC

Special Condition S5 Non-Stormwater Miscellaneous Discharges

Identifies those non-stormwater discharges conditionally approved and the requirements for that approval.

WAC 173-226-070 (1) (d)

WAC 173-226-100 (2)

Special Condition S6 Monitoring Requirements

Identifies the required sampling and analytical procedures for monitoring the characteristics and toxicity of discharges; and requirements for effectiveness monitoring, visual inspections, and operational recordkeeping.

40 CFR Part 122.22

40 CFR Part 122.41 (j) (1) and (4)

40 CFR Part 136

Chapter 173-50 WAC

Chapter 173-205 WAC

WAC 173-226-090 (1) (a), (b), (c), (d), and (e); (4); and (5)

Special Condition S7 Response to Monitoring Results that Exceed Benchmarks

Identifies the required reporting and corrective actions to respond to benchmark exceedances.

40 CFR Part 122.41 (e) and (l) (5)

WAC 173-226-070

WAC 173-226-080 (1) (i) and (4)

Special Condition S8 Stormwater Pollution Prevention Plan

Identifies the requirement for and elements of a facility-specific stormwater pollution prevention

plan.

40 CFR Part 122.26 (b) (14)

40 CFR Part 122.44 (k) and (s) 40 CFR Part 125.3

Chapter 90.48 RCW

WAC 173-226-070

Special Condition S9 Deconstruction and Site Management Plan

Identifies the requirement for and elements of a project specific Deconstruction and Site Management Plan .

40 CFR Part 122.26 (b) (14)

40 CFR Part 122.44 (k) and (s) 40 CFR Part 125.3

Chapter 90.48 RCW

WAC 173-226-070

Special Condition S10 Reporting and Recordkeeping Requirements

Identifies the results that the Permittee must record; the requirements for engineering documentation, notification and posting, reporting, records retention, public access to information, coordination of inspections, and other reporting.

40 CFR Part 122.41(j) (2) and (3); (k); and (l) (1), (2), (4), (5), (6), and (7)

WAC 173-226-080 (1) (b) and (4)

WAC 173-226-090 (2) and (3) (a) and (b)

WAC 173-226-180 (4)

WAC 173-226-200 (3) (d)

Special Condition S11 Bypass

Identifies the types of permitted bypasses, the procedures that permittees must follow to maintain compliance with this permit, and Ecology's possible responses to a bypass event.

40 CFR Part 122.41 (m)

RCW 90.48.120 WAC 173-201A-410

Special Condition S12 Solid Waste Management

Identifies the requirement for the permittee to properly manage solid wastes and prevent the release of leachate.

WAC 173-226-070 (3) (d)

WAC 173-226-100

Special Condition S13 Reporting for Zebra Mussel Control

Identifies notification, quarantine, and pump-out requirements for vessels carrying zebra mussels.

Chapter 77 RCW

WAC 77.135

Special Condition S14 Termination of Coverage under This Permit

Explains the process and requirements for a permittee to obtain approval from Ecology for terminating its coverage under this permit.

40 CFR Part 122.41 (f)

RCW 90.48.190

RCW 90.48.195

WAC 173-226-080 (3)

WAC 173-226-180 (5)

WAC 173-226-230 (1)

WAC 173-226-240

General Condition G1 Discharge Violations

Identifies the requirement that discharges and activities must comply with the terms and conditions of the permit.

WAC 173-226-080 (a), (d), and (j)

General Condition G2 Proper Operation and Maintenance

Identifies and expands on the requirement for proper operation and maintenance of treatment and control facilities.

40 CFR Part 122.41 (e)

WAC 173-226-080 (1) (i)

General Condition G3 Right of Entry

Identifies Ecology's right to enter the permittee's property to inspect, collect samples, and review documents.

40 CFR Part 122.41 (i)

RCW 90.48.090

WAC 173-226-080 (1) (h)

WAC 173-226-250 (2)

General Condition G4 Permit Coverage Revoked

Identifies the conditions when Ecology may revoke coverage under the permit.

40 CFR Part 122.41 (f)

Chapter 43.21B RCW RCW 90.48.090

RCW 90.48.190

RCW 90.48.465

Chapter 173-224 WAC

WAC 173-226-130 (5)

WAC 173-226-240

General Condition G5 General Permit Modification and Revocation

Identifies the conditions when the permit may be modified or revoked.

40 CFR Part 122.41 (f)

RCW 90.48.190

RCW 90.48.195

Chapter 173-226 WAC

General Condition G6 Reporting a Cause for Modification

Identifies the conditions when the permit modification may be required and Ecology's subsequent requirement for a new application for coverage from the permittee.

40 CFR Part 122.41 (f), and (l) (1)

40 CFR Part 122.62

WAC 173-220-150 (1) (b)

WAC 173-226-080 (1) (a), (b), and (d)

General Condition G7 Toxic Pollutants

Identifies requirements for compliance with the Clean Water Act.

CWA Section 307(a) WAC 173-226-070

General Condition G8 Other Requirements of 40 CFR

Incorporates other requirements from Federal regulations.

40 CFR Part 122.41

40 CFR Part 122.42

General Condition G9 Compliance with Other Laws and Statutes

Identifies the requirement for the permittee to comply with other applicable statutes, ordnances, and regulations.

40 CFR Part 122.41

40 CFR Part 122.42

WAC 173-226-070 (3) and (5)

General Condition G10 Additional Monitoring

Identifies the possibility that Ecology may assign additional monitoring requirements.

CWA Section 308

40 CFR Part 122.41 (h)

General Condition G11 Payment of Fees

Identifies the requirement for the permittee to pay fees and Ecology's ability to take actions if fees are not paid.

RCW 90.48.160

RCW 90.48.465

Chapter 173-224 WAC

WAC 173-220-150 (1) (d) (viii)

General Condition G12 Removed Substances

Prohibits the discharge of pollutants removed during treatment.

40 CFR Part 125.3 (g)

RCW 90.48.010

RCW 90.48.080

WAC 173-220-130 (a)

General Condition G13 Requests to be Excluded from Coverage under a General Permit

Identifies how the permittee may be excluded from coverage under this general permit.

WAC 173-216-070

WAC 173-220-040

WAC 173-226-080 (3) and (4)

WAC 173-226-200 (7)

WAC 173-226-240 (4)

General Condition G14 Transfer of Permit Coverage

Identifies how the permittee might transfer permit coverage to another party.

40 CFR Part 122.41 (l) (3)

40 CFR Part 122.61

40 CFR Part 122.63 (d)

WAC 173-226-210

General Condition G15 Duty to Reapply

Identifies the requirement for the permittee to reapply for permit coverage before the current coverage expires.

CWA Section 301

40 CFR Part 122.21 (d)

40 CFR Part 122.41 (b)

RCW 90.48.170

WAC 173-226-080 (2)

WAC 173-226-200 (1), (3), and (4)

WAC 173-226-220 (2)

General Condition G16 Penalties for Violating Permit Conditions

Identifies penalties for violating the terms and conditions of the permit.

40 CFR Part 122.41 (a) (2) and (3)

RCW 90.48.140

RCW 90.48.144

WAC 173-226-250 (3), (4), and (5)

General Condition G17 Signatory Requirements

Identifies the requirements for who must sign and certify applications, reports, and other information provided to Ecology.

40 CFR Part 122.22

40 CFR Part 122.41 (k)

WAC 173-226-090 (3) (b)

WAC 173-226-200 (3) (d)

General Condition G18 Appeals

Identifies the types and methods of appealing the permit and its applicability to particular facilities.

RCW 43.21(B) WAC 173-226 190

General Condition G19 Severability

Identifies the effect of invalidation of particular terms of the permit.

RCW 90.48.904

General Condition G20 Reporting Other Information

Identifies the requirement for informing Ecology of new or corrected information.

40 CFR Part 122.41(h) and (l) (8)

General Condition G21 Duty to Comply

Identifies the requirement for the permittee to comply with all conditions of this permit, or face possible penalties for violating the Clean Water Act.

40 CFR Part 122.41 (a) and (l) (8)

APPENDIX C - PUBLIC INVOLVEMENT INFORMATION

The Washington State Department of Ecology (Ecology) proposes to reissue the Boatyard National Pollutant Discharge Elimination System and State Waste Discharge General Permit (permit). The current permit was issued on July 6, 2016, and is scheduled to expire at the end of July 2021. The draft permit and accompanying fact sheet, which explains the technical basis for the permit, are available for review and public comment from ***Wednesday, March 3, 2021, through Friday, April 16, 2021, at 11:59 pm*.** Ecology will host two public workshops and public hearings on the draft permit.

Purpose of the Permit

The statewide permit provides coverage for boatyards that discharge stormwater runoff from areas with industrial activity directly to the ground, to a surface waterbody, or to a storm sewer system that drains to a surface waterbody. This general permit also regulates process wastewater from pressure washing in boatyards, unless the wastewater is discharged to a municipal sanitary sewer operated by a sewer authority (POTW) with a delegated pretreatment program. Under Federal and State water quality laws (Federal Clean Water Act and State Water Pollution Control Act), a permit is required for the discharge of stormwater or wastewater from these facilities.

Copies of the Draft Permit and Fact Sheet

The draft permit and fact sheet will be available online at Ecology's Boatyard General Permit webpage[11] by end of day on March 3, 2021. You may also request physical copies from Matthew Tietjen at matthew.tietjen@ecy.wa.gov or (360) 407-6401.

Ecology Contact
James Hovis
WA State Department of Ecology
P.O. Box 47696
Olympia, WA 98504-7696
Telephone: (564) 999-3244
Email: james.hovis@ecy.wa.gov

Assistance for Persons with Disabilities

To request ADA accommodation for disabilities, call Ecology at 360-407-7285 or visit Ecology's ADA Accessibility web page[12]. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

En Español

Para información en español, por favor comuníquese con Gustavo Ordóñez al (360) 407-6619.

Submitting Written Comments

Ecology will accept written comments on the draft permit and fact sheet from **March 3, 2021, through April 16, 2021 by 11:59 pm.** Ecology prefers online comment submission via the eComment

[11] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Boatyard-general-permit
[12] https://ecology.wa.gov/About-us/Accessibility-equity/Accessibility

form (link below) on the permit webpage. Written comments by mail must be postmarked by **April 16, 2021**. Comments should reference specific permit text when possible.

Online eComment form [13] (preferred)

By mail (See address information above)

Public Workshops and Hearings

The purpose of the workshop is to explain the general permit and to answer questions prior to the formal public hearing. The purpose of the hearing is to provide an opportunity for people to give formal oral testimony and written comments on the proposed draft permit. Oral testimony will receive the same consideration as written comments.

The public hearing will begin immediately following the public workshop and will conclude when public testimony is complete.

The Boatyard General Permit hearings will occur at the following dates and times:

Evening: Monday, April 12, 2021,
5:00 pm
Webinar
Join the Webinar[14]*

Morning: Tuesday, April 13, 2021,
10:00 am
Webinar
Join the Webinar[15]*

*Workshops and hearings offered via webinar allow individuals to view the presentation and provide testimony via computer or mobile device. *Ecology is not currently offering in-person hearings due to COVID-19 safety concerns.*

Issuing the Permit

After Ecology receives and considers all public comments, we will make a final decision on permit issuance. Ecology expects to make a decision on the general permit in **June 2021**. If you have questions, please contact James Hovis, Boatyard General Permit Writer, at james.hovis@ecy.wa.gov or (360) 407-6588.

The response to comments will also be posted on Ecology's boatyard webpage[16].

Right to Appeal

Permittees and the public have a right to appeal this permit to the Pollution Control Hearings Board (PCHB) within 30 days of the date of issuance of the final permit. The appeal process is governed by

[13] http://wq.ecology.commentinput.com/?id=MYQsb
[14] https://watech.webex.com/watech/onstage/g.php?MTID=ed53ef308d59f82ad60b67d9adb2ab3db
[15] https://watech.webex.com/watech/onstage/g.php?MTID=e462a6dcadec11f6d91f96fdf2bd53d6f
[16] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Boatyard-general-permit

Chapter 43.21B RCW and Chapter 371-08 WAC.

To appeal you must do the following within 30 days of the date of issuance 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). Email is not accepted.

Appealing parties must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses

Department of Ecology
Attn: Appeals Processing Desk 300
Desmond Drive SE
Lacey, WA 98503

Pollution Control Hearings Board
1111 Israel Road SW
Suite 301
Tumwater, WA 98501

Mailing Addresses

Department of Ecology
Attn: Appeals Processing Desk
P.O. Box 47608
Olympia, WA 98504-7608

Pollution Control Hearings Board
P.O. Box 40903
Olympia, WA 98504-0903

APPENDIX D - RESPONSES TO COMMENTS

This Response to Comments addresses comments received on the formal draft of the Boatyard General Permit and addresses changes made to the formal draft based upon comments received. It is included as Appendix D to the Fact Sheet for the Boatyard General Permit and will be published as a separate document on the permit webpage. The public comment period for this permit began on March 3, 2021 and lasted until 11:59 p.m. of April 16, 2021, as noted in Appendix C.

Look for the Response to Comments document on the Boatyard General Permit webpage[17].

[17] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Boatyard-general-permit

March 2024

Issue Paper

Water Quality Standards Aquatic Life Toxics Criteria Update 2024: Issue Paper

DEQ

This document was prepared by
The Oregon Department of Environmental Quality
Water Quality Standards Program
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State of Oregon
DEQ Department of Environmental Quality

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800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

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Executive Summary

The Oregon Department of Environmental Quality (DEQ) is initiating a rulemaking to update Oregon's aquatic life criteria for toxic pollutants, as prioritized during the 2021 water quality standards Triennial Review. The updates will further protect aquatic life and help ensure Oregon's water quality standards are based on the latest science. EPA's nationally recommended criteria protect aquatic life from toxic effects and provide guidance to States and Tribes. Once EPA has released criteria recommendations for a given chemical, states must either adopt sufficiently protective criteria for that chemical into their standards or provide a reason for not doing so during their triennial review process. DEQ's last comprehensive update of aquatic life criteria happened in 2004, and EPA has issued new or revised criteria recommendations for several chemicals since that time.

DEQ
State of Oregon
Department of
Environmental
Quality

To determine the extent of the proposed update to Oregon water quality standards, DEQ compared Oregon's aquatic life criteria with the latest EPA recommendations. DEQ found that Oregon has no aquatic life criteria for five chemicals (acrolein, aluminum, carbaryl, diazinon, nonylphenol) and criteria that are different than EPA recommendations for seven additional chemicals (endosulfan, cadmium, lindane, mercury, selenium, silver and tributyltin). After a review of each chemical, DEQ is proposing to update Oregon's aquatic life criteria to match EPA recommendations for aluminum, acrolein, cadmium, carbaryl, diazinon, and tributyltin.

DEQ is not proposing to update mercury or nonylphenol criteria at this time because the most recent EPA recommendations may not protect threatened and endangered salmonids, and mercury criteria are actively being litigated in the Pacific Northwest. DEQ is also not proposing to update selenium criteria at this time because successful application of the most recent selenium aquatic life criterion recommendation will require detailed development of implementation procedures that are beyond the scope and timeline of the present rulemaking. Further, Oregon already has aquatic life criteria for selenium, and Oregon waters do not typically contain high levels of selenium. Finally, DEQ is not proposing to update Oregon's lindane, endosulfan, and silver aquatic life criteria because they are more stringent than EPA recommendations, are based on sound scientific information and provide necessary protection to aquatic life. Further, EPA has not released new criteria recommendations for these chemicals since DEQ last reviewed them in 2004.

In addition to updating aquatic life criteria in rule, DEQ is proposing to remove the non-regulatory aquatic life water quality guidance values for toxic pollutants from Oregon rule for clarity. These values are not water quality criteria and are outdated.

The purpose of this issue paper is to provide background and technical information about the chemicals and aquatic life criteria that were considered in this review, as well as to document the policy implications and the public process during the rulemaking.

Table of contents

Chapter 1: Standards review and status of aquatic life criteria for toxic pollutants

1.1 Reviewing and revising water quality criteria

1.1.1 Introduction

1.1.1.1 Why is an update needed?

The Clean Water Act gives the federal Environmental Protection Agency (EPA) authority to regulate the discharge of pollutants to surface waters. Under this authority, EPA is charged with recommending water quality criteria that protect beneficial uses of waterways. States are then responsible for adopting water quality standards, which include the beneficial uses of the state's waters and the criteria necessary to protect those uses. EPA periodically issues new or revised criteria recommendations for chemicals once sufficient data or new scientific evidence becomes available. Under section 303 of the Clean Water Act, States are expected to review their water quality standards every three years to incorporate new scientific information. Once new or revised criteria recommendations have been issued by EPA, the states are responsible for adopting criteria into state water quality standards or providing EPA with a reason for not doing so.

EPA has issued new or revised aquatic life criteria recommendations for several toxic chemicals since Oregon's last comprehensive update of aquatic life criteria for toxic chemicals in 2004 (ODEQ, 2004) . Therefore, the Oregon's existing aquatic life criteria for several chemicals are not based on EPA's latest recommendations, which incorporate new scientific information, and need to be updated.

1.1.1.2 Purpose of this issue paper

This issue paper provides the technical background and policy basis for Oregon's proposed aquatic life toxics criteria updates. This issue paper also documents the public process during the rulemaking.

1.1.2 Process for updating aquatic life criteria

1.1.2.1 Overview of major federal and state actions for adopting criteria

For a state to adopt water quality standards that are effective for Clean Water Act purposes, both state and federal action is required (Figure 1). Under Section 304(a)(1) of the Clean Water Act, the EPA is required to publish recommendations for water quality criteria that will protect against the known adverse effects of pollutants in water bodies. While EPA is required to publish recommendations for water quality criteria, it is up to the States and Tribes to adopt water quality criteria into their water quality standards to protect the designated uses of water bodies. Once EPA releases criteria for a given chemical, states must either adopt the criteria (or a scientifically defensible alternative) or provide a reason why they will not adopt criteria for that chemical.

The Clean Water Act requires states to review their water quality standards once every three years to ensure that their standards are based on the best available science. This process is called the Triennial Review. After possible criteria updates are identified, states identify the priority water quality standard projects to work on over the next three years, including rulemaking processes to adopt revised criteria if needed. Water quality standards adopted by a state become effective for Clean Water Act purposes only after they are approved by the EPA. During the approval process, the EPA is required to consult with the National Marine Fisheries Service and U.S. Fish and Wildlife Service (generally referred to as "the Services") under the Endangered Species Act. The Services independently analyze data to produce a biological opinion(s) that determines whether the revised criteria would adversely affect or jeopardize threatened and endangered species. If no jeopardy is determined, then EPA may approve the criteria and they become effective. If the proposed criteria are expected to cause jeopardy to endangered species, the federal agency identifies reasonable and prudent alternatives to address the jeopardy concerns. If reasonable and prudent alternatives cannot be identified or if the criteria prevent the reasonable and prudent alternatives from being achieved, EPA may disapprove the criteria, and they would not become effective for Clean Water Act purposes.

If EPA disapproves the adopted state criteria and the state does not move to revise the criteria, then it is EPA's duty to promulgate (that is, to put law into effect by proclamation) federal criteria to be effective in the state for Clean Water Act purposes until the state adopts (and EPA approves) alternate criteria, or until EPA withdraws the criteria.

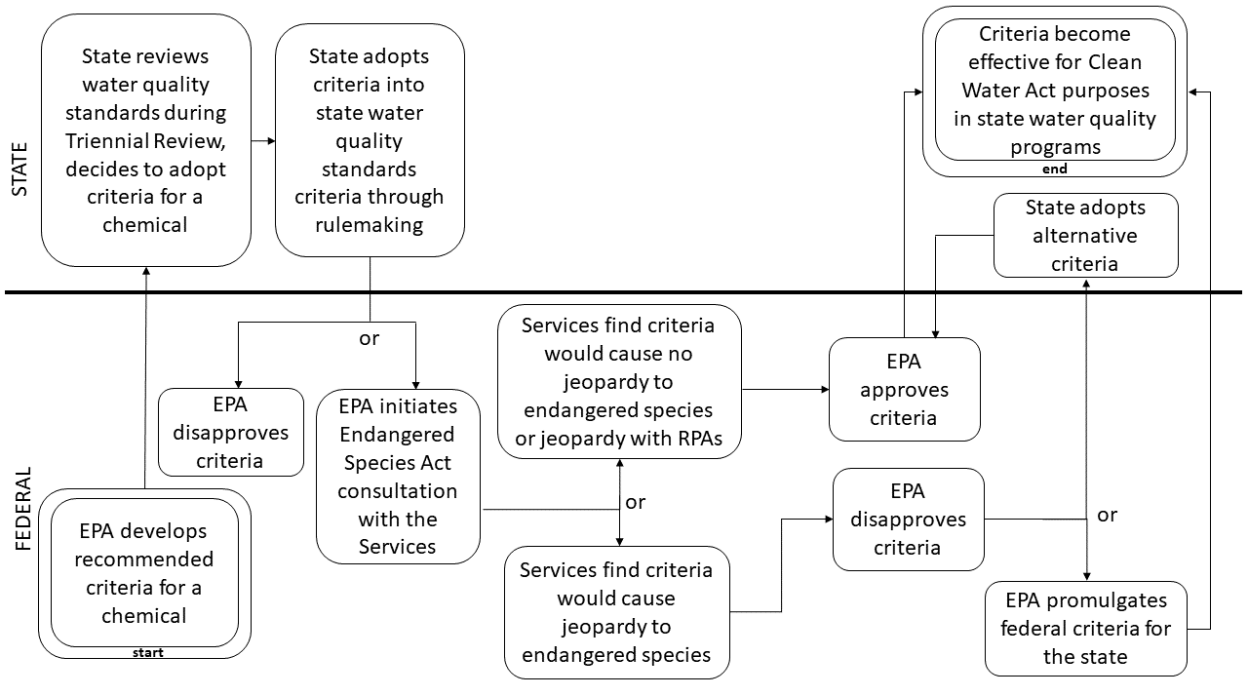

Figure 1. Major federal and state actions required for new or revised criteria to become applicable for Clean Water Act purposes in the state. "RPA" is "Reasonable and Prudent Alternative".

1.1.2.2 Oregon's state rulemaking process to update criteria

During the 2021 Triennial Review, Oregon identified several new or revised EPA aquatic life criteria recommendations that have not yet been incorporated into Oregon's water quality standards. To keep Oregon's rule up-to-date with EPA's recommendations, DEQ decided to initiate a rulemaking process to review and adopt some or all of the new or revised criteria into Oregon rule.

During this process, DEQ obtained technical and policy information on the proposed criteria changes. As part of the public process, Oregon DEQ convened a rulemaking advisory committee composed of multiple stakeholders to review the proposed changes. DEQ will also hold a public hearing and accept and respond to public comment. Once all internal, advisory committee, and public comment is considered, DEQ will make a recommendation regarding criteria adoption to the Environmental Quality Commission while also conveying the input received from the rulemaking advisory committee. In Oregon, the Environmental Quality Commission decides whether to adopt the criteria into state rule.

Once the Environmental Quality Commission adopts criteria into state rule, the criteria rulemaking package must be submitted to EPA for approval before the criteria become applicable for Clean Water Act purposes.

1.1.2.2.1 Rulemaking advisory committee

DEQ convened a rulemaking advisory committee to provide input on the fiscal and economic impacts of the proposed rule amendments, including whether small businesses would be adversely affected by the proposed rule. The committee consisted of representatives from state and federal agencies, local governments, recreational and sport fishing groups, business and industry, environmental organizations, and tribal interests. More information may be found on the committee's web page: Aquatic Life Toxics Criteria 2024 Rulemaking.

Aquatic Life Toxics Criteria Rulemaking Advisory Committee	
Name	**Representing**
Emily Bowes	Rogue Riverkeeper
Michael Campbell	Stoel Rives LLP
Catherine Corbett	Lower Columbia Estuary Partnership
Mike Eliason	Oregon Forest & Industries Council (OFIC)
Raj Kapur Alternate: Julia Crown	Oregon Association of Clean Water Agencies (OR-ACWA)
Hannah LaGassey Alternate: Marnie Keller	Cow Creek Band of the Umpqua Tribe of Indians
Sharla Moffett	Oregon Business & Industry
Lauren Poor	Oregon Farm Bureau
Glen Spain	Pacific Coast Federation of Fishermen's Associations (PCFFA)
Becky Anthony	Oregon Department of Fish and Wildlife
Jeremy Buck	U.S. Fish and Wildlife Service
Cory Engel	Oregon Department of Transportation
Michelle Maier	U.S. Environmental Protection Agency
Rebecca McCoun	Oregon Department of Forestry
Kathryn Rifenburg Alternate: Gilbert Uribe	Oregon Department of Agriculture
Greg Sieglitz	NOAA – National Marine Fisheries Service

DEQ held two rulemaking advisory committee meetings to discuss the proposed rule changes and receive input on the fiscal and economic impact of the proposed rules. Committee members focused on the effect of the environmental protection added by the proposed rules as well as the impacts of the proposed rules to regulated parties and agencies and that implement them. The committee was invited to provide verbal feedback on the first draft Fiscal and Economic Impact Statement at the second meeting on November 13, 2023 and submit any follow-up written comment on the first draft by November 17, 2023 and on the second draft by December 31, 2023.

During the two meetings, DEQ provided information on:

- Scope of the proposed rulemaking, purpose of the project
- Role of the rulemaking advisory committee
- Background on water quality standards and aquatic life toxics criteria in Oregon
- Background on non-regulatory aquatic life water quality guidance values for toxic pollutants
- Scientific and policy basis for the proposed rule amendments (including draft issue paper and draft fact sheet)
- Analysis of the fiscal and economic impact of the proposed rule amendments
- Draft proposed rule language
- The rulemaking process and anticipated timeline

During the first meeting on September 12, 2023, the committee discussed the scope of the rulemaking and expressed an interest in providing feedback on chemicals or chemical characteristics not presently included in the proposed rulemaking. The committee also discussed the technical and policy basis for the proposed criteria recommendations with special focus on utilizing the 'bioavailable' fraction of aluminum to apply the proposed criteria. Several committee members wanted to make sure that DEQ was aware of various data sources for the analyses in the draft issue paper.

At the second meeting on November 13, 2023, the committee continued to discuss the data used in the analyses in DEQ's draft issue paper, noting select areas where data were sparse including stormwater discharge data. The committee discussed the practical impacts of the draft rule language, especially the fiscal and economic impacts of implementing the criteria. The committee also discussed DEQ's proposal to remove Table 31 guidance values from rule and agreed that the removal of those values from rule was appropriate. Some committee members proposed that DEQ emphasize the environmental and economic benefit of adopting the proposed criteria in the fiscal and economic impact statement.

1.1.2.3 Scope and depth of current aquatic life criteria review

During Oregon's most recent 2021 Triennial Review process, DEQ committed to update aquatic life criteria for toxic pollutants during the 2021-2024 period. To do that, DEQ reviewed and evaluated any criteria for which Oregon's rule was different than the latest EPA criteria recommendations. This included aquatic life criteria in Oregon rule that were more stringent (lower), less stringent (higher), and non-existent compared to current EPA recommendations. The Clean Water Act requires that Oregon's water quality criteria be scientifically defensible, which typically means they must be at least as protective of fish and aquatic life as EPA recommended criteria.

Since Oregon's last comprehensive update of aquatic life criteria in 2004, EPA has issued new or revised aquatic life criteria recommendations for ten chemicals, two of which Oregon has since adopted into state water quality standards (copper and ammonia). DEQ reviewed and evaluated EPA's aquatic life criteria recommendations for the remaining eight chemicals (acrolein, aluminum, cadmium, carbaryl, diazinon, nonylphenol, selenium, and tributyltin). For several chemicals (mercury, endosulfan, lindane, and silver) EPA has not released updated criteria recommendations since Oregon's last comprehensive update of aquatic life toxics criteria in 2004, but Oregon's criteria differ from EPA's current recommendations. DEQ also reviewed and evaluated those criteria.

During the review of Oregon's aquatic life criteria, DEQ also reviewed the aquatic life water quality guidance values for toxic pollutants that can be found in Oregon water quality standards. Given that these values are not water quality criteria, DEQ questioned the appropriateness of retaining these values in Oregon rule.

As part of the review of aquatic life criteria, DEQ evaluated whether data from threatened and endangered Oregon species (or close surrogates) were included in EPA's recommended criteria calculations. DEQ did not seek further independent technical review to evaluate the EPA recommended criteria because the goal of this rulemaking was to bring Oregon's water quality standards up-to-date with current EPA recommendations in compliance with the Clean Water Act.

1.1.3 Existing rule

1.1.3.1 Oregon Administrative Rule under review (OAR 340-041-0033 and OAR 340-041-8033)

The objective of this rulemaking is to update Oregon's water quality standards for toxic substances in Oregon Administrative Rule (OAR) 340-041-8033 (Table 30 Aquatic Life Water Quality Criteria for Toxic Pollutants, Table 31 Aquatic Life Water Quality Guidance Values for

Toxic Pollutants, and corresponding reference text) and corresponding reference text in OAR 340-041-0033.

1.2 Protecting water quality and status of aquatic life criteria in Oregon

1.2.1 Background

1.2.1.1 Components of water quality standards

State water quality standards exist to protect and maintain water quality. They have three primary components:

1. Designated beneficial use: the goal for a waterbody, such as fish and aquatic life use.
2. Criteria: limits of a particular chemical or condition in a waterbody, designed to protect a designated use.
3. Antidegradation policy: state framework to maintain existing water quality.

These three components are applied together to protect and preserve water quality in Oregon and all of the uses that state waterbodies provide. Once states establish goals for waterbodies by designating the beneficial uses to be protected, corresponding criteria are established to ensure the uses are protected, i.e. to ensure the use goals are reached.

The designated beneficial uses of Oregon waters include:

- Fish and aquatic life
- Water contact recreation
- Fishing
- Domestic water supply
- Industrial water supply
- Boating
- Irrigation
- Livestock watering
- Aesthetic quality
- Wildlife and hunting
- Hydropower
- Commercial navigation and transportation

In Oregon, two types of numeric criteria currently exist for toxic pollutants. They are aquatic life criteria and human health criteria, and they are applied to waterbodies with select designated uses. Aquatic life criteria, for example, are designed to protect native aquatic life, such as fish, shellfish, and wildlife. In Oregon, aquatic life criteria apply to waters of the state that have been designated for fish and aquatic life uses. Human health criteria often have numeric values to address water consumption and fish and shellfish consumption, and they are designed to protect human health through the beneficial uses of domestic water supply and fishing.

1.2.1.2 How are aquatic life criteria utilized?

Aquatic life criteria are the basis for different water quality programs. Criteria are used to assess waters of the state and determine which need pollution control measures (i.e. Total Maximum Daily Load (TMDL)). Acute and chronic criteria may also be applied in other water quality programs, such as National Pollutant Discharge Elimination System (NPDES) permitting or 401 certification.

1.2.2 Aquatic life criteria and guidance values

1.2.2.1 How are aquatic life criteria structured?

Aquatic life criteria are designed to protect fish, shellfish, and other aquatic life. Recommendations differ for freshwater and saltwater habitats because the conditions and ecosystems are different. When sufficient data are available, aquatic life criteria are structured to protect against short-term (acute) and long-term (chronic) toxicity, including long-term effects like bioaccumulation. Criteria are typically structured to include a numeric value, frequency, and duration. For example, most of Oregon's aquatic life criteria recommendations are structured as follows:

"[Freshwater or saltwater] aquatic organisms and their uses a should not be affected unacceptably if the four-day average concentration of [Chemical X] does not exceed [Y] µg/L more than once every three years on the average and if the one-hour average concentration does not exceed [Z] µg/L more than once every three years on the average." In this example X is a chemical, Y is the chronic numeric value, and Z is the acute numeric value.

While the example above is the most traditional and common format that aquatic life criteria take, some EPA recommended criteria are more complex. Instead of a singular numeric water column value, some criteria are equations. These equations use water quality variables (such as hardness, pH, and/or dissolved organic carbon) to calculate criteria values. Further, some criteria are expressed as tissue concentration values rather than water column concentrations for chemicals that bioaccumulate. Frequencies and durations also might vary to more appropriately reflect the scientific context of the numeric value. For example, the latest chronic selenium criterion recommendation is a fish tissue value that is not to be exceeded.

1.2.2.2 How are aquatic life criteria determined?

EPA has established guidelines that clearly outline acceptable data sources and methods for systematic criterion development in *Guidelines for Deriving Numerical National Water Quality*

Criteria for the Protection of Aquatic Organisms and Their Uses (generally referred to as "the Guidelines") (Stephen et al., 1985). These criteria are designed to be protective of 95% of the aquatic community. Although aquatic life criteria are recommended based on data from the aquatic community, they may be lowered to accommodate sensitive economically or ecologically important species, or threatened or endangered species.

EPA produces recommendations for numeric aquatic life criteria by reviewing information on toxic chemical effects in aquatic organisms, including acute (short-term) and chronic (long-term) toxicity in plants and animals that may include the effects of bioaccumulation (Stephen et al., 1985). Toxicity data must be available from a variety of different families to estimate a chemical level that protects most of the aquatic community.

Generally, the methodology for determining freshwater acute criteria require toxicity test data from at least eight different animal families including vertebrates (such as fish, amphibians), invertebrates (such as insects, mollusks, or crustaceans), and specifically a fish in the family Salmonidae (salmonids). Saltwater acute criteria also require data from at least eight different families including a variety of vertebrates and invertebrates. Once all of the toxicity studies measuring short-term toxic effects (such as mortality) are assembled, toxic effect data are reported at the genus level, and data are then ordered by sensitivity using a species sensitivity distribution approach. Data from the most sensitive genera and safety factors are used to model an acute concentration that is protective of 95% of aquatic organisms for a given exposure period (Stephen et al., 1985). These protective values become the numeric values of the acute criteria. When a species sensitivity distribution approach is used, the four most sensitive genera are typically used in the calculation process, giving them the most weight in determining numeric the criteria values.

Chronic criteria (freshwater or saltwater) can be calculated directly if long-term toxic effect (growth, reproduction) studies are available for eight families, in the same manner as that used to establish acute criteria. Alternatively, if sufficient chronic toxicity data are not available from the appropriate number and diversity of taxonomic groups, the chronic criterion can be established using an acute-to-chronic ratio, which is calculated from paired acute and chronic toxic effect data conducted on the same species from the same laboratory. To use an acute-to-chronic ratio approach, toxicity data must be available from three families including a fish, an invertebrate, and an acutely sensitive species. Once those minimum data requirements are met, the acute toxicity value is divided by the acute-to-chronic ratio to establish the chronic numeric criterion value.

In some cases, EPA uses other data based on sensitive endpoints (behavioral, biochemical, physiological, microcosm, and field studies) to determine the appropriate criterion instead of typical acute or chronic direct toxicity test data. If bioaccumulation is a concern, as it was with

selenium, then data demonstrating the adverse effects of bioaccumulated selenium may be used to establish a criterion. If other water quality variables (such pH, dissolved organic carbon, and/or hardness) affect toxicity and can be modeled, EPA may recommend numeric equations instead of singular numeric values, as is the case with aluminum, cadmium, and others. Regardless of the method for numeric criterion development, more weight is placed on data from sensitive species and genera to ensure that most of the aquatic community is protected by the resulting criteria.

During criteria recommendation development, EPA goes through its own process of external science peer-review, and later public comment before finalizing criteria recommendations.

1.2.2.3 What are aquatic life water quality guidance values for toxic pollutants?

In 1986, EPA produced a list of aquatic life water quality guidance values for toxic pollutants that could be used as benchmarks to protect aquatic life. EPA did not publish aquatic life criteria recommendations for these chemicals because there was not sufficient data to develop criteria using EPA's aquatic life criteria methodology described in Section 1.2.2.2 (EPA, 1986). Some of these chemicals are not identified as priority pollutants. EPA has subsequently developed criteria recommendations for some of the chemicals based on additional data. EPA has not recommended using these guidance values as benchmarks since their aquatic life criteria updates in 1992. (EPA, 1992).

1.2.2.3 EPA aquatic life criteria recommendation revisions and DEQ action

Federal recommendations for ambient water quality criteria date back to 1968 (Federal Water Pollution Control Administration, 1968). Since then, EPA has periodically revised national criteria recommendations for multiple chemicals at a time (the Blue Book (EPA, 1972) , the Red Book (EPA, 1976), the Gold Book (EPA, 1986), the Great Lakes Initiative (EPA, 1996), an update in 1999 (EPA, 1999)). With the National Toxics Rule (EPA, 1992) and California Toxics Rule (EPA, 2001b), EPA promulgated multiple criteria for select states with under protective criteria. EPA also releases criteria recommendations for individual chemicals. Once EPA recommends criteria, those recommendations remain in effect until the criteria are superseded by revised criteria recommendations or until EPA formally withdraws the criteria recommendations. A table of EPA's current nationally recommended aquatic life criteria for toxic chemicals is maintained on the EPA website (https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table) for quick reference.

DEQ's last comprehensive update of aquatic life toxics criteria occurred in 2004. Once Oregon adopted those toxics criteria, EPA initiated Endangered Species Act consultation with the Services. In 2013, after consultation was complete, EPA approved many of the criteria that Oregon adopted in 2004. However, EPA disapproved several of Oregon's freshwater criteria

including those for aluminum, ammonia, cadmium, and copper. In the case of ammonia and copper, EPA issued revised criteria recommendations in the period between Oregon's submission in 2004 and EPA's action in 2013, rendering Oregon's adopted criteria for these chemicals at least in part under protective. For aluminum and cadmium, the Services found jeopardy for threatened and endangered species, leading to an EPA disapproval action for those criteria. Since 2013, Oregon DEQ has adopted new aquatic life criteria with EPA approval for ammonia and copper, and EPA has promulgated federal freshwater criteria for aluminum (effective April 19, 2021) and acute cadmium for Oregon (effective March 6, 2017).

1.2.2.4 Aquatic life criteria under review

Since DEQ's last update of aquatic life criteria, EPA has issued new criteria recommendations for acrolein, carbaryl, diazinon, and nonylphenol and revised recommendations for aluminum, cadmium, selenium, and tributyltin. For aluminum and acute cadmium specifically, EPA promulgated criteria for Oregon, although those criteria are not reflected within state standards. During the present review, DEQ identified 21 aquatic life criteria across nine chemicals for which Oregon's criteria are less stringent or non-existent compared to EPA recommended criteria (Table 1).

Table 1. Status of Oregon's aquatic life criteria relative to EPA recommendations for select chemicals under review

Chemical	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Acrolein	none	None	-	-
Aluminum	none [a]	none [a]	-	-
Cadmium	less stringent [b]	equal [c]	less stringent	less stringent
Carbaryl	none	None	none	-
Diazinon	none	None	none	none
Endosulfan	more stringent	more stringent	more stringent	more stringent
Lindane	equal	more stringent	equal	-
Mercury	less stringent	more stringent	equal	more stringent
Nonylphenol	none	none	none	none
Selenium	more stringent	less stringent	equal	equal
Silver	equal	more stringent	equal	-
Tributyltin	equal	more stringent	more stringent	less stringent

'none' indicates a criterion for which EPA has made a recommendation but Oregon has no criterion in State standards.
'-' indicates there is no recommended EPA criterion.
[a] EPA has promulgated federal freshwater criteria that are effective for Clean Water Act purposes in Oregon, but they have not been adopted into Oregon's standards rules. These federally promulgated criteria (see 40 CFR 131.47) are based on EPA's latest recommended criteria for aluminum (EPA, 2018).
[b] EPA has promulgated a federal freshwater acute criterion that is effective for Clean Water Act purposes in Oregon, but it has not been adopted into Oregon's standards rules. This federally promulgated criterion (see 40 CFR 131.46) is based on EPA's latest recommended criterion for cadmium (EPA, 2016).
[c] This assessment of Oregon's freshwater cadmium criterion is based on a recent court case in Arizona that vacated EPA's 2016 freshwater chronic cadmium criterion recommendation (*Center for Biological Diversity v. United States Environmental Protection Administration et al*, 2023), and not the 2016 recommended criterion (EPA, 2016).

DEQ is proposing to adopt EPA's new or revised recommended criteria for six of the nine chemicals for which at least one of Oregon's aquatic life criteria is less stringent or non-existent compared to current EPA recommendations. This would include adopting all of the most recently recommended criteria for a given chemical, even if that means lowering one criterion (i.e. saltwater chronic) but increasing another (i.e. freshwater acute). The following chemicals are proposed for criteria adoption or revision:

1. Acrolein
2. Aluminum
3. Cadmium
4. Carbaryl
5. Diazinon
6. Tributyltin

For mercury, nonylphenol, and selenium, DEQ is not proposing to adopt new values into state standards at this time. Mercury criteria are actively being litigated in the Pacific Northwest, and concerns have been raised that EPA's most recently recommended mercury aquatic life criteria may not protect salmonids, which comprise several threatened and endangered species in Oregon. DEQ is proposing to wait until EPA and the federal fisheries agencies have agreed upon protective criteria for listed species before updating Oregon's aquatic life criteria for mercury. In the meantime, the EPA's most protective chronic criteria recommendations for mercury have been adopted by Oregon and will remain in effect.

Nonylphenol criteria are currently under ESA consultation, and concerns have been raised about whether they fully protect threatened and endangered species in the Pacific Northwest.

Therefore, DEQ will wait until the ESA review and corresponding biological opinion are completed and addressed by EPA before adopting nonylphenol criteria into state standards.

For selenium, EPA's recommended chronic criterion will require complex and detailed implementation to be successfully applied in water quality programs (permitting, assessment, TMDL, etc.). Given that Oregon already has criteria for selenium and Oregon waters do not have high levels of selenium, DEQ is proposing not to adopt the new selenium criterion recommended by EPA at this time. DEQ may adopt the EPA recommended selenium criteria at a later date after developing and evaluating implementation options.

For endosulfan, lindane, and silver, Oregon's criteria are more stringent than current EPA recommendations because EPA withdrew those criteria recommendations. In 2004, DEQ elected to maintain those withdrawn criteria in Oregon's water quality standards because they were based on sound scientific information and were necessary to protect aquatic life uses. Given that EPA has not issued any criteria recommendation updates since these chemicals were reviewed in 2004, DEQ is proposing to continue to retain the current aquatic life toxics criteria.

More information regarding each chemical considered during the present update can be found in Chapter 2 and the Appendix. Chapter 3 contains a summary of all the numeric aquatic life criteria changes that DEQ is proposing at this time.

1.2.2.5 Aquatic life water quality guidance values for toxic pollutants under review

During the last comprehensive update of aquatic life criteria in 2004, DEQ elected to retain the non-regulatory water quality guidance values for toxic pollutants (Table 31, OAR 340-041-8033) in Oregon rule. Originally, these values were included in the Gold Book by EPA in 1986 (EPA, 1986) for chemicals when there were not sufficient data to generate water quality criteria using using EPA's aquatic life criteria methodology (EPA, 1986). Beginning in 1992, however, EPA no longer maintained this list of guidance values with the release of the National Toxics Rule (EPA, 1992). During DEQ's last review of water quality criteria in 2004, technical advisory committee members found that there was technical value to keeping the guidance values in rule. However, during the present review, DEQ found that these values were non-regulatory, outdated, and seldomly used by water quality programs. For clarity and consistency, DEQ is proposing to remove these non-regulatory values from Oregon's water quality standards, in favor of developing clear procedures for addressing pollutants without national recommended water quality criteria.

Chapter 2: Chemical-specific summary information

2.1 Introduction

For each chemical considered during DEQ's aquatic life toxics criteria update, this chapter provides information about Oregon's current criteria and the proposed criteria. This section also includes a summary of information and considerations that DEQ used to decide whether to update aquatic life criteria for a chemical at this time. For most chemicals under consideration, DEQ performed an analysis to compare chemical concentrations in Oregon ambient waters and discharges to the recommended criteria concentrations to roughly quantify the relative impact of adopting EPA's criteria recommendations. Details of those analyses can be found in Appendix A.2. A summary of EPA's technical basis for the numeric criteria value recommendations may be found in Appendix A.1.

2.2 Chemicals proposed for criteria adoption

2.2.1 Acrolein

2.2.1.1 Acrolein criteria

2.2.1.1.1 Effective acrolein criteria in Oregon

Oregon currently has no aquatic life criteria for acrolein. However, Oregon does have human health criteria for acrolein (Water + Organism = 0.88 µg/L, Organism only 0.93 µg/L; OAR 340-041-8033 Table 40) that are lower than the latest EPA recommended acrolein criteria (EPA, 2009).

2.2.1.1.2 Latest EPA nationally recommended acrolein aquatic life criteria

EPA finalized the aquatic life criteria recommendation for acrolein in 2009 (EPA, 2009). The recommendation is based on a literature search through June 2009 and only includes acute and chronic criteria for freshwater given that saltwater toxicity data were insufficient to produce a recommendation (Table 2). Acrolein criteria are intended to be applied and implemented as the "total" sample fraction.

Table 2. Current acrolein aquatic life criteria in Oregon and the latest EPA recommendations

Acrolein Criteria (CAS 107028)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards	-	-	-	-
EPA Recommendation (2009)	3.0 [a]	3.0 [b]	-	-

"-" indicates no criterion.

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[b] The four-day average concentration is not to exceed the CCC more than once every three years on average.

2.2.1.2 Summary for acrolein and decision to adopt acrolein criteria

Acrolein is primarily used as a restricted use pesticide, although it may also be produced naturally. Oregon standards do not contain aquatic life criteria for acrolein, although they do contain acrolein human health criteria at levels below proposed aquatic life criteria. The 2009 EPA recommended aquatic life criteria for acrolein include freshwater acute and chronic values. Data for threatened and endangered salmonids were considered in the development of the acute criterion, indicating that the criterion is likely to protect these species. Acrolein criteria are intended to be applied as the "total" sample fraction. In Oregon surface waters, acrolein is typically measured at levels below the proposed acute and chronic aquatic life criteria (See Appendix A.2.1). DEQ cannot determine whether acrolein concentrations in Oregon discharges are higher or lower than the criteria because the laboratory reporting (quantification) limit for wastewater is typically higher than the proposed criteria. However, most of the available discharge measurements of acrolein are below 5.0 µg/L.

DEQ is proposing to adopt acrolein criteria at this time to add protection for fish and aquatic life in Oregon waters and to be up-to-date with EPA recommendations.

2.2.2 Aluminum

2.2.2.1 Aluminum criteria

2.2.2.1.1 Effective aluminum criteria in Oregon

Oregon's water quality standards do not contain aquatic life or human health criteria for aluminum. However, in 2021, EPA promulgated aluminum freshwater aquatic life criteria for

Oregon (EPA, 2021b) (Table 3, Table 4). Oregon adopted EPA's 1988 recommended aluminum aquatic life criteria (EPA, 1988) in 2004, and EPA subsequently disapproved those criteria in 2013 following ESA consultation. EPA was then required by law to provide new criteria for Oregon by the end of 2020. On April 19, 2021, EPA's promulgated aluminum aquatic life criteria became effective in Oregon for Clean Water Act purposes. These freshwater criteria are based on EPA's 2018 nationally recommended aluminum aquatic life criteria (EPA, 2018). The freshwater acute and chronic criteria magnitude values vary based on other water quality parameters including pH, dissolved organic carbon (DOC), and total hardness. Criteria values are calculated by inputting these variables into the Aluminum Criteria Calculator.

Table 3. Federally promulgated aluminum criteria language effective for Clean Water Act purposes in Oregon. See 40 CFR 131.47 for additional language and details.

Metal	CAS No.	Criterion maximum concentration (CMC)[3] (µg/L)	Criterion continuous concentration (CMC)[4] (µg/L)
Aluminum [1] [2]	7429905	Acute (CMC) and chronic (CCC) freshwater aluminum criteria values for a site shall be calculated using the 2018 Aluminum Criteria Calculator (Aluminum Criteria Calculator V.2.0.xlsx), or a calculator in R or other software package using the same 1985 Guidelines calculation approach and underlying model equations as in the Aluminum Criteria Calculator V.2.0.xlsx, as defined in EPA's Final Aquatic Life Ambient Water Quality Criteria for Aluminum.[5]	

[1] To apply the aluminum criteria for Clean Water Act purposes, criteria values based on ambient water chemistry conditions must protect the water body over the full range of water chemistry conditions, including during conditions when aluminum is most toxic.

[2] These criteria are based on aluminum toxicity studies where aluminum was analyzed using total recoverable analytical methods. Oregon may utilize total recoverable analytical methods to implement the criteria. For characterizing ambient waters, Oregon may also utilize, as scientifically appropriate and as allowable by State and Federal regulations, analytical methods that measure the bioavailable fraction of aluminum (e.g., utilizing a less aggressive initial acid digestion, such as to a pH of approximately 4 or lower, that includes the measurement of amorphous aluminum hydroxide yet minimizes the measurement of mineralized forms of aluminum such as aluminum silicates associated with suspended sediment particles or clays). Oregon shall use measurements of total recoverable aluminum where required by Federal regulations.

[3] The CMC is the highest allowable one-hour average ambient concentration of aluminum. The CMC is not to be exceeded more than once every three years. The CMC is rounded to two significant figures.

[4] The CCC is the highest allowable four-day average ambient concentration of aluminum. The CCC is not to be exceeded more than once every three years. The CCC is rounded to two significant figures.

[5] EPA–822–R–18–001, Final Aquatic Life Ambient Water Quality Criteria for Aluminum—2018, December 2018, is incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available from U.S. Environmental Protection Agency, Office of Water, Health and Ecological Criteria Division (4304T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460; telephone number: (202) 566–1143, www.epa.gov/wqc/aquatic-life-criteria-aluminum. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email fedreg.legal@nara.gov or go to www.archives.gov/federal-register/cfr/ibr-locations.html.

Table 4. Example aluminum aquatic life criteria values in Oregon based on the federally promulgated Aluminum Criteria Calculator (v. 2.0) outputs

Aluminum Criteria (CAS 7429905)	Example Aquatic Life Criteria based on select Aluminum Criteria Calculator (v 2.0) input values [a]			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards	-	-	-	-
Effective in Oregon	980 [a ,b, d]	380 [a,c,d]	-	-
EPA Recommendation (2018)	980 [a, b]	380 [a, c]	-	-

"-" indicates no criterion.

[a] Criteria values provided are based on a pH of 7, a dissolved organic carbon (DOC) concentration of 1 mg/L, and a total hardness concentration of 100 mg/L as $CaCO_3$ and apply to those conditions only. Criteria magnitude values vary and may be calculated based on pH, DOC, and total hardness at a site using the Aluminum Criteria Calculator v.2.0.

[b] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[c] The four-day average concentration is not to exceed the CCC more than once every three years on average.

[d] These criteria are not included in Oregon's water quality standards rules, but have been promulgated by EPA. See Table 3 (also 40 CFR 131.47) for promulgated aluminum criteria language.

2.2.2.1.2 Latest EPA nationally recommended aluminum aquatic life criteria

The most recent EPA recommended aluminum freshwater aquatic life criteria were released in 2018 (EPA, 2018). Criteria magnitude values vary with pH, DOC, and total hardness, and example criteria values are provided in Table 4. To obtain aluminum criteria magnitude values for a given sample, pH, DOC, and total hardness are entered into the Aluminum Criteria Calculator v. 2.0. It is important to recognize that the 2018 recommended criteria are expressed as "total recoverable", largely because laboratory waters used to determine toxicity were devoid of colloidal, particulate, and clay-bound aluminum. However, EPA has acknowledged that in natural waters, total recoverable aluminum measurements may overestimate toxicity because they include non-bioavailable forms (and therefore non-toxic forms) of aluminum. Therefore, while the federally promulgated aluminum aquatic life criteria in Oregon are expressed as "total recoverable" aluminum, the rule allows DEQ to apply the criteria as "bioavailable" aluminum in ambient waters (which relies on a different analytical method) where appropriate (Table 3, footnote 2). Total recoverable aluminum measurements are required for wastewater until wastewater methods for bioavailable aluminum are approved. However, for assessments of

aluminum in natural waters, bioavailable aluminum is the more appropriate sample fraction to apply the proposed criteria considering because it may more accurately reflect aluminum's toxicity in natural waters.

2.2.2.2 Summary for aluminum and decision to adopt aluminum criteria

Aluminum is the most abundant metal in the Earth's crust and can enter the aquatic environment through natural processes and human activities. In the aquatic environment, a significant fraction of the aluminum is typically not bioavailable or toxic to aquatic life because much of it is bound in clays and sediments or complexed with other ions. Aluminum's toxicity varies with pH, DOC, and total hardness. Therefore, the freshwater acute and chronic criteria magnitudes must be calculated using the Aluminum Criteria Calculator, which calculates criteria values dependent on the water chemistry. EPA's 2021 promulgation of the freshwater aluminum criteria in Oregon means that these criteria recommendations have successfully passed through Endangered Species Act consultation with the Services and have recently been deemed protective of threatened and endangered species in Oregon. An analysis of total recoverable aluminum in surface waters and discharges in Oregon suggests that waters of the State have the potential to exceed the aluminum criteria if total recoverable aluminum is used to assess surface waters (See Appendix A.2.2). Further, some dischargers may find it difficult to meet permit limits derived from aluminum criteria expressed as total recoverable. Limited data from bioavailable aluminum measurements instead suggest that surface waters are not likely to exceed the aluminum criteria when considering only the toxic (i.e. bioavailable) portion of aluminum in the water. An effort to increase bioavailable aluminum measurements in ambient surface waters over the next two years is underway at DEQ.

DEQ is proposing to adopt EPA's 2018 freshwater aluminum criteria recommendation into state water quality standards so it is clear to the public that they are effective and being implemented by Oregon's water quality programs. Since the federal promulgation of the aluminum standard in 2021, Oregon has been applying and implementing EPA's aluminum criteria recommendation. The state does not intend to change the way the standard is applied and implemented but will include additional language in the proposed rule that clarifies DEQ's application procedures. For Oregon's proposed aluminum rule language, please see Chapter 3 in this document or the *Notice of Proposed Rulemaking* that may be found on the Aquatic Life Toxics Criteria 2024 Rulemaking web page. Further, Oregon intends to preferentially use bioavailable aluminum where federal regulations allow when applying the criteria, which will have positive impacts for the state's water quality programs while protecting fish and aquatic life.

2.2.3 Cadmium

2.2.3.1 Cadmium criteria

2.2.3.1.1 Effective cadmium criteria in Oregon

In 2004, Oregon revised the state's aquatic life criteria for cadmium based on EPA's 2001 recommendations (EPA, 2001a). In 2013, EPA approved Oregon's freshwater chronic cadmium criterion, but disapproved the acute criterion, citing the National Marine Fisheries Service Biological Opinion that the acute criterion would jeopardize endangered species in Oregon (NOAA, 2012).

EPA released updated national cadmium criteria recommendations in 2016, using additional toxicity data for endangered species to address the concerns of the National Marine Fisheries Service. Because EPA disapproved the freshwater acute criterion based on EPA's 2001 recommendation in Oregon, EPA was required to promulgate the revised acute cadmium criterion for Oregon. The federally promulgated freshwater acute cadmium criterion based on the 2016 cadmium criteria recommendations became effective for Clean Water Act purposes in Oregon on March 16, 2017 (EPA, 2017) (Table 5). However, because Oregon has not yet adopted the revised criterion, it is not reflected in Oregon's water quality standards and needs to be updated in Oregon rule. Currently, the freshwater acute cadmium criterion reflected in Oregon rule is based on EPA's 1985 recommendation, which remained in state standards after the 2001 recommendation was disapproved by EPA (Table 6).

Oregon's saltwater acute and chronic cadmium aquatic life criteria are now outdated because EPA updated their criteria recommendations for all the cadmium criteria in 2016 (EPA, 2016). The 1985, 2001, and 2016 freshwater criteria recommendations are equation-based criteria that vary with total hardness (Table 5), while the saltwater criteria recommendations are discrete values that do not vary with other water quality parameters. The freshwater and saltwater cadmium aquatic life criteria (2001 and 2016 recommendations only) are expressed as the dissolved sample fraction, given that the dissolved portion is responsible for toxicity to aquatic life. Oregon does not have human health criteria for cadmium.

Table 5. Full hardness-based equation EPA recommendations for freshwater aquatic life criteria magnitudes

EPA Cadmium Criteria Recommendations by Year	Freshwater Aquatic Life Criteria (µg/L) [a]	
	Acute Criterion Magnitudes (CMC)	Chronic Criterion Magnitudes (CCC)
1985	$e^{(1.128[\ln(\text{hardness})]-3.828)}$ *b*	$e^{(0.7852[\ln(\text{hardness})]-3.490)}$ *b*
2001	$e^{(1.0166 \times \ln(\text{hardness}) - 3.924)} \times CF$ *c, d*	$e^{(0.7409[\ln(\text{hardness})]-4.719)} \times CF$ *c, e*
2016	$e^{(0.9789 \times \ln(\text{hardness}) - 3.866)} \times CF$ c, d	$e^{(0.7977 \times \ln(\text{hardness}) - 3.909)} \times CF$ *c ,e, f*

[a] The exponential constant is a mathematical constant and is denoted by the symbol 'e'. It is approximately equal to 2.718.
[b] Criterion expressed in terms of "total" concentrations in the water column.
[c] Criterion expressed in terms of "dissolved" concentrations in the water column.
[d] CMC CF (conversion factor from total to dissolved) = 1.136672 – [(ln hardness) x (0.041838)].
[e] CCC CF (conversion factor from total to dissolved) = 1.101672 – [(ln hardness) x (0.041838)].
[f] This criterion was vacated by a recent court decision, making it no longer the most recent EPA recommended freshwater chronic criterion for cadmium (*Center for Biological Diversity v. United States Environmental Protection Administration et al*, 2023).

Table 6. Current cadmium aquatic life criteria in Oregon and the latest EPA recommendations

Cadmium Criteria (CAS 7440439)	Aquatic Life Criteria			
	Example freshwater values based on default hardness [a] (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards	3.9 *a, b, f*	0.25 *a, c, e*	40 *e*	8.8 *e*
Effective in Oregon	1.8 *a, b, d, e*	0.25 *a, c, e*	40 *e*	8.8 *e*
EPA Recommendation *g*	1.8 *a, b, e*	0.25 *a, c, e*	33 *e*	7.9 *e*

[a] Criteria values are based a total hardness concentration of 100 mg/L as $CaCO_3$ and apply to those conditions only. Criteria magnitude values vary may be calculated on using hardness-based equations found in Table 5.
[b] The one-hour average concentration is not to exceed the CMC more than once every three years on average.
[c] The four-day average concentration is not to exceed the CCC more than once every three years on average.

[d] The effective freshwater acute criterion is not included in state water quality standards, but has been promulgated by EPA. See 40 CFR 131.46.
[e] Criterion expressed in terms of "dissolved" concentrations in the water column.
[f] Criterion expressed in terms of "total" concentrations in the water column.
[g] EPA's current criteria recommendations for cadmium are comprised of the 2016 freshwater acute and saltwater acute and chronic criteria recommendations (EPA, 2016) combined with EPA's 2001 freshwater chronic criterion recommendation (EPA, 2001a) after a recent court case vacated EPA's 2016 freshwater chronic criterion recommendation (*Center for Biological Diversity v. United States Environmental Protection Administration et al*, 2023).

2.2.3.1.2 Latest EPA nationally recommended cadmium aquatic life criteria

EPA last updated aquatic life criteria recommendations for cadmium in 2016 (EPA, 2016). These updates include both fresh and saltwater acute and chronic criteria recommendations and incorporate toxicity data through late 2015. Freshwater acute and chronic criteria magnitudes are expressed as hardness-based equations (Table 5), given that toxicity to cadmium is reduced by increasing hardness. Saltwater acute and chronic magnitudes are not equation-based. Both fresh and saltwater criteria are expressed in terms of dissolved concentrations in the water column, after EPA determined that the dissolved sample fractions more closely approximate the toxic portion of cadmium in the aquatic environment (EPA, 1995).

Note: In 2023, a U.S. district court decision vacated EPA's 2016 freshwater chronic cadmium criterion recommendation (*Center for Biological Diversity v. United States Environmental Protection Administration et al*, 2023), making EPA's 2001 recommendation the most up to date aquatic life criterion for freshwater chronic cadmium.

2.2.3.2 Summary for cadmium and decision to update cadmium criteria

Cadmium is a metal that can enter the aquatic environment through a variety of human activities. The most recent cadmium criteria recommendations are intended to be applied as dissolved cadmium, and the freshwater acute and chronic recommendations are expressed as equations that vary with hardness. EPA's recent (2017) promulgation of the freshwater acute cadmium criterion in Oregon completed Endangered Species Act consultation in Oregon. Cadmium concentrations in Oregon surface waters are generally lower than the conservative 10^{th} percentile acute and chronic criteria based on Oregon water quality (See Appendix A.2.3). In discharges, most measurements were below the 10^{th} percentile chronic criterion. Given the range of laboratory reporting limits for discharges it may be challenging to determine whether discharge measurements are below the proposed freshwater criteria. Although measurements were limited, cadmium in saltwater was always below the proposed criteria (See Appendix A.2.3).

Oregon is proposing to adopt EPA's 2016 cadmium aquatic life criteria recommendations for freshwater acute and saltwater acute and chronic criteria into state water quality standards for

clarity, accuracy, and consistency for use by Oregon's water quality programs and the public. Given that EPA's 2016 freshwater chronic criterion recommendation has been vacated by a recent court case (*Center for Biological Diversity v. United States Environmental Protection Administration et al*, 2023), Oregon's freshwater chronic criterion is the same as the most recent federal recommendation (EPA, 2001a). This action would bring no functional change to the federally promulgated freshwater acute criterion already applied in Oregon. It would also not change Oregon's current freshwater chronic criterion but it would make the saltwater acute and chronic criteria slightly more stringent.

2.2.4 Carbaryl

2.2.4.1 Carbaryl criteria

2.2.4.1.1 Effective carbaryl criteria in Oregon

Oregon currently has no aquatic life or human health criteria for carbaryl.

2.2.4.1.2 Latest EPA nationally recommended carbaryl aquatic life criteria

EPA finalized the aquatic life criteria recommendation for carbaryl in 2012 (EPA, 2012). The recommendation was developed based on scientific literature published through May 2009. The nationally recommended criteria includes freshwater acute and chronic criteria as well as a saltwater acute criterion. EPA did not have sufficient data to recommend a saltwater chronic criterion (Table 7). The criteria are expressed as the total carbaryl sample fraction in the water column.

Table 7. Current carbaryl aquatic life criteria in Oregon and the latest EPA recommendations

Carbaryl Criteria (CAS 63252)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards	-	-	-	-
EPA Recommendation (2012)	2.1 [a]	2.1 [b]	1.6 [a]	-

"-" indicates no criterion.

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[b] The four-day average concentration is not to exceed the CCC more than once every three years on average.

2.2.4.2 Summary for carbaryl and decision to adopt carbaryl criteria

Carbaryl is an insecticide used in urban and agricultural settings. Oregon currently does not have water quality criteria for carbaryl. The 2012 EPA recommended criteria include freshwater acute and chronic criteria, as well as a saltwater acute criterion. Carbaryl criteria recommendations are expressed as the total sample fraction and are expected to be protective of Oregon's threatened and endangered salmonids. Laboratory reporting limits for carbaryl fall below the recommended criteria. Measurements of carbaryl in surface waters indicate that the vast majority of ambient concentrations in Oregon are below the recommended freshwater criteria (See Appendix A.2.4). While saltwater and discharge data were more limited that surface water data, these measurements also fell below the recommended criteria (See Appendix A.2.4).

DEQ is proposing to adopt EPA's 2012 recommended aquatic life criteria for carbaryl to add protection for fish and aquatic life in Oregon waters and to be up-to-date with the national recommendations.

2.2.5 Diazinon

2.2.5.1 Diazinon criteria

2.2.5.1.1 Effective diazinon criteria in Oregon

Oregon currently has no aquatic life or human health criteria for diazinon.

2.2.5.1.2 Latest EPA nationally recommended diazinon aquatic life criteria

The EPA finalized latest aquatic life criteria recommendations for diazinon in 2005 (EPA, 2005a). The last comprehensive literature search for data to inform the 2005 recommendation was performed in 1999, with limited additional data regarding effects on olfaction added in 2004. The recommendation includes both freshwater and saltwater acute and chronic criteria (Table 8). Diazinon is intended to be expressed as the total sample fraction.

Table 8. Current diazinon aquatic life criteria in Oregon and the latest EPA recommendations

Diazinon Criteria (CAS 333415)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards	-	-	-	-
EPA Recommendation (2005)	0.17 [a]	0.17 [b]	0.82 [a]	0.82 [b]

"-" indicates no criterion.

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[b] The four-day average concentration is not to exceed the CCC more than once every three years on average.

2.2.5.2 Summary for diazinon and decision to adopt diazinon criteria

Diazinon is a restricted use pesticide that is currently used in Oregon. Oregon does not currently have water quality criteria for this insecticide. The EPA's 2005 aquatic life criteria recommendations for diazinon include fresh and saltwater acute and chronic criteria. Diazinon criteria recommendations are expressed as the total sample fraction, and available data suggest they will protect Oregon's freshwater threatened and endangered salmonids. Laboratory reporting limits for diazinon fall below the recommended criteria for ambient waters. Measurements of diazinon in surface waters indicate that the vast majority of ambient concentrations in Oregon are below the recommended freshwater criteria (See Appendix A.2.5). While saltwater and discharge data were more limited than surface water data, these measurements in Oregon saltwater fell below the recommended criteria (See Appendix A.2.5). For discharges, laboratory reporting limits were often higher than the criteria, leaving it unclear whether discharges typically fall above or below the criteria (See Appendix A.2.5), although diazinon is not expected to be present in discharges at high levels.

DEQ is proposing to adopt EPA's 2005 recommended aquatic life criteria for diazinon to add protection for fish and aquatic life in Oregon waters and to be up-to-date with EPA recommendations.

2.2.6 Tributyltin

2.2.6.1 Tributyltin criteria

2.2.6.1.1 Effective tributyltin criteria in Oregon

Oregon's current aquatic life criteria for tributyltin (Table 9) are based on the draft recommendations that EPA compiled in 1997 (EPA, 1997). EPA recommended those criteria to states and tribes in 1999, acknowledging that these criteria recommendations were released before EPA considered public comment on the draft recommendations (EPA, 1999). Oregon adopted the draft 1999 aquatic life criteria recommendations in 2004 during the last comprehensive update of aquatic life toxics criteria in Oregon.

Oregon does not have human health criteria for tributyltin.

2.2.6.1.2 Latest EPA nationally recommended tributyltin aquatic life criteria

The 2003 recommended aquatic life criteria for tributyltin include data from a comprehensive literature search through 1997, with some additional data added after that as a response to public comment (EPA, 2003). Tributyltin is intended to be applied as the "total" sample fraction in the water column.

Table 9. Current water quality criteria in Oregon and the latest EPA recommendations for tributyltin

Tributyltin Criteria	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards	0.46 [a]	0.063 [b]	0.37 [a]	0.01 [b]
EPA Recommendation (2003)	0.46 [a]	0.072 [b]	0.42 [a]	0.0074 [b]

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.
[b] The four-day average concentration is not to exceed the CCC more than once every three years on average.

2.2.6.2 Summary for tributyltin and decision to update tributyltin criteria

Tributyltin is a biocide that has historically been used in antifouling paints on hulls of ships. Severe toxic effects in aquatic life, which included endocrine disruption leading to reproductive effects, created international concern and eventually led tributyltin use restrictions by state and federal governments. Oregon's current aquatic life criteria for tributyltin are based on EPA's 1999 recommendations and vary only slightly from the 2003 finalized EPA recommendations. Tributyltin criteria are intended to be implemented as the total amount of tributyltin in the water column. Surface water data for tributyltin were not available in Oregon's water quality database. A limited number of discharge data had reporting limits above the proposed freshwater criteria, making it unclear whether those measurements were above or below the criteria. A limited number of historical tributyltin measurements have been reported in Coos Bay below the recommended saltwater acute criterion and roughly equal-to-double the recommended saltwater criterion. It is not clear how those historical measurements compare to values in Oregon marinas and estuaries today, after legislation significantly limited tributyltin use in the aquatic environment (See Appendix A.2.6). Given that the current tributyltin aquatic life criteria in Oregon are so similar to the proposed criteria, adopting these criteria may not be likely to have a large impact on dischargers or other water quality programs.

DEQ is proposing to adopt EPA's 2003 recommended aquatic life criteria for tributyltin to be up-to-date with EPA recommendations. Adopting these criteria will result in small changes to Oregon's criteria as shown in Table 9.

2.3 Chemicals that will not be updated at this time

2.3.1 Mercury

2.3.1.1 Background for mercury criteria

During the comprehensive update of aquatic life toxics criteria in 2004, DEQ elected not to update the state's mercury criteria based on the EPA's 1995 recommendations (ODEQ, 2004). DEQ's decision was based on the Services' Biological Opinion of EPA's California Toxics Rule that cited concerns over the 1995 mercury criteria recommendations for threatened and endangered west coast salmonids (USFWS & NMFS, 2000). When EPA promulgated the California Toxics Rule in 2000, EPA elected to 'reserve' mercury criteria at that time, effectively withdrawing the criteria until concerns could be resolved (EPA, 2001b). Given that Oregon has threatened and endangered salmonids, DEQ elected to wait until concerns over the 1995 mercury criteria recommendations were resolved before revising Oregon's mercury criteria.

2.3.1.2 Effective and recommended mercury aquatic life criteria

The 1995 nationally recommended aquatic life criteria remain EPA's latest update for mercury criteria (EPA, 1996). The values for the 1995 fresh and saltwater chronic criteria are less stringent than Oregon's current criteria, which are based on the EPA's 1984 recommendations (Table 10).

Table 10. Current mercury aquatic life criteria in Oregon and the latest EPA recommendations

Mercury Criteria (CAS)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards (CAS 7439976)	2.4 [a, c]	0.012 [b, c]	2.1 [a, c]	0.025 [b, c]

EPA Recommendation (1995, CAS No. 7439976, 22967926)	1.4 [a, d]	0.77 [b, d]	1.8 [a, d]	0.94 [b, d]

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[b] The four-day average concentration is not to exceed the CCC more than once every three years on average.

[c] Criterion expressed in terms of "total" concentrations in the water column.

[d] Criterion expressed in terms of "dissolved" concentrations in the water column.

2.3.1.3 Decision not to update mercury aquatic life criteria at this time

Mercury aquatic life criteria are currently being litigated in the Pacific Northwest (See Appendix A.2.7 for more detail). Therefore, DEQ is proposing not to update mercury aquatic life criteria at this time and wait until ESA concerns have been resolved. EPA is expected to update the criteria within the next two years, although subsequent ESA consultation may take additional time. Once the Services and EPA agree on protective aquatic life criteria for mercury, DEQ will consider updating Oregon's criteria.

2.3.2 Nonylphenol

2.3.2.1 Nonylphenol criteria

2.3.2.1.1 Effective nonylphenol criteria in Oregon

Oregon currently has no aquatic life or human health criteria for nonylphenol.

2.3.2.1.2 Latest EPA nationally recommended nonylphenol aquatic life criteria

EPA finalized the aquatic life criteria recommendations for nonylphenol in 2005 (EPA, 2005b). The last comprehensive literature search for scientific data occurred in 1999, with a limited number of additional studies added after that time. The recommendation includes both freshwater and saltwater criteria (Table 11) to be applied as the total sample fraction of nonylphenol in the water column. Nonylphenol is present in several different forms in the environment. However, the recommended aquatic life criteria specifically apply to nonylphenol with the Chemical Abstracts Service (CAS) numbers 84852-15-3 (branched 4-nonylphenol) and 25154-52-3 (nonylphenol).(EPA, 2005b).

Table 11. Current nonylphenol aquatic life criteria in Oregon and the latest EPA recommendations

Nonylphenol Criteria (CAS 84852153, 25154523)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)

Oregon Water Quality Standards	-	-	-	-
EPA Recommendation (2005)	28 [a]	6.6 [b]	7.0 [a]	1.7 [b]

"-" indicates no criterion.

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[b] The four-day average concentration is not to exceed the CCC more than once every three years on average.

2.3.2.2 Summary for nonylphenol and decision not to adopt nonylphenol criteria at this time

Nonylphenol is a man-made industrial chemical that is used for a variety of purposes. Oregon currently has no water quality criteria for nonylphenol. The 2005 EPA recommended aquatic life criteria for nonylphenol include fresh and saltwater acute and chronic criteria. These criteria recommendations apply to only two of the many nonylphenol isomers in industrial use. The nonylphenol criteria are intended to be applied as the total sample fraction. Nonylphenol data are not available for Oregon ambient waters or discharges, presenting a large data gap in assessing how environmental levels of this contaminant compare against the proposed aquatic life criteria. However, supplemental data from other states indicate that the majority of nonylphenol measurements in surface waters fell below the recommended acute and chronic criteria for nonylphenol (See Appendix A.2.8).

DEQ is not proposing to adopt the 2005 nonylphenol criteria at this time because EPA has expressed concern about whether they are sufficiently protective of threatened and endangered species in their recent analysis of water quality standards for the Swinomish Tribe in Washington (See Appendix A.2.8) DEQ therefore proposes to wait until ESA concerns have been resolved before adopting aquatic life criteria for nonylphenol into state standards.

2.3.3 Selenium

2.3.3.1 Selenium criteria

2.3.3.1.1 Effective selenium criteria in Oregon

Oregon's current aquatic life criteria for selenium are based on EPA's 1999 selenium update (EPA, 1999). The acute freshwater criteria are expressed as the dissolved sample fraction, are formula-based, and incorporate two different forms of selenium: selenite and selenate. The saltwater acute and chronic selenium criteria are discrete values, which are expressed as the dissolved sample fraction, regardless of the selenium form (Table 12). Oregon also has human health criteria for selenium for water + organism (120 µg/L) and organism only (420 µg/L), applied as total recoverable selenium.

2.3.3.1.2 Latest EPA nationally recommended selenium aquatic life criteria

EPA most recently updated the aquatic life criteria recommendations for freshwater selenium in 2016, with non-substantial revisions to the criteria in 2021 (EPA, 2021a). The freshwater chronic criterion recommendation incorporates new understanding of the reproductive effects of bioaccumulative selenium on aquatic vertebrates. Given that long term reproductive toxicity was the most sensitive measure of selenium effects in the environment, the 2016 EPA freshwater recommendations do not include an acute criterion.

EPA's freshwater chronic criterion recommendation for selenium is composed of four elements, to be used together as a single criterion. If all four parts are applied together, they are designed to protect fish, amphibians, and invertebrates from the chronic effects of selenium. The first element provides a limit of 15.1 mg/kg dry weight (dw) in fish egg/ovary not to be exceeded as the preferred criterion element from which all subsequent elements of the criterion at least partially derive. If no fish egg/ovary data are available, then the criterion can be expressed in terms of fish muscle (11.3 mg/kg dw skinless, boneless filet not to be exceeded) or body tissue (8.5 mg/kg dw whole body tissue, not to be exceeded). The third and fourth elements of the chronic criterion are water column values, to be utilized in the absence of fish tissue data, or for instances of 1) fishless waters, or 2) new selenium discharges for which selenium has not yet reached steady state in the ecosystem. Steady state may take from months to years depending on physical conditions. The chronic water column criterion can be expressed as a water column value (1.5 µg/L in lentic (standing) aquatic systems or 3.1 µg/L in lotic (flowing) aquatic systems) not to be exceeded more than once in a 30-day period in three years on average. Finally, the freshwater chronic criterion contains a provision for intermittent exposure based on a 30-day water (lentic or lotic) criterion expressed as an equation (Table 12). Footnote *e* in Table 12 includes additional provisions specific to the four-part criterion that further describe the nuances of when to use each element. Unlike previous versions of the freshwater selenium criteria, the 2016 recommendation no longer distinguishes among selenium oxidation states. Further, the recommended chronic criterion is also protective of potential acute selenium effects, thus removing the need for an acute selenium criterion. The fish tissue portion of the recommended chronic criterion is applied as "total" selenium, while the water column values are applied at "dissolved" selenium in the water column.

Table 12. Current selenium aquatic life criteria in Oregon and the latest EPA recommendations

Selenium Criteria (CAS 7782492)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion	Chronic Criterion	Acute Criterion	Chronic Criterion

	(CMC)	(CCC)	(CMC)	(CCC)
Oregon Water Quality Standards	see *a, b, c*	4.6 [b,d]	290 [b,c]	71 [b,d]
EPA Recommendations (2016)	-	*e*	290 [b,c]	71 [b,d]

"-" indicates no criterion.

[a] The CMC=(1/[(f1/CMC1)+(f2/CMC2)]µg/L) * CF where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively. See expanded endnote F for the Conversion Factor (CF) for selenium. [Note: According to endnote F of Table 30, Oregon Administrative Rules 340, Division 41 (ODEQ n.d.), the conversion factors (CFs) for selenium are as follows:

Conversion Factors for Selenium			
Freshwater		Saltwater	
Acute	Chronic	Acute	Chronic
0.996	0.922	0.998	0.998

[b] Criterion expressed in terms of "dissolved" concentrations in the water column.

[c] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[d] The four-day average concentration is not to exceed the CCC more than once every three years on average.

[e] The recommended chronic criterion is as follows:

Media Type	Fish Tissue[1]		Water Column [4]	
Criterion Element	Egg/Ovary [2]	Fish Whole Body or Muscle [3]	Monthly Average Exposure	Intermittent Exposure
Magnitude	15.1 mg/kg dw	8.5 mg/kg dw whole body or 11.3 mg/kg dw muscle (skinless, boneless filet)	1.5 µg/L in lentic aquatic systems 3.1 µg/L in lotic aquatic systems	$WQC_{int} = \frac{WQC_{30\text{-day}} - C_{bkgrnd}(1-f_{int})}{f_{int}}$
Duration	Instantaneous measurement [6]	Instantaneous measurement [6]	30 days	Number of days/months with an elevated concentration
Frequency	Not to be exceeded	Not to be exceeded	Not more than once in three years on average	Not more than once in three years on average

1. Fish tissue elements are expressed as steady-state.
2. Egg/Ovary supersedes any whole-body, muscle, or water column element when fish egg/ovary concentrations are measured, except as noted in footnote 4 below.
3. Fish whole-body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured, except as noted in footnote 4 below.
4. Water column values are based on dissolved total selenium in water and are derived from fish tissue values via bioaccumulation modeling. When selenium inputs are increasing, water column values are the applicable criterion element in the absence of steady-state condition fish tissue data.

5. Where WQC30-day is the water column monthly element, for either a lentic or lotic waters; C_{bkgrnd} is the average background selenium concentration, and f_{int} is the fraction of any 30-day period during which elevated selenium concentrations occur, with f_{int} assigned a value ≥0.033 (corresponding to 1 day).
6. Fish tissue data provide instantaneous point measurements that reflect integrative accumulation of selenium over time and space in fish population(s) at a given site.

2.3.3.2 Summary for selenium and decision not to update selenium criteria at this time

Selenium is naturally occurring but may move into the aquatic environment through natural and human-driven processes. Oregon's current aquatic life criteria for selenium are based on EPA's 1999 recommendation (EPA, 1999). EPA's 2016 recommended aquatic life chronic criterion for selenium (EPA, 2021a) is based on bioaccumulative reproductive toxicity in fish and is expected to protect Oregon's threatened and endangered salmonids. It is intended to be applied in four-parts, including tissue values (egg/ovary or whole body/muscle) and water column values (lentic/lotic). Tissue concentrations are applied as total selenium, while water column values are applied as dissolved selenium. Tissue criterion values take primacy over water column values in steady-state conditions, and all available tissue data in Oregon, including data from more susceptible lentic environments, fall below the tissue whole body or muscle tissue criterion values (See Appendix A.2.9). However, surface water measurements may present a challenge given that laboratory reporting limits for water measurements are often higher than the lentic water column value. Available data indicate that in the absence of fish tissue data, water column measurements in lentic environments may be higher than the criterion. In contrast, lotic environments in Oregon appear to be more thoroughly sampled with few values higher than the water column value. Oregon discharges were rarely higher than the lotic water column criterion value, which is the more appropriate comparison given that discharges are not typically permitted into lentic areas.

DEQ is not proposing to adopt EPA's 2016 selenium criterion at this time because of the crucial need for implementation guidance to make it feasible for Oregon to apply the complex four-part criterion effectively and efficiently in state water quality programs. Further, Oregon does not have high concentrations of selenium in state waters compared with other regions of the U.S, and Oregon currently has water-column criteria for selenium to protect fish and aquatic life that is only slightly higher (5.0 µg/L) compared with the 2016 recommendation (3.1 µg/L or 1.5 µg/L). DEQ may propose to adopt the 2016 selenium criterion in the future if DEQ can work with EPA to develop selenium criterion implementation guidance before adopting the criteria.

2.3.4 Endosulfan, Lindane, and Silver

2.3.4.1 Effective and recommended endosulfan, lindane, and silver aquatic life criteria

Oregon state standards include fresh and saltwater acute and chronic criteria for endosulfan, freshwater chronic criteria for lindane, and freshwater chronic criteria for silver despite EPA withdrawals of those values. All of Oregon's remaining criteria for lindane and silver are up to date with the most recent EPA recommendations (freshwater acute lindane (EPA, 1996), saltwater acute lindane (EPA, 1980a), and fresh and saltwater acute silver (EPA, 1980b)) (Table 13).

Table 13. Current water quality criteria in Oregon and the latest EPA recommendations for endosulfan, lindane, and silver

Criteria (CAS Number)	Aquatic Life Criteria			
	Freshwater (µg/L)		Saltwater (µg/L)	
	Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
Oregon Water Quality Standards – Endosulfan (CAS 115297)	0.22 [a, b, e]	0.056 [a, b, e]	0.034 [a, b, e]	0.0087 [a, b, e]
EPA Recommended – Endosulfan (CAS 115297)	-	-	-	-
Oregon Water Quality Standards - BHC Gamma (Lindane) (CAS 58899)	0.95 [c, e]	0.08 [a, e]	0.16 [a, e]	-
EPA Recommended - BHC Gamma (Lindane) (CAS 58899)	0.95 [c, e]	-	0.16 [a, e]	-
Oregon Water Quality standards - Silver	3.2 [c, f, g]	0.10 [d, f]	1.9 [c, f]	-
EPA Recommended - Silver	3.2 [f, g h]	-	1.9 [f, h]	-

"-" indicates no criterion.

[a] Alternate Frequency and Duration for Certain Pesticides: This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC may not be exceeded at any time and the CCC may not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

[b] This value is based on the criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha- and beta-endosulfan.
[c] The one-hour average concentration is not to exceed the CMC more than once every three years on average.
[d] The four-day average concentration is not to exceed the CCC more than once every three years on average.
[e] Criterion expressed in terms of "total" concentrations in the water column.
[f] Criterion expressed in terms of "dissolved" concentrations in the water column.
[g] The freshwater acute silver criterion is hardness-dependent and the numeric value listed is calculated for a total hardness of 100 mg/L. The freshwater acute criterion is expressed as an equation where CMC = $e^{(1.72 \times \ln(\text{hardness}) - 6.59)}$ x CF, and CF = 0.85.
[h] Alternate Frequency and Duration: This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC may not be exceeded at any time and the CCC may not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

2.3.4.2 Decision not to update endosulfan, lindane, and silver criteria at this time

EPA has not made any new recommendations for the pesticides endosulfan or lindane or silver (a metal) aquatic life criteria since the DEQ last considered the criteria for these chemicals (See Appendix A.2.10 for more detail). At this time, DEQ is proposing to maintain the criteria for these chemicals in Oregon rule, in keeping with the recommendation made by technical and policy advisory committees in 2004. In 2004, DEQ concluded that these criteria were based on sound science and that maintaining Oregon's criteria for these chemicals was the best way to protect beneficial uses.

Chapter 3: Summary of proposed changes to Oregon's aquatic life criteria

This chapter contains a summary of the proposed changes to Oregon's aquatic life criteria for reference. To review the full draft rule language associated with this rulemaking, refer to the *Notice of Proposed Rulemaking*, which may be found on the Aquatic Life Toxics Criteria 2024 Rulemaking web page.

Table 14. Summary of proposed changes to aquatic life criteria in Oregon water quality standards compared to current criteria.

Chemical (CAS Number)	Aquatic Life Criteria							
	Freshwater (µg/L)				Saltwater (µg/L)			
	Current Acute Criterion (CMC)	Proposed Acute Criterion (CMC)	Current Chronic Criterion (CCC)	Proposed Chronic Criterion (CCC)	Current Acute Criterion (CMC)	Proposed Acute Criterion (CMC)	Current Chronic Criterion (CCC)	Proposed Chronic Criterion (CCC)
Acrolein (CAS 107028)	-	3.0 [a, b]	-	3.0 [b, c]	-	-	-	-
Aluminum (CAS 7429905)	- [d]	See Table B[d]	- [d]	See Table B	-	-	-	-
Cadmium (CAS 7440439)	See Table C [d]	See Table D	See Table C	See Table D	40 [a, e]	33 [a, e,]	8.8 [c, e]	7.9 [c, e,]
Carbaryl (CAS 63252)	-	2.1 [a, b]	-	2.1 [b, c]	-	1.6 [a, b]	-	-
Diazinon (CAS 333415)	-	0.17 [a, b]	-	0.17 [b, c]	-	0.82 [a, b]	-	0.82 [b, c]
Tributyltin	0.46 [a, b]	0.46 [a, b]	0.063 [b, c]	0.072 [b, c]	0.37 [a, b]	0.42 [a, b]	0.01 [b, c]	0.0074 [b, c]

"-" indicates no criterion.

[a] The one-hour average concentration is not to exceed the CMC more than once every three years on average.

[b] Criterion expressed in terms of "total" concentrations in the water column.

[c] The four-day average concentration is not to exceed the CCC more than once every three years on average.

[d] Note that there is a federally promulgated criterion that is effective for Clean Water Act purposes but not reflected in OR standards. See Table A for aluminum and Table C for cadmium.

[e] Criterion expressed in terms of "dissolved" concentrations in the water column.

Table A. Federally promulgated aluminum criteria language effective for Clean Water Act purposes in Oregon See 40 CFR 131.47 for additional language and details.

Metal	CAS No.	Criterion maximum concentration (CMC)[3] (µg/L)	Criterion continuous concentration (CCC)[4] (µg/L)
Aluminum [1] [2]	7429905	Acute (CMC) and chronic (CCC) freshwater aluminum criteria values for a site shall be calculated using the 2018 Aluminum Criteria Calculator (Aluminum Criteria Calculator V.2.0.xlsx), or a calculator in R or other software package using the same 1985 Guidelines calculation approach and underlying model equations as in the Aluminum Criteria Calculator V.2.0.xlsx, as defined in EPA's Final Aquatic Life Ambient Water Quality Criteria for Aluminum.[5]	
[1] To apply the aluminum criteria for Clean Water Act purposes, criteria values based on ambient water chemistry conditions must protect the water body over the full range of water chemistry conditions, including during conditions when aluminum is most toxic.			

[2] These criteria are based on aluminum toxicity studies where aluminum was analyzed using total recoverable analytical methods. Oregon may utilize total recoverable analytical methods to implement the criteria. For characterizing ambient waters, Oregon may also utilize, as scientifically appropriate and as allowable by State and Federal regulations, analytical methods that measure the bioavailable fraction of aluminum (e.g., utilizing a less aggressive initial acid digestion, such as to a pH of approximately 4 or lower, that includes the measurement of amorphous aluminum hydroxide yet minimizes the measurement of mineralized forms of aluminum such as aluminum silicates associated with suspended sediment particles or clays). Oregon shall use measurements of total recoverable aluminum where required by Federal regulations.
[3] The CMC is the highest allowable one-hour average ambient concentration of aluminum. The CMC is not to be exceeded more than once every three years. The CMC is rounded to two significant figures.
[4] The CCC is the highest allowable four-day average ambient concentration of aluminum. The CCC is not to be exceeded more than once every three years. The CCC is rounded to two significant figures.
[5] EPA–822–R–18–001, Final Aquatic Life Ambient Water Quality Criteria for Aluminum—2018, December 2018, is incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available from U.S. Environmental Protection Agency, Office of Water, Health and Ecological Criteria Division (4304T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460; telephone number: (202) 566–1143, www.epa.gov/wqc/aquatic-life-criteria-aluminum. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email fedreg.legal@nara.gov or go to www.archives.gov/federal-register/cfr/ibr-locations.html.

Table B. Proposed aluminum aquatic life criteria language for Oregon.

Pollutant	CAS No.	Criterion maximum concentration (CMC) (µg/L)	Criterion continuous concentration (CCC) (µg/L)
Aluminum	7429905	See O, P	See O, P

[O] The freshwater criterion for aluminum is a function of the pH, dissolved organic carbon, and total hardness in the water column. Acute (CMC) and chronic (CCC) freshwater aluminum criteria values for a site shall be calculated using the 2018 Aluminum Criteria Calculator (Aluminum Criteria Calculator V.2.0.xlsx), or a calculator in R or other software package using the same 1985 Guidelines calculation approach and underlying model equations as in the Aluminum Criteria Calculator V.2.0.xlsx, as defined in EPA's Final Aquatic Life Ambient Water Quality Criteria for Aluminum (EPA 822-R-18-001) and referenced at the bottom of Table 30. See also endnote O for procedures and information.

[P] Oregon will use analytical methods that measure the bioavailable fraction of aluminum unless total recoverable aluminum measurements are required by Federal regulations.

Endnote O: Deriving freshwater aluminum criteria

The freshwater aluminum criteria are derived using the Aluminum Criteria Calculator (v 2.0, EPA 2018; EPA 822-R-18-001) based on a concurrently measured set of calculator input parameter values. The Aluminum Criteria Calculator (ACC) uses dissolved organic carbon (DOC), pH, and total hardness to derive 1-hour acute exposure (CMC) and 96-hour chronic exposure (CCC) criteria values for aluminum based on the site and time specific water chemistry that determines the toxicity of aluminum to aquatic life. If measured data for one or more of the ACC input parameters is not available, the

procedures in section (1), (2), or (3) of this endnote will be used as specified to substitute an estimated or a default value for the missing input parameter or to apply default criteria derived using ecoregional data.

ACC outputs based on sufficient concurrent measured input parameter data are more accurate, preferred, and supersede results based on estimates or default values or applied default ecoregional criteria values. The acceptable ACC software is version 2.0, referenced in "Final Aquatic Life Ambient Water Quality Criteria for Aluminum": EPA 822-R-18-001, December 2018. The criteria are expressed as total recoverable in micrograms per liter (to two significant figures). However, the criteria may also be applied using the bioavailable fraction of aluminum if federal regulations allow.

(1) Input Parameter Estimation Procedures to Derive ACC Outputs

If the measured value for the input parameters needed to derive an ACC output are not available, DEQ will substitute a calculated or estimated input value according to the procedures described in this section [Endnote O (1)].

(a) DOC
DEQ will use total organic carbon (TOC) measurements to estimate DOC measurements that are not available. Total organic carbon (TOC) measurements will be multiplied by 0.83 to convert the TOC value to an equivalent dissolved organic carbon (DOC) value; except where sufficient TOC and DOC data are available for a site, DEQ will calculate and apply a site-specific translator in place of 0.83 to convert TOC values to DOC for use in the Aluminum Criteria Calculator. If neither DOC nor TOC measurements are available, substitute a default DOC value as described in Endnote O (2).

(b) Total Hardness
If total hardness is not available, DEQ will estimate total hardness by substituting dissolved hardness as an input parameter for the Aluminum Criteria Calculator. If neither total nor dissolved hardness data are available, DEQ will use the equation in Table O-1 to estimate total hardness using specific conductance. Specific conductance measurements must be concurrent with the other input parameters for the Aluminum Criteria Calculator. If total hardness cannot be estimated from concurrent data, DEQ will apply the applicable ecoregional default aluminum criterion described in Endnote O (3).

Table O-1

Equation to estimate total hardness from specific conductance

Parameter	Regression Equation

Total Hardness	Total Hardness = $\exp^{(1.050\cdot[\ln(SpC)] - 1.211)}$

Where, "SpC" is a measurement of specific conductance in µmhos/cm, "ln" is the natural logarithm, and "exp" is a mathematical constant that is the base of the natural logarithm.

(2) Applying a Default Value for DOC to Derive ACC Outputs

If concurrently measured DOC is not available to derive an ACC output and DOC cannot be estimated as specified in Endnote O (1)(a) above, DEQ will use a conservative default DOC input value as described in this section [Endnote O (2)] to derive an ACC output. The default DOC input value will be used for Clean Water Act purposes until measured or estimated DOC input data are available to derive aluminum criteria based on site-specific water chemistry.

(a) The default input parameter values for DOC will be the percentile value from the distribution of the high-quality data available for surface waters in the region as shown in Table O-2.

Table O-2
Percentile of data distribution to be used as default value by region

Region	DOC percentile
Willamette	15th
Coastal	30th
Cascades	20th
Eastern	15th
Columbia River	10th

b) The regional default DOC values will be updated periodically as additional high-quality data become available and are added to DEQ's database.
(c) The resulting regional default input values for DOC are shown on DEQ's website.
(d) The regions listed in Table O-2 are the same as those listed in Endnote N(2)(d).

(3) Applying Aluminum Default Ecoregional Criteria

If data for pH is missing or hardness is missing and cannot be estimated as described in Endnote O (1)(b), DEQ will apply an ecoregional default aluminum criteria value.

(a) The default ecoregional acute (CMC) and chronic (CCC) criteria values will be the 10th percentile value from the distribution of all ACC outputs calculated from concurrently measured high quality input data available for Oregon surface waters by EPA Level III ecoregion with the Columbia River mainstem treated separately.
(b) The ecoregional default aluminum criteria values will be updated periodically as additional high quality data become available and are added to DEQ's database.
(c) The resulting ecoregional default aluminum criteria values are shown on DEQ's website.

(4) General Policies

(a) The ACC produces outputs that vary at a site over time reflecting the effect of local water chemistry on aluminum toxicity to aquatic organisms. To apply the aluminum criteria for Clean Water Act purposes, criteria values based on ambient water chemistry conditions must protect the water body over the full range of water chemistry conditions, including during conditions when aluminum is most toxic.
(b) When applying the aluminum criteria, DEQ will use approaches that give preference to the use of ACC outputs based on concurrently measured or estimated (as described in Endnote O(1)) input parameter data (in the order listed) and concurrently measured aluminum data.

Table C. Aquatic life criterion for cadmium in Oregon. See 40 CFR 131.46 for additional language and details.

Metal	CAS No.	Criterion maximum concentration (CMC)[3]
Cadmium [1] [2]	7440439	$[e^{(0.9789 \times \ln(\text{hardness}) - 3.866)}] \times CF$ Where CF = 1.136672 − [(ln hardness) × (0.041838)].

[1] The criterion for cadmium is expressed as the dissolved metal concentration.
[2] CF is the conversion factor used to convert between the total recoverable and dissolved forms of cadmium. The term (ln hardness) in the CMC and the CF equation is the natural logarithm of the ambient hardness in mg/L (CaCO3). The default hardness concentrations from the applicable ecoregion in Table 2 of paragraph (c) of this section shall be used to calculate cadmium criteria in the absence of sufficiently representative ambient hardness data.
[3] The CMC is the highest allowable one-hour average instream concentration of cadmium. The CMC is not to be exceeded more than once every three years. The CMC is rounded to two significant figures.

Table D. Cadmium aquatic life criteria, Oregon's current and proposed, which are hardness-based equations.

Cadmium Criteria	Freshwater Aquatic Life Criteria (µg/L)	
	Acute Criterion Magnitudes (CMC)	Chronic Criterion Magnitudes (CCC)

Oregon Rule	$e^{(1.128[\ln(\text{hardness})]-3.828)}$ [a]	$e^{(0.7409[\ln(\text{hardness})]-4.719)} \times CF$ [b, c]
Proposed	$e^{(0.9789 \times \ln(\text{hardness}) - 3.866)} \times CF$ [b, d, e]	$e^{(0.7409[\ln(\text{hardness})]-4.719)} \times CF$ [b, c]

"e" is the exponential constant is a mathematical constant and is approximately equal to 2.718.

[a] Criterion expressed in terms of "total" concentrations in the water column.

[b] Criterion expressed in terms of "dissolved" concentrations in the water column.

[c] CCC CF (conversion factor from total to dissolved) = 1.101672-[(ln hardness) x (0.041838)].

[d] CMC CF (conversion factor from total to dissolved) = 1.136672 – [(ln hardness) x (0.041838)].

[e] The proposed freshwater acute criterion is already the applicable criterion in OR because EPA promulgated that criterion (See 40 CFR 131.46). However, this criterion is not currently in Oregon's standards rule.

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Appendix: Chemical-specific analyses and information

A.1 Introduction

A.1.1 Scope of background and technical information review

In the following sections, each chemical reviewed for new or revised aquatic life criteria adoption is considered in depth. For each chemical, provided information generally includes chemical sources and uses, mode of toxic action, environmental fate, Oregon's current criteria, a summary of the scientific basis for the proposed EPA recommended criteria, and chemical measurement data in Oregon ambient waters and/or discharges. A summary of this information for each chemical may be found in Chapter 2. For chemicals that have different aquatic life criteria in Oregon compared to current EPA recommended criteria but are not under consideration for an update at this time, less detailed information is presented.

A.1.2 Details of chemical measurement data in Oregon waters and data assumptions

Data are presented to show the distribution of chemical measurements in Oregon waters and in wastewater effluent. DEQ preferentially used Oregon's Ambient Water Quality Monitoring System (AWQMS) database to obtain chemical measurement data in Oregon. This system includes access to DEQ and partner data for rivers and streams, lakes, estuaries, beaches and groundwater resources throughout Oregon. In addition, AWQMS provides a direct exchange to the Water Quality Exchange network which will integrate DEQ water quality data with other publicly available data sources, including USEPA and USGS. If data for a specific chemical were not available in AWQMS, an alternative data source (published literature, EPA database, etc.) was used and noted in-text.

In some cases, the amount of a chemical measured was so low that it could not be reliably reported. These measurements are generally referred to as 'censored data'. In this issue paper, censored data are split into two categories: 1) "not detected" and 2) "detected, not quantified". In samples where a given chemical was "not detected", the chemical was either not present in the sample or it was present at a level below the ability of the laboratory to detect it. In samples where a given chemical was "detected, not quantified," the chemical was detected, but at a level that was lower than the ability of the laboratory to accurately report how much of it was in the sample. Because of the increased uncertainty associated with censored data, those data were

reported but not numerically included in an analysis of the distributions of measured (quantified) data in Oregon waters.

In cases where it was appropriate, the recommended criteria were overlayed onto the distribution of measured data to allow for a general comparison of concentrations in Oregon waters, discharges, or fish tissue concentrations and the proposed criteria. For this general comparison, DEQ compared saltwater criteria to chemical concentrations in estuaries and the ocean. DEQ compared freshwater criteria to all other ambient surface waters, fish tissue, and discharges. Although discharges are present in saltwater, they are more commonly found in freshwater. However, it is important to note that water quality programs have specific methods for determining whether a water body is impaired or whether a permit limit is needed. Thus, these comparisons with criteria are presented for general information only.

A.1.2.1 Data quality

Chemical data for Oregon waters were carefully screened before inclusion in analyses. Data was pulled from Oregon's Ambient Water Quality Monitoring System (AWQMS), which is maintained by DEQ. In general, methods for determining if data were of sufficient quality for inclusion were based on similar same criteria used for inclusion in assessment used in the Integrated Report.

Table A.1 Data Quality Requirements for Inclusion

AWQMS Parameter Name	Included Values
Result_status	"Accepted", "Final", "Validated"
DQL	"A", "B", NA
QualifierAbbr	"J", "A", "B", "OTHER", "FQC", NA
Statistical_Base	NA
SampleMedia	"Water", "Tissue"

A.1.2.2 Ambient water and discharge classifications

In order to compare relevant chemical data to the appropriate criteria, data were grouped according to monitoring location type. Surface waters were generally presumed to be freshwater unless they were explicitly a type that is associated with saltwater (ocean, estuary). Surface waters were also further classified as lentic (standing) or lotic (flowing) for the selenium analyses only, given that the proposed chronic criterion is different based on the those differences.

Table A.2 Classification of Water by Monitoring Location Type

AWQMS Monitoring Location Type	Selenium Classification	Overall Classification
Stream/River	Lotic	Surface Water
BEACH Program Site – River/Stream		
River/Stream Perennial		
CERCLA Superfund Site[1]		
Canal Irrigation		
Canal Transport		
Canal Drainage		
Facility Public Water Supply (PWS)[2]		
Reservoir	Lentic	
Wetland Undifferentiated		
Lake		
Facility Public Water Supply (PWS)[2]		
Storm Sewer	NA	Discharge
Facility Industrial		
Facility Other		
Facility Municipal Sewage (POTW)		
Pipe, Unspecified Source		
Estuary	NA	Saltwater
Ocean		
BEACH Program Site – Ocean		
Pond-Anchialine		

[1] This dataset only contained Portland Harbor Superfund sites, which are located on the Willamette River.

[2] These sites are all surface water intakes. Most represent flowing waters including rivers and creeks (inclusion in "Lotic" selenium classification), although one of these sites was a lake (inclusion in "Lentic" selenium classification)

A.1.2.3 Sample fraction designation

It is important to use the correct sample fraction while comparing chemical measurements to criteria values. For example, organic contaminants are typically applied as the "total" sample fraction. Criteria for many metals are often applied as "dissolved" sample fraction, because "dissolved" sample fractions which have been filtered, much more closely approximate the amount of metal that is biologically available to cause toxicity. For aluminum specifically, it is the "bioavailable" sample fraction that causes toxicity in ambient waters. Because AWQMS contains data from a variety of sources, there are many different sample fraction designations that needed to be translated into a single form that could be compared to criteria (total, dissolved, or bioavailable). DEQ translated these different designations based on the method used in the Water Quality Assessment Program to process data for the Integrated Report.

Table A.3 Classification of condensed sample fraction for analysis based on Sample Fraction terms in AWQMS

AWQMS Sample_Fraction	Condensed Sample Fraction for Analysis
Total	Total
Extractable	
Recoverable	
Total Recoverable	
Total Residual	
None	
Volatile	
Semivolatile	
NA	
Dissolved	Dissolved
Filtered, field	
Filtered, lab	
Diss	
Bioavailable	Bioavailable

A.1.2.4 Conversion of selenium from wet weight to dry weight basis in historical tissue data

AWQMS selenium fish tissue data are currently reported on a wet weight basis. However, the recommended selenium chronic criterion for fish tissue is expressed on a dry weight basis (EPA, 2021a). The EPA has drafted a technical support document for the selenium criterion that details methods for converting historical wet weight data to dry weight, so that selenium concentrations can be appropriately compared to the recommended criterion (EPA, 2021c). The equation for wet weight (WW) to dry weight (DW) conversion is:

DW = WW / [1 - (percent moisture/100)] (EPA, 2011)

The EPA recommends using percent moisture data for a given species and tissue type to make the conversion to dry weight. When data for a species is unavailable, percent data for a similar species (i.e., same genus or same family) can be used. Although the draft technical support document provides percent moisture values from fish tissues in a variety of species, the available fish tissue data for Oregon included some species not reviewed in the technical support document or closely related to those that were included. As a way to estimate percent moisture for Oregon's historical fish tissue data, DEQ used the maximum values for percent moisture in whole body tissue and muscle tissue listed in the 2021 draft selenium technical support document (EPA, 2021c) to create a dry weight fish tissue estimates. Using maximum percent

moisture values produced dry weight selenium tissue measurements that were biased high (i.e. worst-case scenario) and could then be compared against the recommended criterion.

Table A.4 Percent moisture used to convert historical wet weight tissue measurements to dry weight measurements

Tissue	Percent Moisture (%)	Source fish measurement
Whole Body	74.8 [1]	*Lepomis macrochirus*, Bluegill
Muscle	81.22 [2]	*Ictalurus punctatus*, Channel Catfish

[1] Fish whole-body moisture value sourced from (EPA, 2014) referenced in the October 2021 Draft Technical Support Document (EPA, 2021c).

[2] Maximum fish muscle moisture value originally sourced from (Pinkney, 2003) referenced in the October 2021 Draft Technical Support Document (EPA, 2021c).

A.2 Chemical-specific information and analyses

A.2.1 Acrolein

A.2.1.1 Acrolein sources and uses

Acrolein has both artificial and natural sources. When produced industrially, acrolein is primarily used as a pesticide in irrigation canals to control the growth of aquatic weeds. It is a restricted use pesticide, which means that it is not available to the general public, and it can only be used by a professional applicator. It is also used to control algae, weeds, mollusks, and slime in closed industrial water systems. To be effective as a pesticide, acrolein must be added to waters at levels (e.g. 15 mg/L) that are high enough to kill fish, insects, crayfish, and amphibians. In Oregon, acrolein has been approved for uses in places like irrigation canals or impoundments (Washington State Pest Management Resource Service, 2020) in cases where the loss of aquatic life is considered acceptable. Aside from its use as a pesticide, acrolein is an intermediate product in the manufacture of acrylic acid, as well as a tool to fight microorganisms in fuel production (ASTDR, 2007; EPA, 2009).

Acrolein can also be released into the environment through natural and chemical processes. For example, acrolein is present as a by-product of the incomplete combustion of organic matter (e.g. fossil fuel combustion, burning wood, cooking, cigarette smoke) or chlorination and is also produced from the volatilization of oak tree essential oils (EPA, 2009).

A.2.1.2 Acrolein mode of action and environmental fate

Acrolein is highly reactive, binding to and destroying cellular components. In general, the most damage occurs in the organ system that is exposed first (WHO, 2002).

Acrolein can enter the aquatic environment by direct pesticide application, industrial discharge, or from water treatment processes that produce acrolein as a by-product of chlorination (EPA, 2009). Acrolein released as a combustion by-product typically results in air pollution. Acrolein has a strong affinity for water, meaning that it does not bind to or stay in the sediment in aquatic environments. It degrades by volatilization, microbial degradation, or absorption to plants. In freshwater, acrolein has a half-life (the time it takes for half of the quantity present in the environment to degrade) of roughly seven hours (Nordone et al., 1998), although environmental factors (temperature, presence and composition of a microbial community, the amount of acrolein present) can have an impact on acrolein degradation (EPA, 2009). Given its high reactivity and short half-life, acrolein is not bioaccumulative nor persistent.

A.2.1.3 Basis for the latest recommended acrolein criteria

The freshwater acute criterion for acrolein of 3.0 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 14 different genera. Invertebrates tended to be the least sensitive to acrolein. The four most sensitive species tested were vertebrates. The acute criterion was calculated based on toxicity data from the following species, from most to least sensitive:

1. African clawed frog (tadpole: *Xenopus laevis*)
2. White sucker (*Catostomus commersoni*)
3. Bluegill (*Lepomis macrochirus*)
4. Fathead minnow (*Pimephales promelas*)

Acute data for Coho salmon (*Oncorhynchus kisutch*) and rainbow trout (*O. mykiss*) were included in the analysis, and *Oncorhynchus* was the fifth most acutely sensitive genus. While these data were not directly used to calculate the acute criterion, the acute criterion is protective of coho salmon and rainbow trout because they are less sensitive.

The freshwater chronic criterion for acrolein of 3.0 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute freshwater data in conjunction with acute-to-chronic ratios for the following species, from most to least sensitive:

1. Fathead minnow (*Pimphales promelas*)
2. Cladoceran (*Daphnia magna*)
3. Flagfish (*Jordanella floridae*)

Direct chronic data for salmonids or other threatened and endangered species were not available. However, the acute data used during the acute-to-chronic ratio calculation to determine the chronic criteria did consider data from the genus *Oncorhynchus*, which was not among the four most sensitive genera (see above).

A.2.1.4 Acrolein measurements in Oregon waters

A.2.1.4.1 Acrolein in Oregon surface waters

A total of 91 surface water measurements were obtained from AWQMS. For 89 of those measurements, acrolein was either not detected, or detected but not quantified. The most common quantifiable reporting limit for acrolein was 1.5 µg/L, indicating that measurements that were not quantified were likely below the recommended acrolein freshwater acute and chronic criteria (3.0 µg/L). Of the two acrolein measurements that were quantified, both were below the recommended freshwater acute and chronic criteria (Figure A.1).

A.2.1.4.2 Acrolein in Oregon discharges

In all 476 samples of Oregon discharges, acrolein was either not detected or detected but not quantified. The most common reporting limit listed for acrolein in wastewater was 5.0 µg/L, indicating that it is unclear whether the concentrations of acrolein reported in discharges are likely to be above or below recommended freshwater acute and chronic criteria (3.0 µg/L).

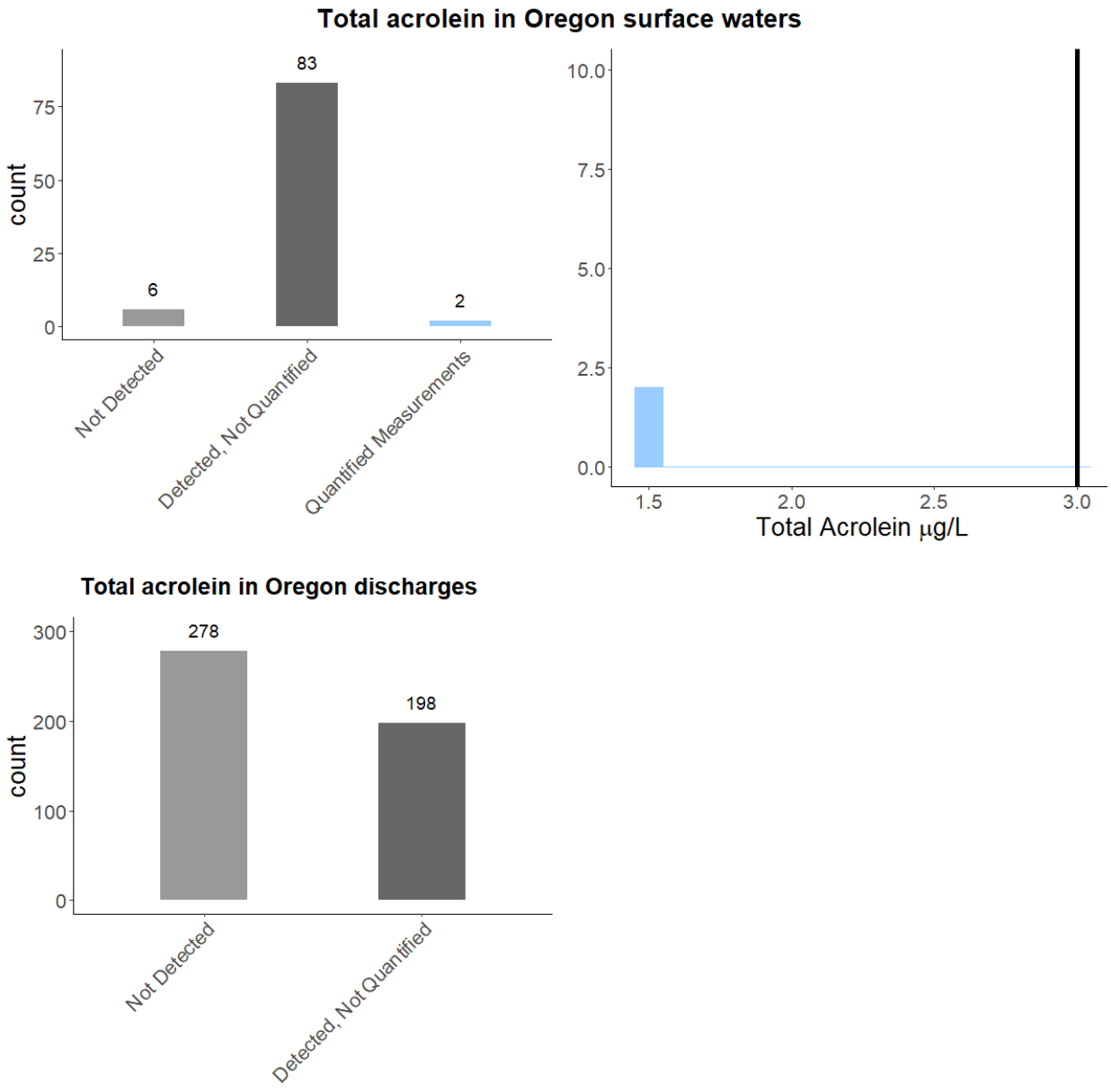


Figure A.1. Acrolein measured in Oregon surface waters and discharges. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. The solid black vertical line corresponds to the proposed freshwater acute and chronic criteria for acrolein (3.0 µg/L). All quantified measurements to the left of that line are also below the proposed criteria.

A.2.2 Aluminum

A.2.2.1 Aluminum sources and uses

Aluminum occurs naturally and is the most abundant metal in the Earth's crust. It is found in most rocks, and in clays, soils, and sediments, often complexed with oxygen or silica. Because it is naturally so abundant on Earth's crust, aluminum enters waterways through natural weathering processes. Human activities that move aluminum into surface waters include aluminum mining and smelting, fertilizer application and use, fossil fuel combustion, and the use of alum (potassium aluminum sulfate) as a coagulant to clarify drinking and wastewater and sometimes lakes. In particular, alum is used to remove phosphorus during wastewater treatment. Bauxite (aluminum ore) mines can also be a significant source of aluminum in the environment. In Oregon, the majority of bauxite mine records (14) occur in Columbia County, with an additional record in Marion County and another in Josephine County (McClaughry et al., 2022). Several smelting and aluminum processing facilities have existed in Oregon, and one of these smelting facilities is now a Superfund program site in the Dalles, OR. Along with heavy precipitation and snow melt, acid rain can mobilize aluminum in aquatic environments (EPA, 2018).

A.2.2.2 Aluminum mode of action and environmental fate

Despite being so prevalent in the environment, aluminum has no known biological function, and is therefore considered a non-essential metal. Aluminum causes toxicity to aquatic animals by affecting ion regulation and respiratory processes. In fish, specifically, aluminum accumulates at the gill causing damage to the cells there and resulting disfunction related to ion balance (EPA, 2018).

Aluminum can be found in many different forms depending on environmental conditions, and certain forms are more toxic to aquatic life than others. These environmental conditions affect the bioavailability of aluminum, or the aluminum that is able to have a biological effect. Aluminum toxicity in the aquatic environment varies depending on other water quality parameters in natural waters, especially pH, DOC, and total hardness (EPA, 2018). A large proportion of aluminum remains bound to clays and sediments, or complexed with other ions, and therefore is not available to cause harm to aquatic organisms. However, at high and low pH, aluminum solubility in water increases, making it more toxic at extreme pH's than in neutral waters. In the presence of dissolved organic carbon (DOC), aluminum may form organic aluminum complexes, becoming less bioavailable to aquatic organisms. Because aluminum is affected by other ions in the water, as total hardness (a measure of calcium and magnesium ions in the water) increases, aluminum becomes less bioavailable because aluminum ions must now compete with other ions being taken up by organisms. However, pH also affects the extent to which total hardness reduces bioavailability.

A.2.2.3 Basis for the latest recommended aluminum criteria

The 2018 nationally recommended criteria used an approach that normalized aluminum toxicity in invertebrates and vertebrate fish using models to account for the combined effects of pH, DOC, and total hardness on aluminum toxicity. This approach is in line with the methods outlined in EPA's 1985 Guidelines because there was sufficient evidence to demonstrate that those water quality parameters affected aluminum toxicity.

The magnitude of the freshwater acute criterion for aluminum, measured as a one-hour average, which is not to be exceeded more than once every three years on average, is dependent on pH, DOC, and total hardness and can be calculated using the Aluminum Criteria Calculator v. 2.0. Acute toxicity data from 20 different genera normalized to models accounting for pH, DOC, and total hardness were used to establish criteria values. While the ranked order of the genera that are most sensitive to aluminum change with water chemistry, the following were the four most sensitive genera at a pH of 7, total hardness of 100 mg/L, and DOC of 1.0 mg/L:

1. Cladocerans (*Daphnia magna and D. pulex*)
2. Smallmouth bass (*Micopterus dolomieu*)
3. Rainbow trout (*Oncorhynchus mykiss*)
4. Cladocerans (*Ceriodaphnia dubia* and *C. reticulata*)

Acute data for rainbow trout (*O. mykiss*) and brook trout (*Salvelinus fontinalis*) were included in the analysis at the described conditions. *Oncorhynchus* was the third most acutely sensitive genus, and the recommended criteria magnitudes are protective of salmonids in the genera *Oncorhynchus* and *Salvelinus*, which include threatened and endangered species in Oregon.

The magnitude of the freshwater chronic criterion for aluminum measured as a four-day average, which is not to be exceeded more than once every three years on average, is dependent on pH, DOC, and total hardness and can be calculated using the Aluminum Criteria Calculator v. 2.0. Chronic toxicity data from 13 different genera normalized to models accounting for pH, DOC, and total hardness were used to establish criteria values. While the ranked order of the genera that are most sensitive to aluminum change with water quality, the following were the four most sensitive genera at a pH of 7, total hardness of 100 mg/L, and DOC of 1.0 mg/L:

1. Atlantic salmon (*Salmo salar*)
2. Brook trout (*Salvelinus fontinalis*)
3. Cladocerans (*Daphnia magna*)
4. Fatmucket (*Lampsilis siliquoidea*)

Salmonids (Atlantic salmon (*Salmo salar*) and brook trout (*Salvelinus fontinalis*)) comprised the two most sensitive genera assessed for chronic aluminum toxicity. The chronic criterion

recommendations are expected to be protective of these sensitive fish as well as threatened and endangered species that share the same genus in Oregon.

Although EPA reviewed saltwater aluminum toxicity data, they were insufficient to determine saltwater criteria recommendations.

A.2.2.4 Aluminum measurements in Oregon waters

2.2.2.4.1 Aluminum in Oregon surface waters

Because the freshwater aluminum criteria magnitudes must be calculated using concurrent water quality parameters, there are no singular acute or chronic criteria values that can be visually compared to the distribution of aluminum measurements in surface waters to get a sense of whether the proposed criteria tended to fall above or below ambient measurements. DEQ elected to instead display the 10th and 50th percentiles of acute and chronic criteria magnitudes calculated from waters in the state of Oregon (Figure A.2). The 10th percentile comparison represents a conservative approach (as a sort of 'worst case scenario') in comparing Oregon water aluminum concentrations with proposed aluminum criteria. By definition, 90% of criteria magnitudes from Oregon waters will be higher than those displayed. The 50th percentile analysis compares concentrations to the median acute and chronic aluminum criteria values based on data from Oregon waters.

Both total recoverable and bioavailable sample fraction data are presented for aluminum (Figure A.2, Table A.5). A total of 4,381 total recoverable aluminum measurements and 111 bioavailable aluminum measurements were available in AWQMS. For both total recoverable and bioavailable aluminum, measurements below detection most frequently had detection limits on the order of 10 µg/L, while samples in which aluminum was detected but not quantified typically had reporting limits on the order of 20 µg/L. In all cases where aluminum measurements (total recoverable or bioavailable) were below the quantification limit, they were also below the 10th percentile of recommended acute and chronic criteria values in Oregon.

Of the 4,234 quantified total recoverable aluminum measurements (Table A.2), 975 were greater than the 10th percentile recommended acute criterion, while 1,737 were greater than the 10th percentile recommended chronic criterion. Four-hundred and nineteen were greater than the 50th percentile recommended acute criterion, while 948 were greater than the 50th percentile recommended chronic criterion. The total recoverable aluminum measurements with the highest concentrations tended to come from areas of canal transport. Several extremely high total recoverable aluminum measurements (> 1,000,000 µg/L) came from historical data or other less well-characterized surface water data. However, those data met data quality criteria, so they were included in the analysis. Still, it is important to note that total recoverable measurements

that were more specifically described in AWQMS did sometimes exceed 10,000 µg/L in some rivers and streams. Whether surface water total recoverable measurements actually exceed aluminum criteria must be determined by using pH, DOC, and total hardness data for each sample.

Of the 16 quantified bioavailable aluminum measurements, none were greater than either the 10th or 50th percentile chronic or acute recommended criteria. Although bioavailable measurements were limited, DEQ intends to increase bioavailable sampling in ambient waters over the next two years.

Table A.5. Statistical summary for quantified aluminum concentrations in Oregon waters

Measurement Type	n	Aluminum (µg/L)								
		minimum	Percentile							maximum
			5th	10th	25th	50th	75th	90th	95th	
Surface Waters – bioavailable sample fraction	16	22.2	22.65	23	23.35	25.6	30.175	43.55	46.875	48.3
Surface Waters – total recoverable sample fraction	4,234	0.3	47	73	150	313	674	1,470	2,543	8,000,000
Discharges – total recoverable sample fraction	725	4.1	14.04	20	46	126	400	1,636	3,686	11,000,000

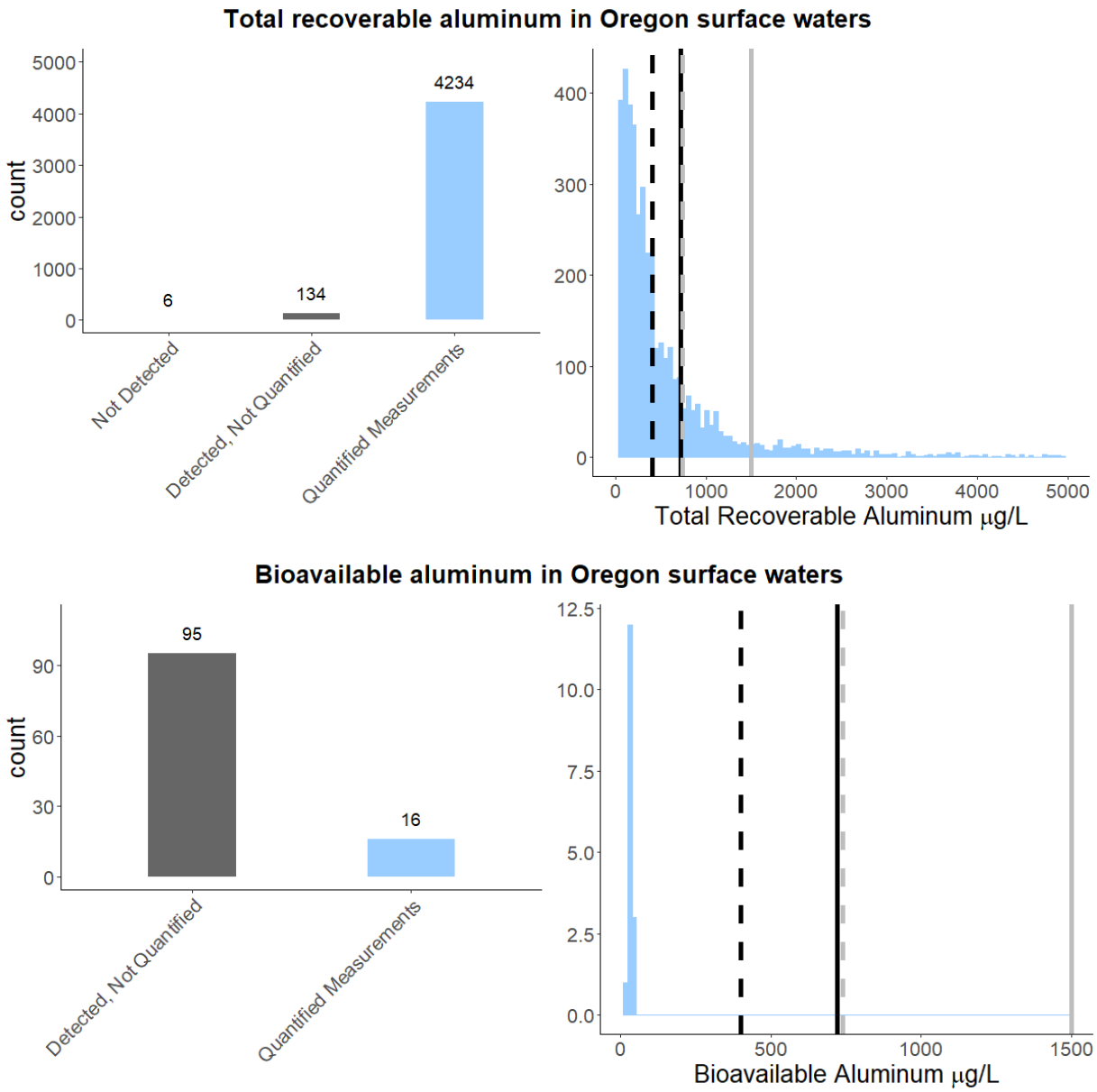


Figure A.2. Aluminum measured in Oregon surface waters and discharges. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. Both total recoverable and bioavailable aluminum measurements are displayed separately for comparison. The x-axes are truncated to better visualize data. The solid black vertical line corresponds to the proposed freshwater acute 10th percentile aluminum criterion (720 µg/L), while the dashed black vertical line corresponds to the proposed freshwater chronic 10th percentile aluminum criterion (400 µg/L). The solid gray vertical line corresponds to the proposed freshwater acute 50th percentile aluminum criterion (1,500 µg/L), while the dashed gray vertical line corresponds to the proposed freshwater chronic 50th percentile aluminum criterion (740 µg/L). All quantified measurements to the left of those lines are below the proposed 10th and 50th percentile criteria.

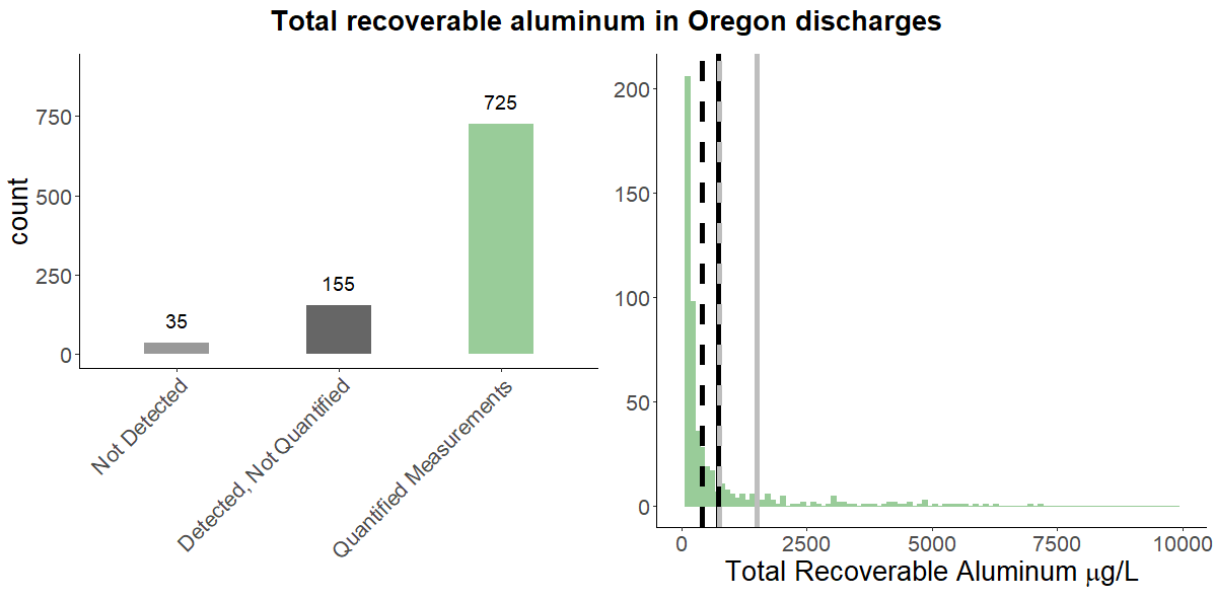


Figure A.2 (continued).

A.2.2.4.2 Aluminum in Oregon discharges

As with aluminum surface water measurements, discharge measurements were compared to a conservative 10th percentile and a median 50th percentile of recommended acute and chronic criteria values based on surface water data.

For discharges, only total recoverable aluminum data are displayed because bioavailable aluminum measurements are not approved for wastewater. For discharge measurements below quantification, detection limits were often 10 µg/L, while reporting limits were most often 50 µg/L. For the 190 measurements at or below quantification (Figure A.2), all of those measurements were also below the 10th percentile recommended acute and chronic criteria.

Of the 725 total recoverable aluminum measurements that were quantified (Table A.5), 124 were above the 10th percentile recommended acute criterion, and 182 were above the 10th percentile recommended chronic criterion. Seventy-eight were above the 50th percentile recommended aluminum acute criterion, and 124 were above the 50th percentile chronic criterion. The highest total recoverable aluminum concentrations (above the 95th percentile) came from wastewater treatment plant effluents. The range of total recoverable aluminum concentrations in Oregon discharges suggests that some dischargers may be challenged by trying to meet permit limits determined by the total recoverable aluminum criteria.

A.2.3 Cadmium

A.2.3.1 Cadmium sources and uses

Cadmium is a naturally occurring metal associated with mineral deposits. In the absence of human activities, it is typically found at low concentrations in the environment. Industrially, cadmium is used in batteries, pigments, plastic stabilizers, and electronics. Nickel-cadmium batteries account for most of current cadmium consumption. Cadmium is also sometimes used during the manufacture of nanoparticles for photovoltaic devices. To a lesser extent, cadmium can be present in mine wastes, fossil fuels, iron and steel, cement, and fertilizers (EPA, 2016). Cadmium is no longer actively mined in the U.S., and there is no record of cadmium mining in Oregon (McClaughry et al., 2022).

Most cadmium in the aquatic environment is the result of anthropogenic inputs, although natural processes such as weathering and erosion of rock and soils is also a source. Atmospheric deposition from fossil fuel combustion or agricultural applications of phosphate fertilizers are both significant sources of cadmium in surface waters (EPA, 2016).

A.2.3.2 Cadmium mode of action and environmental fate

Cadmium is a non-essential element, meaning it has no known biological function in aquatic animals. In the short term, it causes toxicity primarily by affecting ion balance and causing oxidative damage. Cadmium is also responsible for a variety of long-term effects including developmental defects, endocrine disruption, reduction in growth and reproduction, and immune system disfunction. Cadmium is bioaccumulative and is also capable of causing cancer (EPA, 2016).

In the aquatic environment, most cadmium is not biologically available to cause toxicity in aquatic organisms because it readily adsorbs to clays and organic materials and is precipitated out into sediments. Cadmium toxicity is affected by a variety of environmental parameters including pH, hardness, alkalinity and organic matter. For example, as total hardness increases, cadmium toxicity decreases (EPA, 2016).

A.2.3.3 Basis for the latest recommended cadmium criteria

The 2016 nationally recommended freshwater criteria for cadmium account for changes in toxicity as a result of changes in hardness for a variety of species, as they were in previous recommendations (EPA, 1985, 2001a). This approach is in line with the methods outlined in the Guidelines because there was sufficient evidence and data demonstrating that hardness affected freshwater cadmium toxicity. For the saltwater criteria, the magnitudes do not vary with hardness or any other water quality parameter.

The magnitude of the freshwater acute criterion for cadmium of 1.8 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, applies only when total hardness is 100 mg/L. It was derived based on data from 75 different genera. The most sensitive genus toxicity value came from *Salvelinus* (bull trout), although those data were not directly used in calculating the criteria. Instead, data from the second through the fifth most sensitive genera were used to determine the acute criterion, in accordance with procedures listed in the Guidelines when over 59 taxa have acute toxicity information available. Data from the following genera (most sensitive to least sensitive) were used to calculate the acute criterion magnitude given a total hardness of 100 mg/L:

2. Sculpins (*Cottus bairdii and C. confuses*)
3. Brown trout (*Salmo trutta*)
4. Striped bass (*Morone saxatilis*)
5. Pacific salmon and Pacific trout (*Oncorhynchus mykiss, O. clarkia, O. kisutch, O. tshawytscha*)

Although fish in the genus *Oncorhynchus* collectively comprised the fifth most sensitive genus, rainbow trout (*O. mykiss*) as a species was the most sensitive species, even compared to bull trout (*Salvelinus*). Thus, as recommended by the Guidelines, EPA lowered the overall acute criterion recommendation to protect the commercially and recreationally important rainbow trout. Lowering the criterion magnitude to protect rainbow trout ensures that other threatened and endangered salmonids (genus *Oncorhynchus, Salmo, Salvelinus*) are also protected by the freshwater acute criterion.

Note that 2016 the freshwater chronic criterion for cadmium has recently been vacated by a U.S. district court decision. The basis for that vacated criterion is not discussed here.

The saltwater acute criterion for cadmium of 33 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was derived based on data from 79 different genera. The most sensitive genus was a mysid (*Neomysis america*), although those data were not directly used in calculating the criteria. Instead, data from the second through fifth most sensitive genera were used to determine the acute criterion, in accordance with procedures listed in the Guidelines when over 59 taxa have acute toxicity information available. Data from the following genera (from most to least sensitive), were used to calculate the saltwater acute criterion magnitude:

2. Copepod (*Tigriopus brevicornis*)
3. Moon jellyfish (*Aurelia aurita*)
4. Mysid (*Americamysis bahia* and *A. bigelowi*)
5. Striped bass (*Morone saxatilis*)

Data for Oregon's threatened and endangered species were not available for inclusion in determining the saltwater acute criterion.

The saltwater chronic criterion for cadmium of 7.9 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute saltwater data in conjunction with acute-to-chronic ratios from the following genera, from most to least sensitive:

1. Brown trout (freshwater: *Salmo trutta*)
2. Rainbow trout and Chinook salmon (freshwater: *Oncorhynchus mykiss* and *O. tshawytscha*)
3. Mysids (saltwater: *Americamysis bahia* and *A. bigelow*)
4. Mottled sculpin (freshwater: *Cottus bairdii*)
5. Fathead minnow (freshwater: *Pimephales promelas*)
6. Cladoceran (freshwater: *Ceriodaphnia dubia*)
7. Cladoceran (freshwater: *Daphnia magna* and *D. pulex*)

Although mysids were the only saltwater genus for which acute-to-chronic ratio were available, EPA relied on acute-to-chronic ratio data from six other freshwater genera to establish the chronic saltwater criterion for cadmium in accordance with methods outlined in the Guidelines. This approach captured toxic effects in a diversity of aquatic life. It also included a genus (*Oncorhynchus*) which also includes some of Oregon's threatened and endangered species.

A.2.3.4 Cadmium measurements in Oregon waters

A.2.3.4.1 Cadmium in Oregon surface waters

Because the freshwater cadmium criteria magnitudes must be calculated using concurrent total hardness data, there is no singular acute or chronic criterion value that can be visually compared to the distribution of cadmium measurements in surface waters to get a sense of whether the proposed criteria tend to fall above or below ambient measurements. DEQ elected to instead display the 10^{th} and 50^{th} percentile of acute and chronic criteria magnitudes calculated from waters in the state of Oregon. The 10^{th} percentile represents a conservative approach (a sort of 'worst case scenario') in comparing Oregon water cadmium concentrations with proposed cadmium criteria. By definition, 90% of criteria magnitudes from Oregon waters will be higher than those displayed. The 50^{th} percentile analysis compares concentrations to the median acute and chronic aluminum criteria values based on data from Oregon waters.

A total of 4,420 dissolved cadmium measurements were available in AWQMS (Figure A.3). A total of 1,352 samples were below detection and most frequently had detection limits on the order of 0.10 µg/L. In the 2,952 samples where cadmium was detected but not quantified,

reporting limits were typically on the order of 0.06 to 0.10 µg/L. Given that the detection and reporting limits were so low, it is evident that the vast majority of measurements that could not be quantified came from the samples where dissolved cadmium was below the 10th percentile criteria.

Of the 116 quantified surface water cadmium measurements, 9 were above the 10th percentile recommended acute criterion, and 22 were above the 10th percentile recommended chronic criterion. Five were above the 50th percentile acute criterion, and 10 were above the 50th percentile chronic criterion. In fact, the 75th percentile of dissolved cadmium measurements in Oregon was still below the 10th percentile recommended freshwater chronic criterion, and the 90th percentile of dissolved cadmium measurements in Oregon was below the 10th percentile recommended acute criterion (Table A.6). The highest measurements of dissolved cadmium (≥ 1.0 µg/L) came from historical measurements from the Willamette, Coquille, Rogue, and Clackamas Rivers. However, it is important to note that the 10th and 50th percentile acute and chronic criteria values are presented here are for a general comparison purposes, and that hardness must be used to calculate the exact applicable criteria to determine whether a cadmium measurement exceeds the criteria.

A.2.3.4.2 Cadmium in Oregon saltwater

Unlike the freshwater cadmium criteria, the recommended saltwater criteria have discrete values that do not vary with water quality parameters. A total of 110 cadmium measurements in saltwater were available in AWQMS (Figure A.3). Measurements that were below detection (42) had a detection limit of 0.10 µg/L, while measurements that were below the reporting limit (67) most commonly had a reporting limit of 0.10 µg/L and always below 1.5 µg/L. This indicated that all measurements below the reporting limit were also lower than the recommended saltwater acute and chronic criteria. Only a single saltwater measurement was quantified with a value of 3.0 µg/L, indicating that it was also below the recommended saltwater acute and chronic criteria.

A.2.3.4.2 Cadmium in Oregon discharges

As with surface water measurements, cadmium discharge measurements were compared against the 10th and 50th percentile of freshwater recommended acute and chronic criteria based on surface water measurement data.

Of the 528 cadmium measurements from Oregon discharges in AWQMS, over half were either below detection (87) or below quantification (242) (Figure A.3). The most common detection

limits reported were 0.10 and 0.25 µg/L, while the most common reporting limits were 0.05 and 0.25 µg/L. Given the range of detection and reporting limits, it was not clear how many of the measurements at or below the reporting limit were also lower than the 10th percentile recommended chronic criterion, but it was clear that the majority of these measurements were below the 10th percentile recommended acute criterion.

Of the 199 quantified cadmium measurements, 33 were above the 10th percentile acute criterion, while 72 were above the 10th percentile chronic criterion. Twenty-two were above the 50th percentile acute criterion, while 36 were above the 50th percentile chronic criterion. However it is important to note that data higher than the 10th or 50th percentile values may not necessarily indicate that the measurements were higher than actual calculated criteria for that measurement. Further, the methods for determining limits in permitting discharges are complex and consider other factors (such as the water quality of the waterbody receiving the discharge).

Table A.6. Statistical summary for quantified dissolved cadmium concentrations in Oregon waters

Measurement Type	n	Cadmium (µg/L)								
		minimum	Percentile							maximum
			5th	10th	25th	50th	75th	90th	95th	
Surface Water	116	0.005	0.008	0.012	0.020	0.060	0.16	0.32	0.48	4.0
Saltwater	1	3.0	-	-	-	-	-	-	-	3.0
Discharge	199	0.020	0.026	0.030	0.050	0.12	0.27	0.78	1.6	8.8

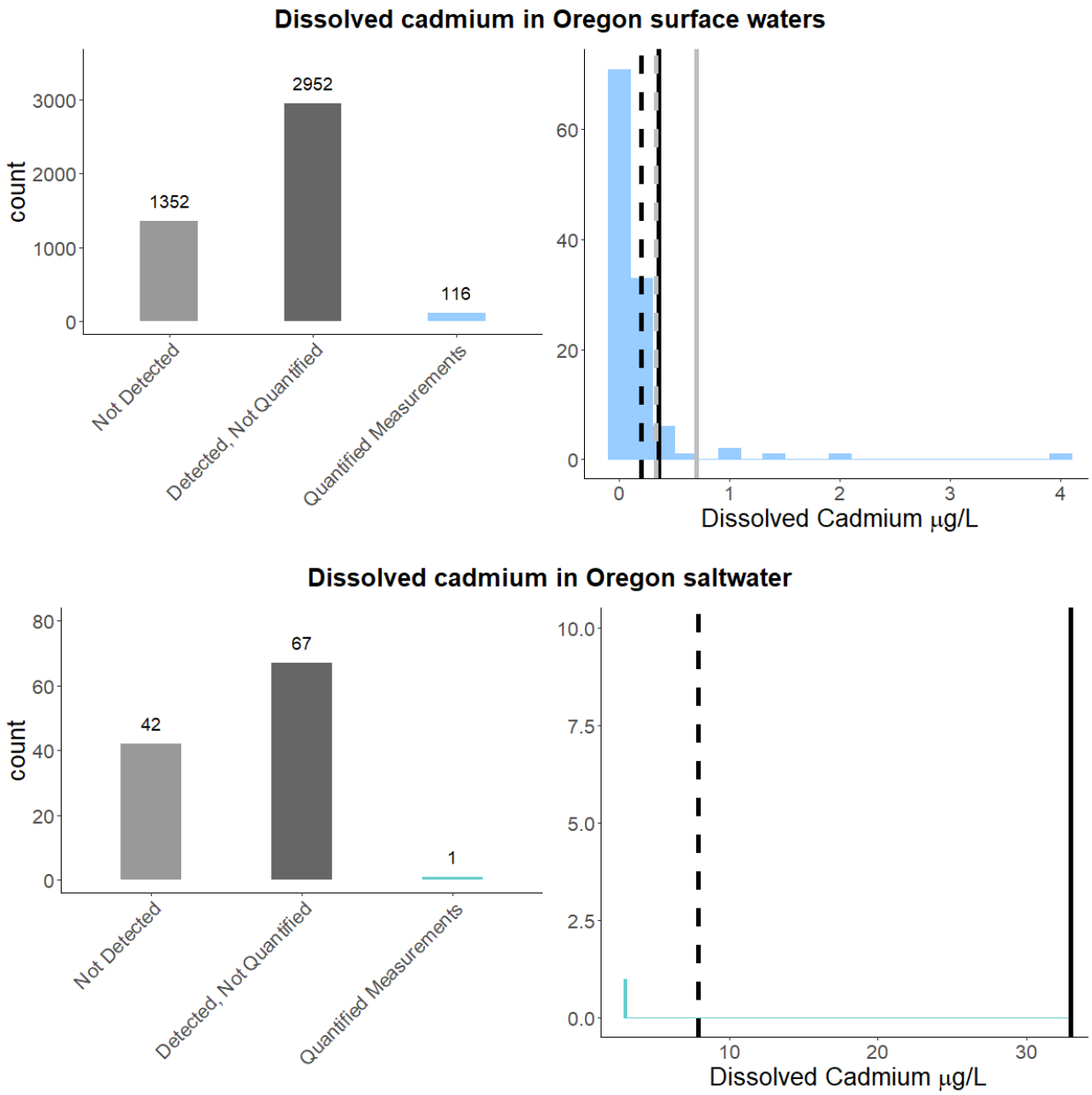


Figure A.3. Cadmium measured in Oregon surface waters, saltwater and discharges. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. For surface waters and discharges, the solid black vertical line corresponds to the proposed freshwater acute 10th percentile cadmium criterion (0.36 µg/L), while the dashed black vertical line corresponds to the proposed freshwater 10th percentile cadmium criterion (0.20 µg/L). For surface waters and discharges, the solid gray vertical line corresponds to the proposed freshwater acute 50th percentile cadmium criterion (0.70 µg/L), while the dashed gray vertical line corresponds to the proposed freshwater 10th percentile cadmium criterion (0.34 µg/L). For saltwater, the solid black vertical line corresponds to the proposed saltwater acute cadmium criterion (33 µg/L)., while the dashed black vertical line corresponds to the proposed saltwater chronic criterion (7.9 µg/L). All quantified

measurements to the left of those lines are below the proposed 10th or 50th percentile criteria (freshwater and discharges) or the proposed criteria (saltwater).

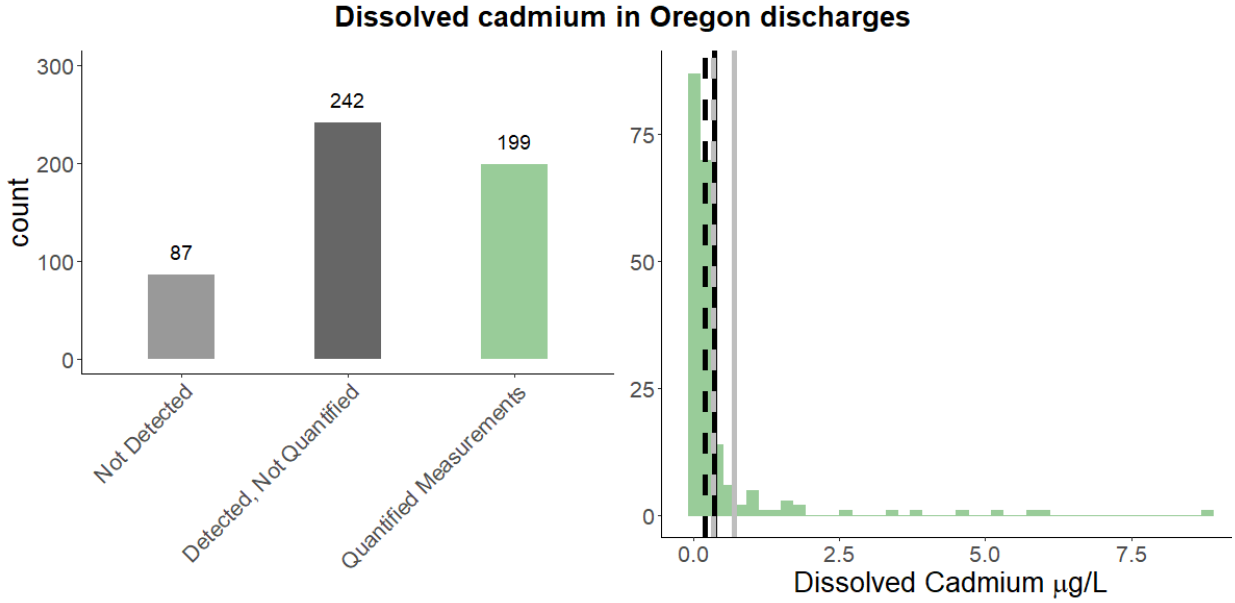


Figure A.3 (continued).

A.2.4 Carbaryl

A.2.4.1 Carbaryl sources and uses

Carbaryl is a man-made general use insecticide that was first used agriculturally in the late 1950s (NPIC, 2016). As of 2020, carbaryl was registered for over 120 agricultural, non-crop, and residential uses in Oregon (ODA, 2020). From 2000 to 2017, the USGS estimates that most agricultural carbaryl in Oregon was applied to orchards and grapes, followed by vegetables and fruits, with occasional applications on alfalfa, wheat, and other crops as well (USGS, 2020). Aside from its primary use as an insecticide, carbaryl is also used to thin fruit trees. Although residential use of carbaryl is not as easily quantified, it is sufficient to result in measurable carbaryl levels in urban waterways. In fact, one national USGS study of pesticides in urban rivers and streams showed that carbaryl exceeded aquatic life benchmarks in roughly 10% streams in the U.S. for the period 2002 to 2011 (Stone et al., 2014).

A.2.4.2 Carbaryl mode of action and environmental fate

Carbaryl is a carbamate insecticide. Insecticides in this class cause their toxicity by acting on the nervous system, eventually resulting in paralysis followed by death (EPA, 2012).

Carbaryl enters the aquatic environment through runoff after rain events as well as through spray drift, and to some extent, volatilization followed by deposition (EPA, 2012). Carbaryl is not expected to significantly bioaccumulate (EPA, 2010). Depending on environmental conditions,

the half-life of carbaryl ranges from 0.13 to 12 days. The presence of microbes and alkaline conditions increase the rate of degradation (EPA, 2012).

A.2.4.3 Basis for the latest recommended carbaryl criteria

The freshwater acute criterion for carbaryl of 2.1 µg/L, measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 47 different genera. Insects tended to be the most sensitive to carbaryl, which was expected because carbaryl is an insecticide. In fact, the 15 most sensitive genera for which toxicity information was available were insects and crustaceans. Fish tended to be far less acutely sensitive to carbaryl. Stoneflies were the most sensitive, and the freshwater acute criterion was calculated based on toxicity data from the following stonefly species, from most to least sensitive:

1. Stonefly (*Isogenus sp*.)
2. Stonefly (*Skwala sp*.)
3. Stonefly (*Pteronarcys californica*)
4. Stonefly (*Claassenia sabulosa*)

Acute data were available for a variety genera that also contain threatened and/or endangered species in Oregon, including *Salvelinus* (Brook trout (*S. fontinalis*) and Lake trout (*S. namaycush*)), *Acipenser* (Shortnosed sturgeon (*A. brevirostrum*)), and *Oncorhynchus* (Apache trout (*O. apache*), Coho salmon (*O. kisutch*), Chinook salmon (*O. tshawytscha*), Cutthroat trout (*O. clarkii*) and Rainbow trout (*O. mykiss*). The most sensitive of these genera was *Oncorhynchus*, which was over 500 times less sensitive than the most sensitive stonefly, indicating that the recommended acute freshwater criterion is protective of *Oncorhynchus* and other threatened and endangered species in Oregon.

The freshwater chronic criterion for carbaryl of 2.1 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute freshwater data in conjunction with acute-to-chronic ratios from the following species, from most to least sensitive:

1. Cladoceran (*Ceriodaphnia dubia*)
2. Cladoceran (*Daphnia magna*)

Chronic freshwater toxicity data for animals sharing the same genus as Oregon's threatened and endangered species were not available. However, fish data (Fathead minnow, *Pimephales promelas* and Colorado pikeminnow, *Ptychochelius lucius*) tended to indicate that fish were less sensitive (over 60 times) than invertebrates.

The saltwater acute criterion for carbaryl of 1.6 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 11 different genera. The most sensitive groups were crustaceans, and the saltwater acute criterion was calculated based on data from the following genera, from most to lease sensitive:

1. Mysid (*Americamysis bahia*)
2. Dungeness crab (*Metacarcinus magister* formerly *Cancer magister*)
3. Ghost shrimp (*Callianassa californiensis*)
4. Mud shrimp (*Upogebia pugettensis*)

None of the saltwater acute data correspond to genera comprising Oregon's threatened or endangered species.

A.2.4.4 Carbaryl measurements in Oregon waters

A.2.4.4.1 Carbaryl in Oregon surface waters

For the vast majority of surface water samples (5,748 of 6,279), carbaryl was detected but at levels below quantification (Figure A.4). Carbaryl was not detected in 36 samples. In all cases where carbaryl concentrations were too low to be quantified or detected, the low laboratory reporting limits (most commonly 0.005 µg/L) indicated that these measurements were also below the recommended freshwater criteria. Of the 495 quantified measurements (Table A.7), only two were greater than the freshwater acute and chronic criteria (Figure A.4), with one measurement coming from the North Fork Deep Creek at Hwy 212, upstream of Boring and the other coming from Mill Creek at Wright Road in the Dalles.

A.2.4.4.2 Carbaryl in Oregon saltwater

In all saltwater measurements of carbaryl (56), carbaryl was detected but too low to be quantified. In these cases, the low laboratory reporting limits (most commonly 0.005 µg/L) indicated that the carbaryl measurements were also below the recommended saltwater acute criterion (Figure A.4).

A.2.4.4.3 Carbaryl in Oregon discharges

Carbaryl was measured in a total of 96 discharge samples. In the majority of those discharge samples (74), carbaryl was detected but not quantified (Figure A.4). In all cases where carbaryl concentrations were too low to be quantified, the low laboratory reporting limits (most commonly 0.05 µg/L) indicated that these measurements were also below the recommended freshwater criteria. Of the 19 quantified measurements of carbaryl in Oregon discharges, none of them were higher than the recommended freshwater criteria (Figure A.4, Table A.7).

Table A.7. Statistical summary for quantified carbaryl concentrations in Oregon waters

Measurement Type	n	Carbaryl (µg/L)								
		minimum	Percentile							maximum
			5th	10th	25th	50th	75th	90th	95th	
Surface Waters	495	0.003	0.0054	0.0060	0.0080	0.015	0.038	0.12	0.20	14
Discharges	19	0.048	0.048	0.049	0.049	0.051	0.073	0.19	0.24	0.66

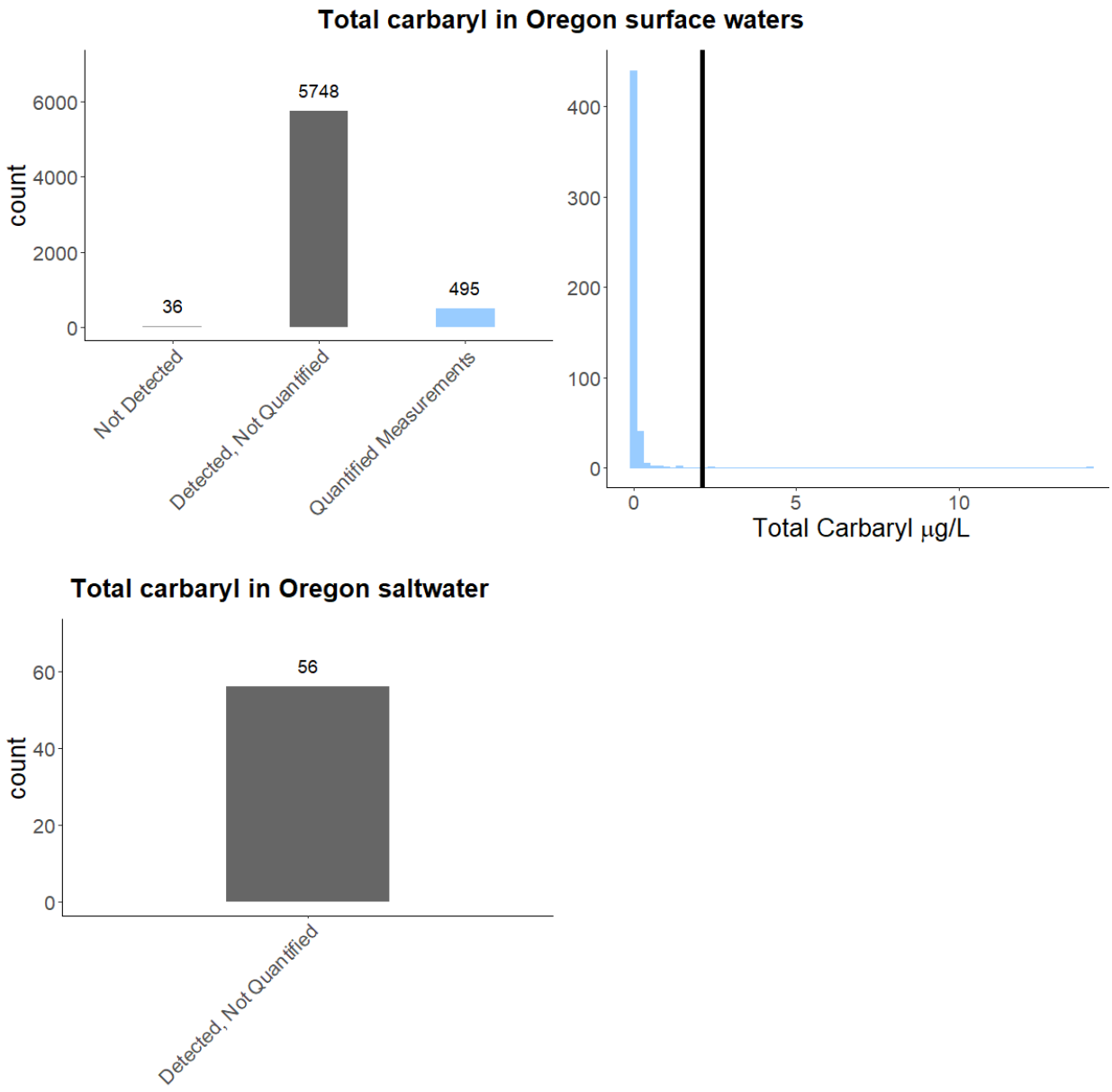


Figure A.4. Carbaryl measured in Oregon surface waters, saltwater and discharges. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. The solid black vertical line corresponds to the proposed freshwater acute and chronic criteria (2.1 µg/L) for carbaryl. All quantified measurements to the left of that line are also below the proposed criteria.

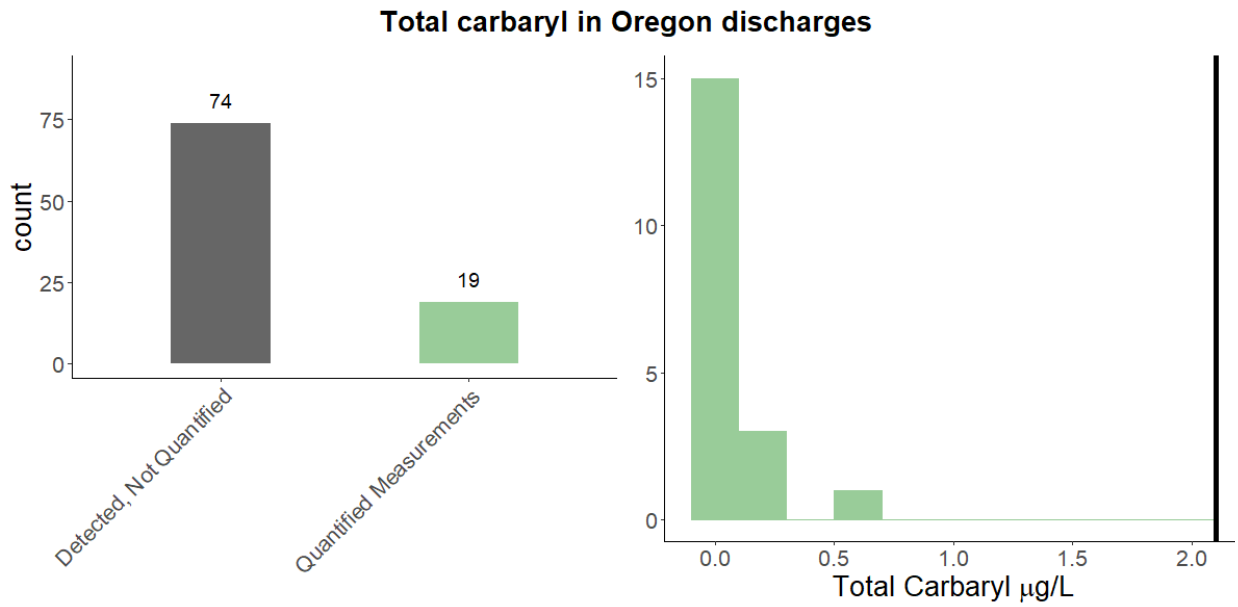


Figure A.4 (continued).

A.2.5 Diazinon

A.2.5.1 Diazinon sources and uses

Diazinon is a pesticide that was first used in the United States in 1956. It is currently a restricted use pesticide, registered for at least 55 agricultural and non-crop uses in Oregon (ODA, 2020). It was approved for residential and household use until 2004, when it was banned for those uses (NPIC, 2009). From 2000 to 2017, the USGS estimates that most agricultural diazinon use in Oregon has been applied to orchards and grapes, followed by vegetables and fruits, with occasional applications on corn and other crops as well (USGS, 2020). Diazinon use in urban settings has been limited by its classification as a restricted use pesticide in the early 2000s, and a national USGS study of pesticides in rivers and streams showed that the frequency of diazinon detections in urban streams decreased for the period 2002-2011, reflecting this change in policy (Stone et al., 2014).

A.2.5.2 Diazinon mode of action and environmental fate

Diazinon is an organophosphate insecticide. Pesticides in this class are neurotoxicants. Inhibition of a key enzyme in the nervous system leads to a repeated firing of nerve impulses, causing paralysis and eventually death (EPA, 2005a).

Diazinon enters the aquatic environment through runoff during rain events and spray drift (EPA, 2005a). It is not expected to pose a severe bioaccumulation risk in fish tissues. In water, diazinon

breaks down through several processes. Diazinon is stable for up to 6 months at neutral pH, but breaks down most rapidly in acidic, followed by alkaline environments (EPA, 2005a).

A.2.5.3 Basis for the latest recommended diazinon criteria

The freshwater acute criterion for diazinon of 0.17 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 20 different genera. Insects tended to be the most sensitive to diazinon, which was expected because diazinon is an insecticide. In fact, the seven most sensitive genera were insects and crustaceans. Fish tended to be far less acutely sensitive to diazinon. The freshwater acute criterion was calculated based on toxicity data from the following species, from most to least sensitive:

1. Cladoceran (*Ceriodaphnia dubia*)
2. Cladoceran(*Daphnia*)
3. Cladoceran (*Simocephalus serrulatus*)
4. Amphipod (*Gammarus*)

Acute data were available for a variety of genera that also contain threatened and/or endangered species in Oregon, including *Salvelinus* (Brook trout (*S. fontinalis*) and Lake trout (*S. namaycush*)) and *Oncorhynchus* (Cutthroat trout (*O. clarkii*) and Rainbow trout (*O. mykiss*)). The most sensitive of these groups was *Salvelinus*, which was over 1,700 times less sensitive than the most sensitive cladoceran, indicating that the recommended acute freshwater criteria are protective of *Salvelinus* and other threatened and endangered species in Oregon.

The freshwater chronic criterion for diazinon of 0.17 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute freshwater data in conjunction with acute-to-chronic ratios from the following species, from most to least sensitive:

1. Cladoceran (*Ceriodaphnia dubia*)
2. Mysid (*Americamysis bahia*)

It is important to note that although mysids are saltwater species, the Guidelines allow for the use of saltwater species data to inform freshwater criteria development, particularly in cases where the range of freshwater acute-to-chronic ratios was very large, as it was with diazinon. None of the chronic freshwater data correspond to genera comprising Oregon's threatened or endangered species, but the acute data used in the acute-to-chronic ratio approach do include salmonid data (see above).

The saltwater acute criterion for diazinon of 0.82 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on

data from 9 different genera. The most sensitive groups were crustaceans, and the saltwater acute criterion was calculated based on data from the following genera, from most to lease sensitive:

1. Copepod (*Acartia tonsa*)
2. Grass shrimp (*Palaemonetes pugio*)
3. Mysid (*Americamysis bahia*)
4. Amphipod, (*Ampelisca abdita*)

None of the acute saltwater data correspond to genera comprising Oregon's threatened or endangered species.

The saltwater chronic criterion for diazinon of 0.82 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute saltwater data in conjunction with acute-to-chronic ratios from the following species, from most to least sensitive:

1. Cladoceran (*Ceriodaphnia dubia*)
2. Mysid (*Americamysis bahia*)

It is important to note that although cladocerans are freshwater species, the Guidelines allow for the use of freshwater species data to inform saltwater criteria development when no other saltwater acute-to-chronic data were available. None of the chronic saltwater data correspond to genera comprising Oregon's threatened or endangered species.

A.2.5.4 Diazinon measurements in Oregon waters

A.2.5.4.1 Diazinon in Oregon surface waters

For the vast majority of samples (8,101 of 8,282), diazinon was detected but at levels below quantification (Figure A.5). Diazinon was not detected in 40 samples. In most cases where diazinon concentrations were too low to be quantified or detected, the low laboratory reporting limits (most commonly 0.025 µg/L) indicated that the measurements were also below the recommended freshwater criteria. Thirty of the 141 quantified measurements were greater than the recommended freshwater acute and chronic criteria (Figure A.5), with those measurements coming from rivers and streams across the state. The 75th percentile of Oregon surface water measurements are below the recommended freshwater criteria (Table A.8).

A.2.5.4.2 Diazinon in Oregon saltwater

In all saltwater samples (56) where diazinon was measured, diazinon was detected but not quantified (Figure A.5). In all cases where diazinon concentrations were too low to be

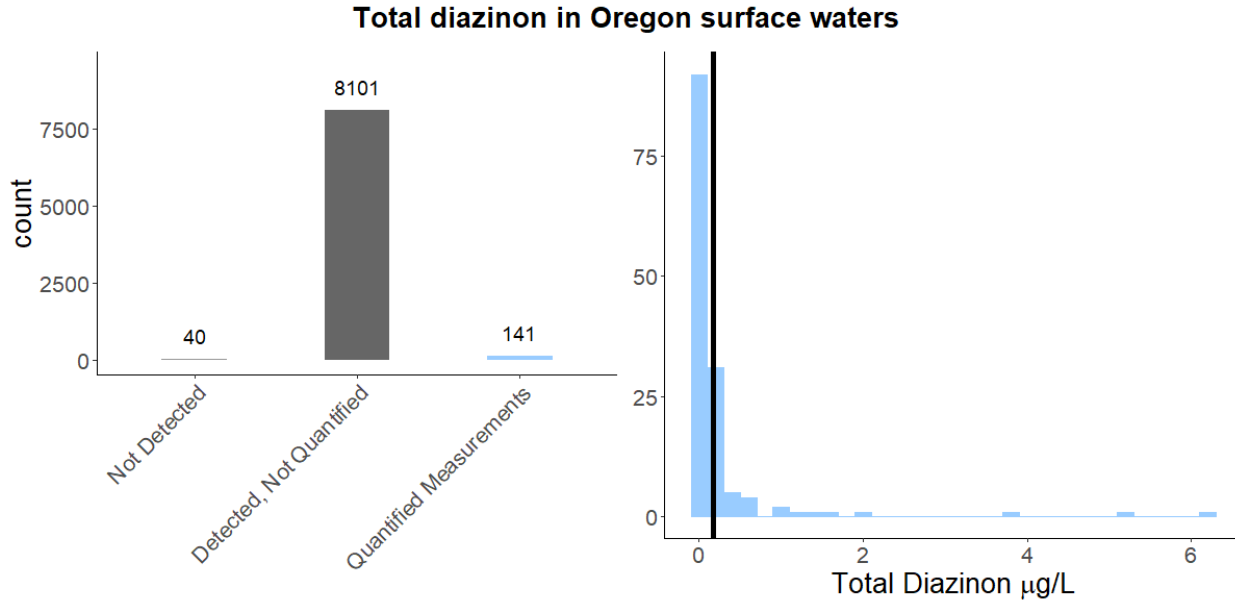
quantified, the low laboratory reporting limits (most commonly 0.022 µg/L) indicated that the measurements were also below the recommended saltwater criterion.

A.2.5.4.3 Diazinon in Oregon discharges

In the majority of discharge samples (109 of 121) where diazinon was measured, diazinon was detected but not quantified (Figure A.5). In 12 samples, diazinon was not detected. However, the most common laboratory reporting limit for discharge samples was roughly 0.40 µg/L, which is above the freshwater acute and chronic criteria for diazinon, so it remains unclear whether these discharge detections were higher or lower than the recommended criteria.

Table A.8. Statistical summary for quantified diazinon concentrations in Oregon waters

Measurement Type	n	Diazinon (µg/L)								
		minimum	Percentile							maximum
			5th	10th	25th	50th	75th	90th	95th	
Surface Waters	141	0.012	0.016	0.023	0.035	0.065	0.15	0.44	1.1	6.2



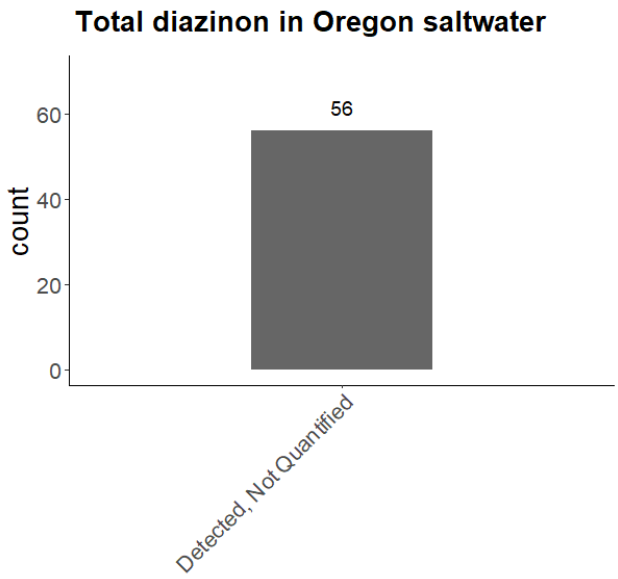


Figure A.5. Diazinon measured in Oregon surface waters, saltwater and discharges. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. The solid black vertical line corresponds to the proposed freshwater acute and chronic criteria (0.17 µg/L) for diazinon. All quantified measurements to the left of that line are below the proposed criteria.

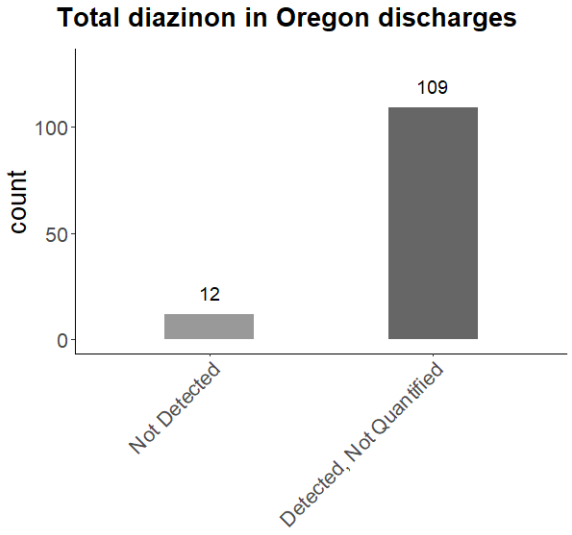


Figure A.5 (continued)

A.2.6 Tributyltin

A.2.6.1 Tributyltin sources and uses

Tributyltin is a man-made compound that is used as a biocide in paints for the bottoms of ship hulls. It is incorporated in paints that prevent the attachment of fouling communities (i.e. barnacles, algae, and other marine organisms). Tributyltin has also been used industrially as a stabilizer for plastics. However, the primary source of tributyltin in the aquatic environment comes from its use in antifouling paints, either through direct leaching of tributyltin into the water, or through chipping during in preparation for periodic hull repainting.

In the 1980s, the effects of tributyltin on the Pacific oyster (*Crassostrea gigas*) and dogwhelks (*Nucella lapillus*) in marinas and estuaries caused international concern. As a result, federal and state legislation significantly restricted the use of tributyltin in antifouling paints. In the state of Oregon specifically, tributyltin antifouling paint is restricted to use on vessels with hull lengths over 25 meters. Further, when tributyltin containing paint may be used, the paint must be low-leaching (ORS 634.500-634.520). These provisions were designed to specifically reduce tributyltin in marinas and estuaries, where the greatest environmental impacts have been noted.

A.2.6.2 Tributyltin mode of action and environmental fate

Short-term tributyltin exposure causes toxicity to aquatic life by disrupting ion transfer across cell membranes. However, tributyltin is also a potent endocrine disruptor in gastropods. Tributyltin causes a condition in dogwhelks called "imposex" or the imposition of male sex organs onto female genitalia, by increasing the hormone testosterone. In the Pacific oyster, tributyltin causes severe shell malformations and increased larval mortality.

Once in the aquatic environment, tributyltin adsorbs to sediments and suspended solids. In the water column, tributyltin more readily degrades into di- and mono-butyltin. Tributyltin is bioaccumulative and degrades slowly once partitioned into the sediment.

A.2.6.3 Basis for the latest recommended tributyltin criteria

The freshwater acute criterion for tributyltin of 0.46 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 12 different genera. The freshwater acute criterion was calculated based on toxicity data from the following species, from most to least sensitive:

1. Hydra (*Hydra littoralis* and *H. oligactis*)
2. Hydra (*Chlorohydra viridissmia*)
3. Fathead minnow (*Pimephales promelas*)
4. Amphipod (*Gammarus pseudolimnaeus*)

Acute data were available for lake trout (genus *Salvelinus*) and rainbow trout (genus *Oncorhynchus*), genera that also contain threatened or endangered salmonid species in Oregon. The most sensitive of these groups was *Oncorhynchus*, which was over three times less sensitive than the most sensitive hydra. Therefore the freshwater acute criterion for tributyltin is expected to protect salmonids in the state.

The freshwater chronic criterion for tributyltin of 0.072 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute freshwater data in conjunction with acute-to-chronic ratios from the following freshwater and saltwater species, from most to least sensitive:

1. Copepod (*Eurytemora affinis*: saltwater)
2. Fathead minnow (*Pimephales promelas*: freshwater)
3. Cladoceran (*Daphnia magna*: freshwater)

It is important to note that although the copepod is saltwater species, the Guidelines allow for the use of saltwater species data to inform freshwater criteria development. None of the chronic freshwater data correspond to genera comprising Oregon's threatened or endangered species, although the acute criterion (derived from data in the same genus as some threatened and endangered species in Oregon) was used in the chronic criterion development.

The saltwater acute criterion for tributyltin of 0.42 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 30 different genera. The saltwater acute criterion was calculated based on data from the following genera, from most to lease sensitive:

1. Mysid (*Acanthomysis sculpta*)
2. Copepod (*Acartia tonsa*)
3. Chinook salmon (*Oncorhynchus tshawytscha*)
4. Hard clam (*Mercenaria mercenaria*)

Data for Chinook salmon (*Oncorhynchus tshawytscha*), a threatened species in Oregon, were used to calculate saltwater acute criteria. Further, an economically important species in Oregon, the Pacific oyster (*Crassostrea gigas*), was in the 10th most sensitive genus for which saltwater toxicity data were available, so it was not directly used to calculate the acute saltwater criteria, but both Chinook salmon (and other threatened and endangered salmonids) and the Pacific oyster are expected to be protected by the acute saltwater criterion.

The saltwater chronic criterion for tributyltin of 0.0074 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined

based on alternative data that demonstrate tributyltin is a potent endocrine disruptor. After review of all saltwater acute data and an acute-to-chronic ratio analysis, EPA determined that the chronic criteria generated from traditional chronic toxicity assays were not sufficient to protect saltwater aquatic life from other effects including imposex abnormalities and immune system suppression. Instead, EPA based the saltwater chronic criterion for tributyltin on a long-term study that demonstrated significant reproductive effects in the ecologically important dogwhelk (*Nucella lapillus*) above 0.0074 µg/L. The Guidelines allow for the use of alternative scientific information in setting protective criteria.

A.2.6.4 Tributyltin in Oregon waters

A.2.6.4.1 Tributyltin in Oregon surface waters

No tributyltin surface water data were available in AWQMS.

A.2.6.4.2 Tributyltin in Oregon saltwater

No tributyltin saltwater data were available in AWQMS. Some limited work by DEQ and others detected tributyltin in five of seven samples taken from the Coos Bay estuary in 1986 and 1987. The concentrations ranged from 0.007 to 0.014 µg/L (Wolniakowski et al., 1987). These values are well below the recommended acute saltwater criterion, and roughly equal-to-double the recommended chronic saltwater criterion.

A.2.6.4.3 Tributyltin in Oregon discharges

Tributyltin was detected but not quantified in all discharge data measurements (92) available in AWQMS (Figure A.6). For all measurements, the laboratory reporting limit for discharge samples was 2 µg/L, which is above the proposed freshwater acute and chronic criteria for tributyltin, so it remains unclear whether these discharge detections were higher or lower than the recommended criteria.

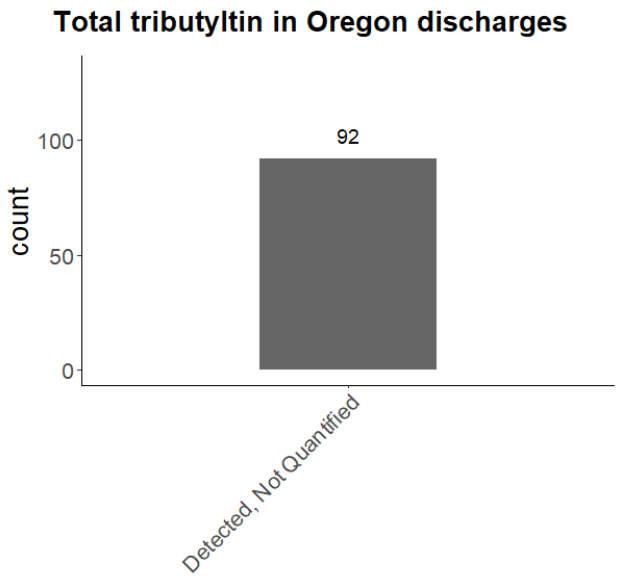


Figure A.6 Tributyltin measured in Oregon discharges. All discharge measurements were detected but not quantified.

A.2.7 Mercury

A.2.7.1 Recent actions related to mercury aquatic life criteria in the Pacific Northwest

Idaho removed the 1995 numeric mercury aquatic life criteria from state water quality standards in 2006, in favor of using the state's narrative toxics criterion in combination with the fish tissue based human health mercury criterion instead. Idaho made this change because the state concluded that available science no longer supported the 1995 mercury criteria recommendations and using the more stringent human health fish tissue criteria value would be more protective of aquatic life. In 2008, EPA subsequently disapproved Idaho's use of the mercury human health criteria values in conjunction with the narrative toxics criterion, leaving the 1984 mercury criteria recommendations in effect in Idaho for Clean Water Act purposes (EPA, 2008). During subsequent consultation by the Services, the 1984 freshwater chronic criteria value of 0.012 µg/L was not considered stringent enough to protect threatened and endangered species, and the Services directed EPA to promulgate a more appropriate, new freshwater chronic criterion in Idaho by May 7, 2021 (USFWS, 2015). To date, new mercury criteria have not been established or promulgated.

As part of a pending 2022 settlement agreement that resulted from subsequent litigation against the Services and EPA regarding mercury aquatic life criteria in Idaho, EPA has proposed to release new mercury aquatic life criteria for Idaho and initiate any needed ESA consultation

with the Services within a term of 27 months (EPA, 2022b). The National Recommended Water Quality Criteria – Aquatic Life Criteria Table that is maintained on EPA's website (https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table) still displays the 1995 mercury recommendations, but features a footnote that reads:

> "*It is important to note that the mercury aquatic life criterion includes a caution that it might not be adequately protective of such important fishes as the rainbow trout, coho salmon and bluegill. The criterion was derived from data for inorganic mercury (II), but is applied to total mercury and may be under-protective if a substantial portion of the mercury in the water column is methylmercury. Also, even though inorganic mercury is converted to methylmercury and methylmercury bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived. In light of these issues, EPA is working on an update to the mercury criterion*." (Accessed 10/27/2022)

A.2.8 Nonylphenol

A.2.8.1 Nonylphenol sources and uses

Nonylphenol is man-made and occurs as a mixture of isomers. The three most industrially abundant isomers are branched 4-nonylphenol (Chemical Abstract Service (CAS) No. 84852-15-3), 4-nonylphenol (CAS No. 104-40-5), and nonylphenol, (CAS No. 25154-52-3) (EPA, 2005b). The majority of industrial nonylphenol is used as an intermediate to produce other chemicals, including nonylphenol ethoxylates (NPEs), which are nonionic surfactants used in industrial processes and many consumer products including plastics, pesticides, and detergents. To a lesser extent, nonylphenol is also used in copper extraction and to color fuel oil (EPA, 2005b). Nonylphenol is produced and ubiquitously used in the United States (EPA, 2005b). In 2014, the EPA proposed a significant new use rule that will require companies to report use and manufacture for 15 different nonylphenol and NPE chemicals (Certain Nonylphenols and Nonylphenol Ethoxylates; Significant New Use Rule, 2014).

A.2.8.2 Nonylphenol mode of action and environmental fate

Nonylphenol has a non-specific mode of action that often results in a reversible cellular narcosis, or a disruption in cellular activity caused by organic chemicals. Exposure to nonylphenol has also been linked to endocrine disruption because of its estrogenicity, which is associated with reproductive effects in organisms (Environment Canada, 2002).

Nonylphenol moves into the aquatic environment through wastewater and surface runoff. Once NPEs are in the environment, they eventually degrade into nonylphenol (Mao et al., 2012). Nonylphenol is lipophilic and is generally found at greater concentrations in the sediment than in surface water (Mao et al., 2012). Nonylphenol is moderately bioaccumulative in animals.

However, laboratory and field studies do not support the level of bioaccumulation expected, demonstrating that organisms are able to metabolize nonylphenol to some degree. Once in the environment, biodegradation occurs when nonylphenol is exposed to microorganisms (EPA, 2005b).

A.2.8.3 Basis for the latest recommended nonylphenol criteria

The freshwater acute criterion for nonylphenol of 28 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 15 different genera. The freshwater acute criterion was calculated based on toxicity data from the following invertebrate and vertebrate species, from most to least sensitive:

1. Amphipod (*Hyalella azteca*)
2. Boreal toad (*Bufo boreas*)
3. Fathead minnow (*Pimephales promelas*)
4. Claoderan (*Daphnia magna*)

Acute data were available for the genus *Oncorhynchus* that includes threatened and endangered species in Oregon. Data were available for greenback cutthroat trout (*O. clarki stomais*), Lahontan cutthroat trout (*O. clarki henshawi*), Apache trout (*O. apache*), and rainbow trout (*O. mykiss*). Overall, *Oncorhynchus* was the eighth most sensitive genus and while *Oncorhynchus* data were not explicitly used to derive the acute criterion, the recommended acute criterion is protective of these salmonids.

The freshwater chronic criterion for nonylphenol of 6.6 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute freshwater data in conjunction with the acute-to-chronic ratio from the following species:

1. Mysid (*Americamysis bahia*)

It is important to note that although mysids are saltwater species, EPA mysid data were used in lieu of other freshwater data in accordance with methods outlined in the Guidelines. Chronic freshwater data were available for a limited number of species, including rainbow trout (*O. mykiss*). The freshwater recommended chronic criterion value was lower than the chronic toxic effect value for *O. mykiss*, indicating that the recommended criteria would be protective of salmonids in the genus *Oncorhynchus,* which also contains other Oregon threatened and endangered species.

The saltwater acute criterion for nonylphenol of 7.0 µg/L measured as a one-hour average, which is not to be exceeded more than once every three years on average, was determined based on data from 11 different genera. The saltwater acute criterion was calculated based on data from the following genera, from most to lease sensitive:

1. Winter flounder (*Pleuonectes americanus*)
2. Coot clam (*Mulinia lateralis*)
3. Mysid (*Americamysis bahia*)
4. Grass shrimp (*Palaemonetes vulgaris*)

None of the acute saltwater data correspond to genera containing Oregon's threatened or endangered species.

The saltwater chronic criterion for nonylphenol of 1.7 µg/L measured as a four-day average, which is not to be exceeded more than once every three years on average, was determined using acute saltwater data in conjunction with acute-to-chronic ratios from the following species:

1. Mysid (*Americamysis bahia*)

None of the chronic saltwater data correspond to genera comprising Oregon's threatened or endangered species.

A.2.8.4 Nonylphenol in Oregon waters

No nonylphenol data from Oregon waters were available in AWQMS for comparison with the recommended EPA criteria. However, the EPA's Water Quality Exchange contained nonylphenol surface water data from several other states (Wisconsin, Utah, New Mexico, Colorado, Arkansas, Indiana, California, and Washington) (National Water Quality Monitoring Council, 2020). Of these 198 nonylphenol measurements, 133 of them were below the laboratory detection or reporting limit. Most commonly, the quantification limit was roughly 0.050 µg/L, indicating that most (>85%) censored nonylphenol measurements were also below the chronic nonylphenol criterion of 6.6 µg/L. The remainder of the measurements had quantification limits higher than the criteria which made it impossible to determine whether nonylphenol concentrations were above or below acute and chronic criteria.

Of the 65 quantifiable nonylphenol surface water measurements in other states, the 75th percentile of nonylphenol was still below the chronic criterion (Table A.9). High measurements of nonylphenol (20+ µg/L) were all collected from channelized streams in Washington state.

Table A.9. Statistical summary for quantified nonylphenol concentrations in surface waters from other states

	n	Nonylphenol (µg/L)

Measurement Type		minimum	Percentile							maximum
			5th	10th	25th	50th	75th	90th	95th	
Surface Water (Other States)	65	0.098	0.56	0.62	0.80	1.42	3.60	15.49	30	80

A.2.8.1 Recent findings related to nonylphenol aquatic life criteria

In June 2022, the EPA published the biological evaluation assessing the impacts of the Water Quality Standards adopted by Swinomish Tribe in the Pacific Northwest on threatened and endangered species (EPA, 2022a). That analysis indicated that EPA's 2005 recommended nonylphenol criteria would be likely to directly adversely affect Chinook Salmon, Steelhead, Bull Trout, Chum Salmon and likely to indirectly affect the prey species of Chinook Salmon, Steelhead, Bull Trout, and the Marbled Murrelet. All of the named species are also threatened or endangered species in Oregon. Based on this finding, it seems unlikely that the 2005 recommended nonylphenol aquatic life criteria will successfully pass through ESA consultation and be approved by EPA.

A.2.9 Selenium

A.2.9.1 Selenium sources and uses

Selenium is a naturally occurring element that is essential in small quantities but toxic at concentrations that are not much higher. It is a common component of sedimentary rocks, with shales tending to have the highest concentrations. Natural weathering can enrich selenium concentrations in surface waters. Certain anthropogenic activities can also lead to selenium enrichment. The mining of metals and minerals, the refinement and use of fossil fuels, and irrigation of selenium-rich soils or use of selenium-rich groundwater are the most common anthropogenic activities that move selenium into the aquatic environment (EPA, 2021a; Seiler, 1995)

Mining can bring selenium-rich minerals to the surface, which can lead to natural weathering. Selenium pollution can be common in areas of heavy phosphate mining including Idaho, Montana, Wyoming, and Utah, as well as areas of heavy coal mining including West Virginia, Kentucky, Virginia, and Tennessee. Selenium is also often released during the mining and refinement of sulfide deposits of iron, uranium, copper, lead, mercury, silver, and zinc (EPA, 2021a). The Oregon Department of Geology and Mineral Industries (DOGAMI) provides data regarding mineral and mine locations in Oregon. Of 21,101 records of mineral deposits and past or present mines in Oregon, 164 list coal and only two list phosphorus as a commodity. Other

minerals that are commonly associated with selenium (see above) are listed as commodities for a total of 3,672 records (Niewendorp & Geitgey, 2020).

Coal fired power plants can contribute to selenium pollution through coal combustion, but also through the deposition of fly ash in waste ponds that are enriched for selenium and can leach into surrounding waterways (Gillespie & Baumann, 1986). Portland General Electric own Oregon's only remaining coal-fired power plant near Boardman, OR, which closed in 2020 (PGE, personal communication, January 14, 2010).

Compared with other regions of the United States, Oregon has a lower concentration of selenium in surficial soils than many regions. Mean county values in the U.S. range from 0.01 to 5.32 parts-per-million selenium (USGS, 2017). Oregon soils with the highest concentration of selenium can be found along the coast, in the Portland metro area, as well as in eastern Oregon. Irrigation with selenium-rich groundwater can also cause selenium loading in surface waters (Seiler, 1995).

A.2.9.2 Selenium mode of action and environmental fate

Although acutely toxic at high concentrations, the worst effects of selenium in the aquatic environment occur through chronic exposures, when selenium bioaccumulates in animal tissue. Selenium causes severe toxicity in egg-laying vertebrates. In most cases, acutely toxic levels of selenium are much higher than observed environmental levels. It is clear that the worst effects of selenium are dictated primarily by the uptake of selenium into primary producer, and selenium bioaccumulation as a result of dietary uptake rather than direct uptake via the water column (Chapman et al., 2010). Chronic selenium toxicity is therefore a greater concern than acute toxicity, and occurs when selenium is transferred to eggs, causing reproductive toxicity in egg-laying vertebrates.

Selenium enters the aquatic environment through runoff from irrigation of selenium-rich soils or with selenium-rich groundwater, natural weathering of selenium rich sedimentary rocks, mining runoff, coal fired power plant fly ash discharge, and runoff or deposition from the refinement and use of fossil fuels (EPA, 2021a). In the aquatic environment, selenium can exist as inorganic selenium, although it is the organic form of selenium (organoselenium) in plants and microbes which is then transferred up through the food web and becomes a toxic threat to animals in higher trophic levels. In surface waters, the primary dissolved species of selenium are inorganic selenate and selenite, followed by organic selenides in fine particulate matter. There is very little conversion between the forms in surface waters, and the form is dictated by the selenium source. Selenate predominates in waters contaminated by agricultural irrigation drainage, treated oil refinery effluent, mountaintop coal mining, and copper mine discharge, while selenite comes from oil refinery effluent, fly ash disposal effluent, and phosphate mining overburden

leachate. Organoselenium may come from treated agricultural drainage in ponds (EPA, 2021a). The largest step in selenium bioaccumulation comes when dissolved selenate, selenite, and organic selenides are incorporated into the tissues of algae and other microorganisms where the selenium is then transformed into organoselenium. Bioaccumulation factors at this stage can range from several hundred to tens of thousands.

A.2.9.3 Basis for the latest recommended selenium criteria

Low concentrations of selenium in the aquatic environment can cause significant reproductive toxicity in fish and other vertebrates through bioaccumulation through dietary uptake. The most sensitive biological effects (larval deformities and mortality from selenium bioaccumulation in adult fish) cannot be observed in typical acute and chronic measures of toxic effect. Thus, the EPA's 2016 recommended freshwater selenium chronic criterion was derived from studies that demonstrate quantitative chronic effects of long-term exposure to selenium. Although the minimum data requirements of eight taxonomic groups recommended by the Guidelines were not met, the EPA concluded that the missing data came from groups that were less sensitive than fish (insects, crustaceans) and a genus-level sensitivity distribution approach was used to derive the chronic criterion for selenium (EPA, 2021a).

The primary element of the selenium chronic criterion of 15.1 mg/kg dry-weight selenium in egg/ovary tissue not to be exceeded, was determined based on data from eight different genera. These data included reproductive studies measuring effects in offspring in cases where selenium in the mothers was transferred via the eggs. All of the data on reproductive effects came from fish species, because they were the most sensitive to the effects of selenium. Data from the following species were used to establish the primary egg/ovary element of the recommended selenium criterion.

1. White sturgeon (*Acipenser transmontanus*)
2. Bluegill sunfish (*Lepomis macrochirus*)
3. Brown trout (*Salmo trutta*)
4. Rainbow and cutthroat trout (*Oncorhynchus*)

Egg/ovary data for the most sensitive genera included threatened and/or endangered species in Oregon. White sturgeon (*A. transmontanus*), Cutthroat trout (*O. clarkii*) and rainbow trout (*O. mykiss*) were among the most sensitive genera tested, and Dolly Varden (*Salvelinus malma*) was the 8th most sensitive species, indicating that the recommended egg/ovary criterion element is designed to be protective of these sensitive groups.

The secondary element of the selenium chronic criterion of 8.5 mg/kg dw whole body or 11.3 mg/kg dw muscle (skinless, boneless filet) not to be exceeded, was determined based on data from 15 different genera used to translate the reproductive study values to whole body or

muscle tissue values. Data from the following genera were used to establish whole body and muscle criterion elements, in order of most to least sensitive (by tissue type listed).

1. *Acipenser* (whole body and muscle)
2. *Lepomis* (whole body), *Oncorhynchus* (muscle)
3. *Oncorhynchus* (whole body), *Lepomis* (muscle)
4. *Salmo* (whole body and muscle)

As with the egg/ovary element, these data included genera from threatened and endangered species in Oregon (*Acipenser, Oncorhynchus*).

The water column criterion was determined by using a mechanistic model of bioaccumulation to translate egg-ovary concentrations into water column values. One value was determined for lentic (standing) systems (1.5 µg/L) and one for lotic (flowing) systems (3.1 µg/L) to reflect the different dynamics due to physical conditions. These values are expressed 30-day averages not to be exceeded more than once in three years on average. The 30-day average period is specified to account for the long term, bioaccumulative nature of selenium. The final element of the chronic criterion is an intermittent exposure water criterion intended to limit cumulative exposure to selenium and was produced as a reorganization of the 30-day average element. The equation for the intermittent element can be found in footnote *e* Table 15.

Because both the secondary fish tissue element of the selenium chronic criterion and the subsequent water column values were translated or modeled using the same genera that determined the primary criterion element, these elements are expected be protective of the same genera containing threatened and endangered species as the primary element.

A.2.9.4 Selenium in Oregon tissue and water

A.2.9.4.1 Selenium in Oregon fish tissue

Although no egg/ovary fish tissue data were available from Oregon waters to compare with the primary egg/ovary chronic selenium criterion value, both whole body and muscle fish tissue data were available to compare against the secondary whole body and muscle tissue criterion values. All the available whole body and muscle tissue values in AWQMS were reported as wet weight samples, while the selenium criterion is expressed as dry weight. To estimate dry weight measurements from the wet weights in AWQMS, DEQ followed the procedure provided in EPA's draft selenium guidance (See Appendix A.1.2.4).

Selenium was detected but not quantified in six whole body fish tissue samples and in 92 muscle tissue samples. For both sample sets, the laboratory reporting limits for selenium in tissue (1 mg/kg or below), were well below the values for whole body or muscle tissue recommended

criteria, indicating that samples where selenium was detected but not quantified were also below the recommended tissue criterion values. In addition, all the quantified whole body (44) and muscle tissue samples (21) were below the recommended criteria as well (Table A.10, Figure A.7). The most frequently sampled fish were rainbow trout (*Oncorhynchus mykiss*), smallmouth bass, (*Micropterus dolomieu*), largemouth bass (*M. salmoides*), and white sturgeon (*Acipenser transmontanus).* The four highest selenium tissue concentrations (>10 mg/kg dw but below the applicable criterion of 11.3 mg/kg dw) came from largemouth bass muscle tissue in Hagg lake, a lentic environment. Lentic environments are generally considered higher risk for selenium bioaccumulation.

Given that all fish tissue measurements that could not be quantified were below the criteria as well as all of the quantified measurements, it is useful to note that over half of the muscle tissue measurements (74 of 113) came from lentic environments, along with eight of the 50 whole body measurements. While more fish tissue data especially from lentic environments may be needed to understand the potential of Oregon fish to exceed the recommended tissue criterion, preliminary tissue concentration data indicate no measurements higher than the recommended whole body and muscle tissue criteria.

Table A.10. Statistical summary for quantified selenium concentrations in Oregon fish tissue

Measurement Type	n	Selenium (mg/kg dry weight)								
		minimum	Percentile							maximum
			5th	10th	25th	50th	75th	90th	95th	
Whole Body	44	0.29	0.53	0.79	1.2	1.2	4.0	5.2	5.5	5.7
Muscle	21	2.2	2.2	2.4	3.3	4.3	9.6	10.1	10.1	11.2

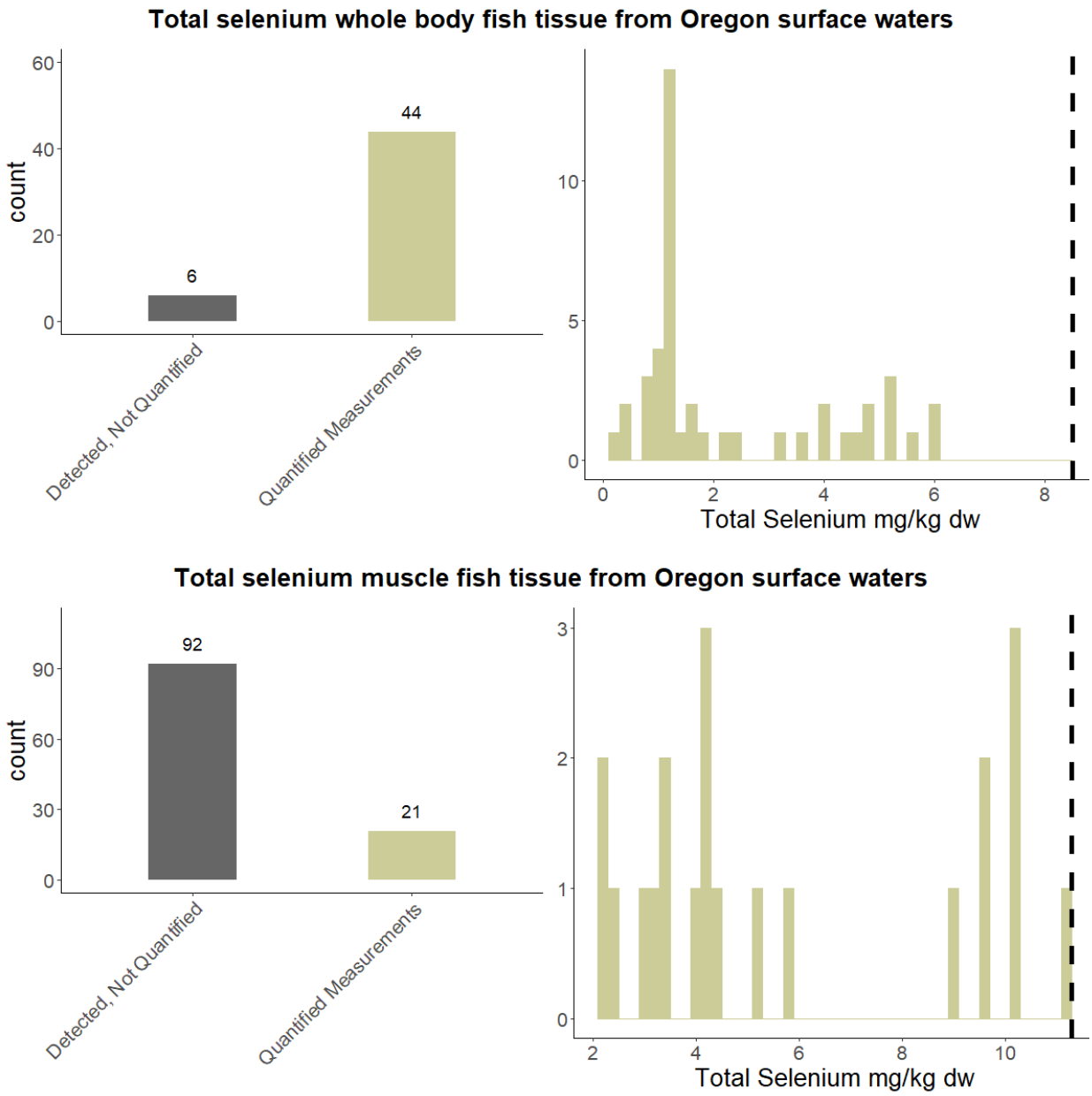


Figure A.7. Selenium measured in whole body and muscle fish tissue from Oregon surface waters. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. The dashed black vertical lines correspond to the proposed freshwater chronic criterion tissue values (8.5 µg/L for whole body, 11.3 µg/L for muscle tissue) for selenium. All quantified measurements to the left of that line are also below the proposed criterion.

A.2.9.4.2 Selenium in Oregon surface waters

A total of 4,440 dissolved selenium measurements in lotic waters were available in AWQMS (Figure A.8). Of the 3,889 measurements that could not be quantified in lotic waters, the most common detection and reporting limits were on the order of 0.5 to 2.0 µg/L indicating that for the vast majority of cases, selenium concentrations were below the lotic criterion of 3.1 µg/L. Of the 551 measured selenium water samples from lotic environments, only 15 were higher than the recommended criterion. The maximum measured concentration was 4.9 µg/L in rivers and streams (Table A.11).

In contrast, dissolved selenium data from lentic systems was only available for 62 samples in AWQMS (Figure A.8), and most of those (57) were unable to be quantified. Given that the most common reporting limit was 2.0 µg/L, which was above the lentic criterion of 1.5 µg/L, it is not possible to know whether those 57 sample measurements are higher or lower than the criterion. All five of the quantified lentic water measurements were higher than the lentic criterion, even though the maximum measurement was only 3.8 µg/L. All quantified lentic measurements came from Cooper Creek Reservoir, Crane Prairie Reservoir, Bully Creek Reservoir, and Howard Prairie Lake. The lack of quantifiable data in lentic areas combined with all quantified measurements being higher than the recommended criterion suggests that lakes and reservoirs in Oregon may be at risk for exceeding the recommended water column criterion.

A.2.9.4.3 Selenium in Oregon discharges

A total of 410 dissolved selenium measurements in discharges were available in AWQMS (Figure A.8). For the vast majority of discharge samples where selenium was not detected or quantified, laboratory reporting limits (most commonly 1.0 to 2.0 µg/L) were also below the lotic criterion value (3.1 µg/L). Discharges are typically not permitted in lakes so the lotic criterion is a more appropriate comparison for discharges.

Of the 140 quantified selenium discharge samples, only eight were higher than the recommended lotic recommended criterion (Table A.11, Figure A.8). The maximum concentration of selenium in discharge of 30 µg/L was measured in a storm sewer in Portland, although most other samples that were above the lotic criterion were on the order of 10 µg/L or below.

Table A.11. Statistical summary for quantified selenium concentrations in Oregon waters

Measurement Type	n	Selenium (µg/L)							
		minimum	Percentile						maximum
			5th	10th	25th	50th	75th	90th	95th	

Surface Water - Lotic	551	0.011	0.027	0.037	0.060	0.12	0.26	0.58	0.85	4.9
Surface Water - Lentic	5	2.0	2.1	2.2	2.4	2.6	3.2	3.6	3.7	3.8
Discharge	140	0.068	0.12	0.14	0.22	0.37	1.2	2.4	4.0	30

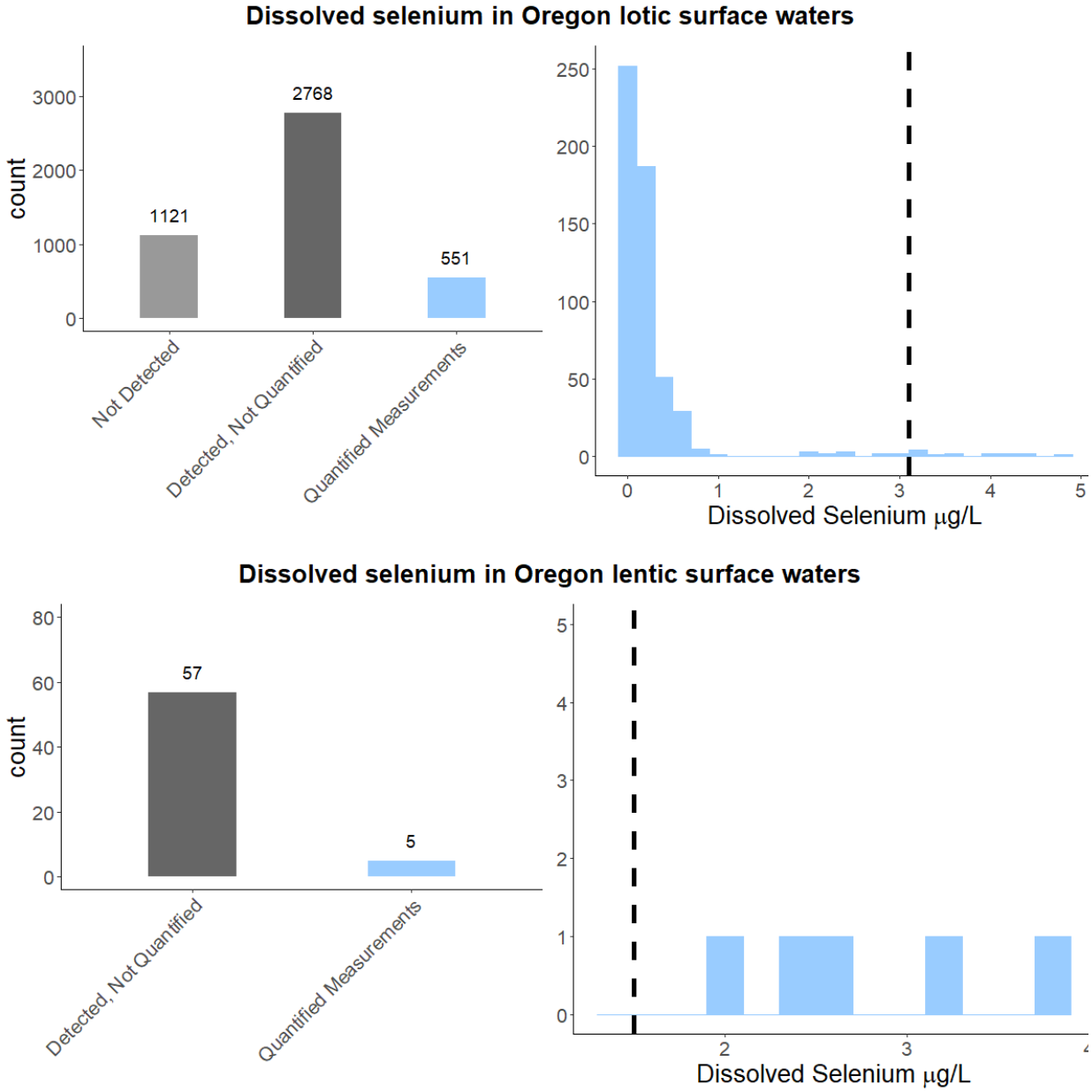


Figure A.8. Selenium measured in Oregon surface waters discharges. Bar graphs show the proportion of measurements that were not detected, detected but not quantified, and quantified. Histograms display the distribution of quantified measurements relative to the proposed criteria. The dashed black vertical lines correspond to the proposed freshwater

chronic criterion values (3.1 µg/L for lotic, 1.5 µg/L for lentic) for selenium. For discharges, only the lotic criterion is displayed because discharges are typically not permitted into lentic environments. All quantified measurements to the left of that line are also below the proposed criteria.

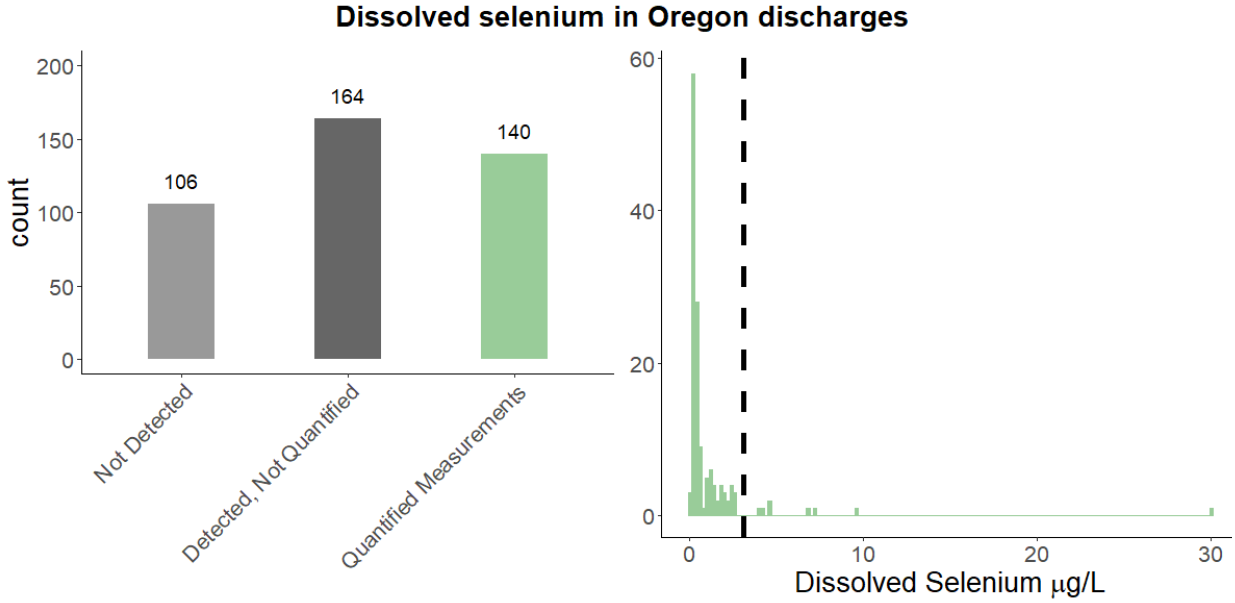


Figure A.8 (continued).

A.2.9.5 A note about implementing the 2016 recommended selenium aquatic life criteria

EPA's 2016 recommended chronic criterion is a complex four-part chronic criterion comprised of fish tissue and water column values. To successfully apply this criterion in water quality programs, Oregon would need to develop detailed implementation guidance. The criterion's specification of "steady-state" indicates that site-specific data will need to be acquired before determining which portion of the criterion to apply. If DEQ elects to adopt the criterion without developing detailed implementation guidelines, it could potentially place a large burden on Oregon's water quality programs. In the case of selenium, DEQ is mindful of the balance between the resource needs for criterion implementation and the added protection that adopting the 2016 recommended chronic criterion would provide. A preliminary discussion between DEQ and EPA in June 2023 reinforced the value that Oregon perceives in working closely with EPA to develop the complex implementation procedures for the selenium criterion before DEQ proposes to adopt the criterion.

A.2.10. Endosulfan, Lindane, and Silver

A.2.10.1 Background for endosulfan, lindane, and silver criteria

During DEQ's last comprehensive update of aquatic life toxics criteria in 2004, DEQ considered whether it should keep or remove several aquatic life criteria for which EPA had withdrawn recommendations. The 1999 EPA aquatic life criteria recommendations on which the 2004 Oregon update was based did not contain criteria for endosulfan (freshwater acute, freshwater chronic, marine acute, marine chronic), lindane (freshwater chronic), or silver (freshwater chronic), indicating that these criteria recommendations had been withdrawn (EPA, 1999). DEQ sought input from a technical advisory committee and a policy advisory committee about whether to keep or remove the existing criteria from Oregon rule (ODEQ, 2004).

EPA withdrew total endosulfan criteria but replaced them with alpha-endosulfan and beta-endosulfan criteria that had the same values as the total endosulfan criteria. In the 1999 EPA aquatic life criteria recommendation update, however, EPA included a footnote that these new criteria would be "most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan" (EPA, 1999). In 2004, DEQ's technical advisory committee was concerned that this footnote would be missed given the removal of total endosulfan from the criteria recommendations, potentially resulting in an exceedance of Oregon's total endosulfan criteria while complying individually with the alpha- and beta-endosulfan criteria. Therefore, DEQ elected to keep the total endosulfan criteria because it captured the intent of EPA (ODEQ, 2004).

EPA withdrew its recommended freshwater chronic criterion for lindane in 1995 because the removal of data for fathead minnow had caused the collective toxicity data to fall below the eight minimum family data requirements for calculation of the criterion. The 2004 DEQ technical advisory committee advised DEQ to keep the freshwater chronic criterion because lindane was still used in Oregon at that time and because the committee thought the data were scientifically sound (ODEQ, 2004).

Oregon adopted the now-withdrawn freshwater chronic value for silver after it was issued in the 1986 EPA Gold Book (EPA, 1986). Subsequent publications of EPA criteria do not contain the freshwater chronic silver criterion recommendations. However, DEQ's 2004 technical advisory committee found that the data used in the chronic criterion development were credible and that the calculation of that criterion was consistent with EPA methods. Therefore, DEQ retained the freshwater chronic criterion at that time (ODEQ, 2004).