Fact Sheet for
NPDES Waste Discharge General Permits
Water Treatment Plants

July 16, 2014

Purpose of this fact sheet

This fact sheet is a companion document to the National Pollutant Discharge Elimination System (NPDES) General Permit for Water Treatment Plants (WTP). It explains and documents the decisions the Washington State Department of Ecology (Ecology) made in drafting the permit and the regulatory and technical bases for those decisions, and it fulfills the requirements of Washington Administrative Code Section 173-226-110.

Ecology prepared and made available a draft permit for water treatment plants and this accompanying fact sheet for public evaluation during the 30-day review period before issuing the final NPDES general permit. Copies of the draft NPDES general permit and this fact sheet were available at Ecology regional offices and via the Internet for public review and comment from April 16, 2014 through May 31, 2014. Details about how to prepare and submit comments are in Appendix D (Public Involvement Information).

After the public comment period, Ecology made changes to the draft NPDES general permit in response to comments, summarized substantive comments, and provided responses to them in Appendix E (Responses to Comments). Ecology will maintain the final fact sheet and permit in the permit file as part of the legal history.

Summary

The general permit provides coverage for discharges of treated wastewater from water treatment filtration processes (filter backwash, sedimentation/pre-sedimentation wash-down, sedimentation/clarification, or filter-to-waste) to surface waters of the State, if water treatment is the primary function of the facility. The general permit does not provide coverage for WTPs with an average monthly production rate of less than 35,000 gallons per day, nor for wastewater resulting from ion exchange or reverse osmosis processes. Descriptions of these processes are in Appendix G (Industrial Process Descriptions).

The general permit includes technology-based limits for pH and settleable solids, and a water quality-based limit for total residual chlorine. This fact sheet reviews the monitoring data reported during the previous permit cycle. Based on those data, a reassessment of the potential to pollute found that lower discharge limits for acute exposures to chlorine were warranted. Thus, after a 1-year compliance period, the maximum daily discharge limit for total residual

chlorine will decrease from 0.15 mg/L to 0.07 mg/L (beginning in September 2015). Although the permit requires no additional water quality-based effluent limits, WTPs must continue monitoring and reporting the turbidity and volume of their discharges.

Also, for the third year of the term of this new 5-year permit cycle (September 2016 through August 2017), WTPs must analyze and report monthly the total and dissolved arsenic concentrations in their wastewater discharges. Depending on the results of these and other analyses and on information provided by the Washington State Department of Health, Ecology may modify the permit by requiring continued or additional monitoring, by setting one or more new discharge limits, and/or by changing the population of WTPs and types of WTP technologies covered by this permit.

Ecology issued the draft version of this fact sheet on April 16, 2014. Since then, Ecology has incorporated a small number of changes into this final version. These changes are located:

- Re-numbering of some of the page numbers in the Table of Contents on page 5.
- Reversal of a misstated ratio (i.e., "divided by") in the first paragraph on page 8.
- Insertion of "not applicable" into the blank cell in Table 10 on page 37.
- Switched the order of the "Temperature" and "Chlorine" sections on page 39.
- Addition of a copy of the April 16, 2014, Public Notice to Appendix D (pages 89 and 90).
- Addition of Ecology's responses to public comments on the draft permit and fact sheet in Appendix E (pages 91 – 101).
- Addition of Figures H-2 and H-3 on pages 127 and 128.

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1.0 Introduction

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the U.S. Environmental Protection Agency (EPA). The U.S. EPA authorized the State of Washington to manage the NPDES permit program in Washington State. 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 water treatment plants (WTPs) 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 ground waters, 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)
- Procedures Ecology follows for NPDES permits (Chapter 173-220 WAC)
- Determination and payment of fees (Chapter 173-224 WAC)
- Procedures Ecology follows 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. It may not be appropriate for every situation. 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 WTP 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.

1.1 Activities, Discharges, and Facilities that Require this Permit

The discharge of wastewater from WTPs to surface water requires an NPDES permit. Also, no pollutants may be discharged from any commercial or industrial operation into waters of the State except as authorized under a wastewater discharge permit. WTPs meet the legal definition of commercial or industrial operation, the process wastewater contains pollutants, and WTPs are point source dischargers. This general permit satisfies the legal requirement for an NPDES permit for WTPs that employ filtration processes and discharge wastewater to surface water. Filtration processes include oxidative filters (berm, green sand) as well as conventional, direct, and in-line filtration systems. In addition to facilities that produce potable water, this general permit applies to WTPs that produce industrial grade water through primary treatment (settling and filtration), when the production and distribution of the treated water is the primary product of the industry with no other activities that would require a discharge permit.

The current WTP general permit (effective September 1, 2009, through August 31, 2014) provides coverage for facilities with a maximum production capacity of at least 50,000 gallons per day (gpd) of drinking water. Maximum production capacity refers to the amount of potable water that a treatment facility is designed to produce at peak output and 24-hour production.

The draft WTP general permit (effective September 1, 2014 through August 31, 2019) provides coverage for facilities that produce treated product water (finished water) at an actual rate of at least 35,000 gpd as determined on an average monthly basis. The actual production rate is the amount of finished water that a treatment facility actually produces on any given day. To calculate the value of the actual production rate on an average monthly basis, add the values of each daily production rate during a calendar month, and divide the sum by the total number of days in the month.

Ecology's reasoning for changing the threshold for coverage from maximum production capacity to actual production rate is explained as follows. Small WTPs are frequently over-designed to account for potential future increases in the number of their customers. Consequently, many small WTPs, particularly the newer facilities, use only a small fraction of their total capacity. Thus, instances exist where the designed total capacity of a WTP facility greatly exceeds 50,000 gpd, but the facility has never produced near that amount of water. Since the amount of

pollutants discharged by a WTP is more related to the amount of water it actually treats than to the amount it could potentially treat, Ecology believes that actual production rates are a more reasonable basis for its regulatory focus on WTP discharges.

Ecology's reason for selecting 35,000 gpd as the cutoff for actual production rates was to maintain a similar level of regulatory focus from one permit cycle to the next. Ecology determined for a majority of the currently permitted WTP facilities (those for which data were readily available) the ratio of their self-reported peak daily production volume divided by their maximum production capacity. Averaging those ratios yielded an average ratio of 0.691 (about 70 percent). Ecology then multiplied 50,000 gpd by 70 percent to give 35,000 gpd.

Except for better accounting for the amount of pollutants discharged by WTPs, this change in the threshold for coverage will have little effect. Since all of the current Permittees have actual production rates much greater than 35,000 gpd, they will all continue to require the coverage of this NPDES general permit. While a small number of facilities not previously covered (those with maximum production capacity less than 50,000 gpd and that produce more than 35,000 gpd) may now be subject to the WTP general permit, facilities that use little of their relatively large total available production capacity (those with maximum production capacity in the hundreds of thousands of gpd but that produce less than 35,000 gpd) will not be subject to the expense of compliance with this WTP general permit. Also, this change will enable Ecology to direct the resources it would have spent on small water producers who have small impacts on the environment onto other larger sources of pollutants of greater importance. In any case, Ecology retains the right to determine that any WTP facility (no matter how small) must obtain coverage if Ecology finds a potential threat to water quality.

1.2 Activities, Discharges, and Facilities Excluded from Coverage under this Permit

Facilities that require a wastewater discharge permit for processes that are not associated with the production of drinking water or industrial water will not be covered under this general permit. WTPs with actual production rates of less than 35,000 gpd based on a monthly average will not be covered under this general permit. This general permit establishes monitoring and reporting requirements that assume a level of operation and expertise that is not expected from small systems. These very small WTPs have low-volume and infrequent discharges that most often can be better addressed with best management practices and guidelines for environmental protection.

This general permit does not cover WTP discharges that are significantly different from typical filter backwash. A general permit is an appropriate vehicle for regulating wastewater discharges when the characteristics of the wastewater are similar and a single set of permit conditions can address the environmental concerns and set treatment and discharge standards for the industry as a whole. WTPs that employ treatment processes (e.g., ion exchange and reverse osmosis) where the general permit conditions do not adequately address the environmental concerns associated with the wastewater discharge are not covered by this general permit.

Ion exchange is a type of water treatment process used by some relatively small WTPs and single domestic water systems in Washington State. As the name implies, ions are removed from the water as they pass over an exchange medium. When the ability of the media to attract these ions has been consumed, the media is washed with a liquid (typically salt brine) that replaces the attached ions thereby regenerating the medium. The wastewater consists of regeneration liquid, the removed ions, and rinse water. Whereas filtration processes remove suspended solids and clean the filter with water, ion exchange removes dissolved solids and adds a regeneration liquid to the wastestream. Hence the characteristics of the resulting wastewater are quite different. This general permit does not apply coverage to WTPs that discharge wastewater from ion exchange processes. Guidance on the permitting and best management practices required for the discharge of wastewater from ion exchange processes is included in Appendix G-2 (Ion Exchange and Reverse Osmosis).

Reverse osmosis is another water treatment process used by a few, very small water treatment systems in Washington State. Pressure and semi-permeable membranes are used to remove contaminants from water. The primary application of this technology in the State has been to produce potable water from salt water or brackish water. The quantity of wastewater can be greater than that of the produced potable water, and the resulting wastewater is very high in dissolved salts, quite different from the wastewater associated with filtration processes. This general permit will not apply coverage to WTPs that discharge wastewater from reverse osmosis processes. Guidance on the permitting and best management practices required for the discharge of wastewater from reverse osmosis processes is included in Appendix G-2 (Ion Exchange and Reverse Osmosis).

Additionally, discharges to land and to sewage treatment plants (POTWs, publicly-owned treatment works) by WTPs that employ filtration are not covered under this general permit. Water treatment filtration processes typically remove dirt, water-borne pathogens, and small amounts of organic material from surface water or iron and manganese from ground water. Ecology has determined that land application of the type of material removed by filtration in the production of drinking water will not typically require a permit. For the purposes of this permit, discharges to land are those discharges that will completely infiltrate or evaporate, with no reasonable potential, during all weather conditions, of discharging to surface water, per Appendix G-3 (Discharge to Land or POTWs). Typical WTP discharge does not have a reasonable potential to adversely affect POTW operation, introduce pollutants that will interfere with or pass through the POTW, or violate any pretreatment standard or requirement. Additionally, since the discharge has about the same concentration of suspended solids as domestic wastewater, with lower biochemical oxygen demand and fewer pollutants than domestic wastewater, a state-based discharge permit is not required for typical WTP discharges to POTWs, per Appendix G-3 (Discharge to Land or POTWs).

2.0 Background Information

2.1 Facility Description

2.1.1 History

Ecology first issued the WTP wastewater discharge general permit on December 3, 1997. When the permit expired on February 1, 2003, Ecology administratively extended it for those 30 facilities already covered.

In July 2004, Ecology reissued the general permit with several changes. The effluent limits for chlorine were decreased, and Permittees received a 2-year compliance schedule to meet the new limits. The requirements for monitoring and reporting the oxygen content, temperature, trihalomethane concentrations, and the rate and total volume of discharges were deleted. The permit contained an additional requirement for Permittees to prepare and use a stormwater pollution prevention plan.

In September 2009, the third version of the general permit took effect, but contained no substantive changes. By the end of the term of this permit, in early 2014, Ecology had issued coverage under the permit to only 31 facilities. Table 1 lists the WTPs currently covered under this general permit.

Table 1. Facilities Currently Covered Under this Permit.

Water Treatment Plant	Permit No.	Location	Receiving Water
Aberdeen City WTP	WAG641026	Aberdeen	Wishkah River
Anacortes WTP	WAG643002	Mount Vernon	Skagit River
Arlington City	WAG647003	Arlington	Stillaguamish River
Camas WTP	WAG641006	Camas	Lacamas Lake
Castle Rock WTP	WAG641025	Castle Rock	Cowlitz River
Cathlamet WTP	WAG641009	Cathlamet	Elochoman River
Chehalis WTP	WAG641012	Chehalis	Dillenbaugh Creek
Clallam County PUD 1	WAG641010	Port Angeles	Morse Creek
Cusick WTP	WAG647000	Cusick	Pend Oreille River
Everett Water Filtration Plant	WAG643009	Everett	Lake Chaplain
Friday Harbor WTP	WAG643005	Friday Harbor	Unnamed stream into Margos Lake
Hoquiam WTP	WAG641000	Hoquiam	West Fork of the Hoquiam River
Indian Creek WTP	WAG641001	Ilwaco	Bear Creek / Black Lake
Kalama Drinking WTP	WAG641023	Kalama	Kalama River
Leavenworth WTP	WAG645001	Leavenworth	Icicle Creek
LISECC, Inc.	WAG643004	Lummi Island	No Name Creek
Long Beach WTP	WAG641019	Long Beach	Yeaton Baker Creek
Lynden WTP	WAG643003	Lynden	Nooksack River
Morton WTP	WAG641016	Morton	Tilton River
Pasco WTP	WAG647001	Pasco	Columbia River
Raymond WTP	WAG641007	Raymond	S F of Willapa River
Richland WTP	WAG645000	Richland	Columbia River
Ryderwood WTP	WAG641011	Ryderwood	Stillwater Creek
South Bend WTP	WAG641008	South Bend	Martin Creek
Stevenson WTP	WAG641020	Stevenson	Rock Creek
Vader WTP	WAG641004	Vader	Olequa Creek
Washington Department of Corrections McNeil Island WTP	WAG643008	McNeil Island	Eden Creek
Whatcom County PUD 1 Plant 1	WAG643006	Ferndale	Nooksack River
Whatcom County PUD 1 Plant 2	WAG643007	Ferndale	Nooksack River
Willapa Valley Water District WTP	WAG641013	Raymond	Stringer Creek
Woodland WTP	WAG641021	Woodland	Lewis River

2.1.2 Industrial Processes

Washington State is home to more than 500 WTPs that use some form of water filtration in the treatment of drinking water. Almost 90% of these facilities are very small facilities producing less than 35,000 gallons of drinking water per day. Of the larger facilities, about half discharge to land or to a sewage treatment plant and the others discharge to a surface water body. Chlorine continues to be the primary disinfectant used by WTPs in the State in the production of drinking water. WTPs typically use chlorine-treated water when backflushing their filters.

Typical WTP filtration processes include presedimentation, oxidation, coagulation, flocculation, sedimentation, and filtration. Although any one facility may not utilize all the processes, the wastestreams produced by any combination of processes are relatively similar. When the source water (raw water) has significant levels of suspended solids such as sand, an initial settling tank may be the technique employed to remove those solids. The settling tank can be designed to allow for continuous removal of the solids, or the tank may be drained periodically and the solids removed. Some facilities dispose these solids separately as a solid waste or wash them into the same wastestream as the backwash. A sedimentation basin may also be incorporated to settle solids after the addition of coagulants and flocculants, but before filtration. Like a presedimentation basin, the sedimentation basin may be equipped for continuous cleaning or may be cleaned periodically and the solids may be disposed separately or washed into the same wastestream as the backwash.

Coagulants are added to the raw water to destabilize the colloidal state of suspended particles through "charge neutralization" allowing the particles to adhere to each other. The most common coagulant in use is aluminum sulfate (alum), $Al_2(SO_4)_3 \bullet 14\ H_2O$, but at least one facility uses ferric chloride, $FeCl_3$, and many other coagulants are available. Other additives may include compounds to adjust pH (e.g., soda ash); oxidants (e.g., chlorine, potassium permanganate, and ozone) for disinfection or precipitation of dissolved minerals; and polymers to enhance coagulation, settling (flocculation), and filtration.

A wide variety of polymers are available for use in the production of drinking water to enhance coagulation, settling, and filtering. Polymers are relatively large molecules made through linkage (chaining) of small lightweight molecules (monomers). They are not readily soluble and may be cationic, anionic, or nonionic. Those polymers susceptible to ultraviolet radiation and microbes tend to break down readily. Coagulant aids that produce cationic polymers tend to be expensive and are generally used in dilute amounts, in the range of 0.2 to 2 milligrams per liter (mg/L). Settling aids produce anionic polymers that form a heavy floc that settles readily. Large polymer molecules entrap suspended particles as they settle with the polymer. The dose rates are generally in the range of 1 to 5 mg/L. Nonionic polymers are used primarily as filter aids. Filter aids are large, very "sticky" polymers that will not pass through the filter medium but interact with it to increase the ability of the filter medium to remove suspended particles. They easily plug a filter and hence are used in very dilute amounts, 10 to 50 micrograms per liter (µg/L).

Additives are generally applied with great care and in precise amounts. Dosage is based on the amount of suspended solids to be removed or the dissolved solids to be precipitated. This not

only makes economic sense, but many of these chemicals work best at just the right dosage. Too much can produce as poor a result as too little. Also, since the product here is drinking water, the quality of that product cannot be compromised by an excess of additives. Drinking water with a "pink tinge" from the addition of too much potassium permanganate, for example, would not be acceptable.

Source water may be either surface water or ground water, and the typical processes associated with water treatment vary with the source of the water. Typical surface water treatment applies filtration to remove organic and inorganic matter and to remove pathogenic organisms. Coagulation, flocculation, and filtration are key to treating surface water in order to meet drinking water quality standards. Typical ground-water treatment consists of precipitation of dissolved minerals through oxidation, followed by filtration to remove the minerals. The filtration processes used for raw waters from both sources employ filters that lose their effectiveness as solid residues accumulate, necessitating cleaning to avoid breakthrough and unacceptable head loss. Filter cleaning is accomplished by reversing the flow of water and backflushing the filter, which produces wastewater composed of the solid residue and backflush water. The solid residue includes substances removed from the raw water as well as additives applied to enhance their removal, and the backflush water may include additives such as chlorine. This wastewater is known as backwash and constitutes the majority of the wastewater discharge.

The frequency of discharge is highly variable, from several times per day for large WTPs with several filters to once or twice per week for small WTPs. Likewise, the quantity of the discharge varies somewhat by the size of WTP, from about 3,000 gallons to backflush a small filter to 80,000 gallons for large filters. The duration of backwash discharge, however, is relatively constant, about 10 to 15 minutes per episode. Following a backflush of the filter, WTPs may also discharge filtered water for a period of time while the filter settles and "cures", a procedure known as filter-to-waste.

2.1.3 Wastewater Treatment Processes

Filter backwash is not discharged directly to surface water. Backwash must be treated before discharge. Treatment typically consists of one or more settling ponds. After a period of settling, water from the surface of the pond is drained off either by pump or gravity and discharged. As described in the previous section, the frequency of discharge is highly variable among WTPs.

2.1.4 Discharge Outfall

The typical discharge of wastewater from WTPs is through a pipe at the edge of the receiving water body. This side bank discharge is only submerged when the level of the receiving water rises above normal levels. Most facilities do not use diffusers and submerged discharge pipes. Table 1 identifies the water bodies to which the currently-permitted WTPs discharge.

2.1.5 Solid Wastes

The result of filter backwashing is generally a wastewater containing spent filter media and accumulated sediment. Subsequent filtration or settling produces a sludge from which the clearer wastewater is separated or decanted and discharged. The residual water in the remaining sludge may then be allowed to drain into the soil. WTP operators then either pump out the sludge or scoop it into trucks for transport off site. Typically, either the municipality responsible for the WTP or a contractor disposes of the sludge in a landfill or applies it to the land for a beneficial agronomic or silvicultural use. Local regulatory jurisdictions are responsible for overseeing or permitting such land application, disposal in a landfill, and intra-county beneficial use. If the owner of the sludge wants the sludge designated for beneficial use statewide, the Ecology solid waste program is responsible for oversight, including approving the beneficial use or permitting the disposal operation. Appendix C (Guidance for Regulatory Oversight of Water Treatment Plants: Wastewater and Solid Waste Disposal) contains a summary of the agencies with regulatory oversight authority of WTPs for different wastestreams and disposal methods.

Permittees must have and maintain an up-to-date site-specific solid waste control plan that describes the details of the characteristics of the solid waste (sludge), its source(s), the rate of generation, and disposal methods. The plan must comply with any applicable requirements of the jurisdictional health department and any local requirements for a solid waste permit. The Permittee must update the plan as necessary to reflect changes in solid waste handling and disposal and keep the plan on site and available for inspection by Ecology.

2.2 Description of the Receiving Water

The typical receiving water relevant to this general permit is a fresh water surface water body. Characteristic uses for this type of water body include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning, and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce; and navigation. Water quality of this type must meet or exceed the requirements for all or substantially all uses.

Some WTPs, particularly the smaller facilities, discharge wastewater to the ground. Ecology has excluded those facilities and their discharges to the ground from coverage under this NPDES general permit due to the relatively small volume of wastewater they discharge and the availability of state waste discharge permits, if needed for specific WTPs that would pose a potential threat to ground-water quality. Numerous communities and individuals do rely on ground water as their source of raw water for drinking.

2.3 Wastewater Characterization

WTPs may use either ground water or surface water as their source water. The required water treatment processes can vary depending on the source water. Treatment of ground water most

frequently consists of removing dissolved iron and manganese and typically includes oxidation (e.g., ozonation or addition of chlorine or potassium permanganate) to precipitate the iron and manganese followed by filtration to remove the iron and manganese oxides. The typical backwash from these oxidation/filtration processes can be characterized as follows:

Total Iron:	100 to 200 mg/L
Total Manganese:	70 to 100 mg/L
Total Residual Chlorine:	0.6 to 1 mg/L

The most frequent treatment method for surface water has been filtration to remove suspended solids and large diameter pathogens (e.g., Giardia), possibly including passage through presedimentation and sedimentation basins before filtration. Precipitation, coagulation, and flocculation frequently increase the effectiveness of filtration and sedimentation. Aluminum sulfate (alum) is the most common additive used by WTPs to induce coagulation of dissolved materials. Polymers are another common additive that enhance coagulation, flocculation, or filtration. WTPs may add chlorine before filtration as an oxidizing agent to promote precipitation and to remove unwanted taste and color. Chlorine is also frequently added after filtration for disinfection purposes and to produce the "finish water" for distribution as drinking water. Chlorinated finish water is typically used to backflush the filters.

The chlorine used as a disinfectant by WTPs can chemically combine with other chemicals in the water and form trihalomethanes. The U.S. EPA has listed the trihalomethanes as potential carcinogens that have a potential to cause a human health concern. Based on available data, Ecology has determined that the wastewaters discharged from WTPs typically contain small amounts of the three trihalomethanes: chlorodibromomethane, dichlorobromomethane, and trichloromethane (chloroform). These chemicals have human health-based criteria based on long-term exposure from eating fish exposed to the toxicants and drinking water containing the toxicants. While the trihalomethane of greatest concern was dichlorobromomethane, with modest dilution its concentration will likely be reduced to an acceptable level. Deriving reasonable potential for WTPs is difficult because they produce discharges intermittently and do not readily fit the long-term exposure assumptions of the criteria as there will typically be longer periods of no discharge than of discharge. The intermittent nature of the discharges combined with the relatively low concentrations of these toxicants in the discharges support Ecology's determination that there is no reasonable potential for these toxicants to violate water quality standards.

Filter backwash from standard coagulation/flocculation processes associated with treating surface water can be characterized as follows:

Settleable Solids:	6 to 20 mL/L	
Aluminum Hydroxide or Ferric Hydroxide (additive):		25 to 50%
Clay/Silt (source water):		35 to 50%
Organic Matter (source water):		15 to 25%
Total Residual Chlorine:	0.1 to 1 mg/L	

WTP Permittees in Washington State have reported the concentrations of pollutants in their discharges via their monthly or weekly discharge monitoring reports. The tabulated data below represent the quality of the wastewater effluent discharged from the permitted WTPs from January 1, 1998, through December 31, 2013.

Table 2. Summary of Monitoring Data: 1998 through 2013.

	Total Residual Chlorine	Settleable Solids	Turbidity	pH
Total Number of Permittees	34	35	34	30
Total Number of Outfalls	38	49	37	30
Total Number of Unique Samples	5,085	4,821	3,942	624
Total Number of Monthly Averaged Results	4,590	4,225	3,382	NA
Total Number of Unique Samples with pH < 6.5	NA	NA	NA	35
Total Number of Unique Samples with pH > 8.5	NA	NA	NA	4
	mg/L	**mL/L**	**NTU (a)**	**S.U. (b)**
Maximum of Unique Samples	91.	221.	1,000	9.0
Maximum of Monthly Averaged Results	7.2	153.	672.	NA
90th Percentile of Monthly Averaged Results	0.17	0.1	9.7	NA
Median of Monthly Averaged Results	0.03	<0.1	1.9	NA
Average of Unique Samples	0.11	1.4	9.6	NA
Average of Monthly Averaged Results	0.077	1.1	6.4	NA
Minimum of Unique Samples	Non-detect	Non-detect	0.01	6.0
90th Percentile of Reporting Limits	0.025	0.05	NA	NA
Median of Reporting Limits	0.01	0.05	NA	NA

(a) NTU = Nephelometric turbidity units.
(b) S.U. = Standard units.

An Ecology study ("Investigation of Discharges from Water Treatment Plant Filter Backwash," in preparation) included chemical analyses of filter backwash wastewater generated by 15 small WTPs at various locations in Washington State. Although the usefulness of the data was limited,

the data for total arsenic provided a starting point for later calculations of pollution potential, discussed below. Table 3 below summarizes the data for total arsenic.

Table 3. Summary of Arsenic Concentrations in Filter Backwash Wastewater

Water Treatment Plant	Total Arsenic (µg/L)	Water Treatment Plant	Total Arsenic (µg/L)
Bayview Beach	140	Mountain Road Estates	<60
Boxx Berry Farm	<60	Mutiny View Manor Community	<60
Bummer #2	<60	Naches Water Treatment	<60
Harbor Hills Water System	<60	Outlook	6.9
Ledgewood Beach Water District	150	Ridgeview Estates	<60
Lost Lake	<60	Coupeville	<60
Mariners Cove Beach Club	<60	Westside Water System	190
Mission Ranch Estates	<60		

The results of the arsenic analyses for 11 of the 15 WTPs were "non-detect." However, the reporting limit for those arsenic analyses was 60 µg/L, which is much greater than both the water quality criterion for protection of human health (0.018 µg/L) and the primary drinking water standard maximum contaminant level (10 µg/L). The results for three of the remaining WTP discharges ranged from 140 to 190 µg/L. Two of those WTPs with the greater concentrations employed aeration or another method to oxidize arsenic, iron, and manganese, and filtration to remove those contaminants from the treated water. The treatment method used by the third WTP is unknown. These data, limited as they are, suggest a potential that filter backwash wastewaters from at least some types of WTPs may pose a threat to human health via the ground-water pathway.

Ecology will propose for this permit term beginning in 2014 that existing and current Permittees collect and analyze a representative set of treated filter backwash discharges. Ecology believes that one year of monthly sampling and analysis for total and dissolved arsenic from the approximately 31 WTP Permittees will provide sufficient data to determine whether:

- Additional monitoring may be required of the Permittees.
- Discharge limits for arsenic may be required through a modification of this permit.
- Certain water treatment processes are more or less likely to produce wastewater excessively contaminated with arsenic.

- Certain smaller WTPs should acquire coverage under a new or modified NPDES WTP general permit or a state waste discharge permit.

Ecology will propose that monitoring for arsenic occur monthly during the third year of the next permit cycle (from September 2016 through August 2017). At present, discussions are ongoing among Ecology, the U.S. EPA, and numerous stakeholders concerning changes to water quality standards for arsenic in Washington State and the development of rules and tools to implement protections for waters of the State to meet those standards. Ecology believes that monitoring WTP filter backwash discharges beginning in 2016 is appropriate because the results from the monitoring will be available to inform the reissuance, potentially with modifications, of the WTP general permit in 2019. If Ecology's review of the arsenic monitoring results for the first few monitoring periods of that third year finds that additional information is required, Ecology may modify the permit to require Permittees to provide additional monitoring or other data during subsequent monitoring periods within the 2014 – 2019 permit term.

2.4 Summary of Compliance with Previously Issued Permit

For the 6-year period from December 1997 through December 2003, there were a total of 696 permit violations from 29 of the 33 facilities that had been permitted under the Washington State NPDES WTP general permit. This represented a total rate of non-compliance of roughly 8%. Non-reporting from 23 facilities constituted 425 of the permit violations. The non-reporting was due to operator error.

During that same period, there were 115 exceedances of the discharge limit for total residual chlorine (TRC) from 11 facilities; five of the facilities were chronic violators. After plant upgrades and technical assistance from Ecology, the violations for TRC went down from 33 violations in 1999 to only five violations in 2003.

There were a total of six violations for pH from four facilities, with only one pH violation in 2002 and no violations for pH since.

From December 1997 through December 2003, there were 151 exceedances of the discharge limit for settleable solids from 15 different facilities, 82 of them from one facility. That facility was in the process of upgrading its plant. The violations were due to several different causes, a few of them being: wrong sampling location, operator error in sampling and sample reading, and needed facility upgrade.

Ecology has provided technical assistance to the majority of the facilities that have multiple violations to help them come into compliance. Ecology sent four Administrative Orders, two Civil Penalties, nine Notices of Correction, and three Notices of Violation to promote compliance. Ecology also sent 253 Warning Letters to 21 of the facilities to notify them of compliance issues.

For 2013, the last full year of the current permit term, compliance has been considerably better than previous years. In 2013, the total rate of non-compliance was roughly 2%. All Permittees submitted the required monitoring reports, though 12 Permittees occasionally submitted them late. Two Permittees erred once each in the frequency at which they sampled, and two others exceeded their discharge limits for TRC (once and twice, respectively). Table 4 summarizes the reported wastewater discharge violations for 2013.

Table 4. Permit Violations in 2013

Permittee	Month	Violation
Anacortes WTP	November	Late submittal of discharge monitoring report.
Arlington WTP	March August	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.
Castle Rock WTP	June	Late submittal of discharge monitoring report.
Chehalis WTP	September	Incorrect frequency of sampling.
Friday Harbor WTP	May September October	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.
Leavenworth WTP	November	Chlorine effluent exceedance (0.1 mg/L actual versus 0.07 mg/L limit)
LISECC, Inc. WTP	July August	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.
Long Beach WTP	February March October	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.
Longview WTP	February thru June	Late submittal of discharge monitoring report.
McNeil Island WTP	March May July	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.
Pasco WTP	April	Late submittal of discharge monitoring report.
Richland WTP	May	Incorrect frequency of sampling.
Vader WTP	February October	Late submittal of discharge monitoring report. Chlorine effluent exceedances (0.23 mg/L actual versus 0.07 mg/L limit; 2.2 mg/L actual versus 0.15 mg/L limit)
Whatcom County PUD 1 Plant 1	April May September	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.
Whatcom County PUD 1 Plant 2	April May September	Late submittal of discharge monitoring report. Late submittal of discharge monitoring report. Late submittal of discharge monitoring report.

Ecology intends that industrial dischargers manage their operations to minimize the discharge of pollutants. To the extent practical, Ecology relies on operator standard operating procedures and

facility-specific planning, consistent with applicable regulations, for ensuring Permittee compliance with the requirements and limits specified by the wastewater discharge permit. The WTP general permit requires all Permittees to maintain up-to-date Operation and Maintenance (O&M) Manuals, Solid Waste Control Plans, and Spill Plans. If a permitted facility discharges stormwater to surface water or a separate stormwater sewer system, the Permittee must also maintain an up-to-date Stormwater Pollution Prevention Plan (SWPPP). Table 5 summarizes compliance with report submittal requirements over the most recent permit term.

Table 5. Compliance with Schedule of Required Submissions.

Water Treatment Plant	Permit No.	O&M Manual	Solid Waste Control Plan	Spill Plan	SWPPP (a)
Aberdeen City WTP	WAG641026	*missing*	*10/10/2007*	*missing*	**None**
Anacortes WTP	WAG643002	**9/15/2004**	*9/15/2004*	*missing*	**None**
Arlington City	WAG647003	**Not due yet**	**Not due yet**	**Not due yet**	**Not due yet**
Camas WTP	WAG641006	**10/18/2004**	*10/18/2004*	*10/18/2004*	*10/18/2004*
Castle Rock WTP	WAG641025	*missing*	*missing*	*missing*	**None**
Cathlamet WTP	WAG641009	**9/28/2004**	*9/28/2004*	*9/28/2004*	*9/28/2004*
Chehalis WTP	WAG641012	**11/23/2004**	*11/23/2004*	*11/23/2004*	*11/23/2004*
Clallam County PUD 1	WAG641010	**10/20/2004**	*10/20/2004*	*10/20/2004*	*10/20/2004*
Cusick WTP	WAG647000	*missing*	*missing*	*missing*	**None**
Everett Water Filtration Plant	WAG643009	**6/2/2010**	**6/2/2010**	**5/18/2010**	**6/2/2010**
Friday Harbor WTP	WAG643005	**10/14/2004**	*10/14/2004*	*10/14/2004*	*10/14/2004*
Hoquiam WTP	WAG641000	**11/24/2009**	**11/24/2009**	**11/24/2009**	**11/24/2009**
Indian Creek WTP	WAG641001	**9/2/2005**	*9/2/2005*	*9/2/2005*	*9/2/2005*
Kalama Drinking WTP	WAG641023	**9/16/2004**	*9/14/2004*	*9/14/2004*	*9/14/2004*
Leavenworth WTP	WAG645001	*missing*	*missing*	*missing*	**None**
LISECC, Inc.	WAG643004	**10/14/2004**	*missing*	*missing*	**None**
Long Beach WTP	WAG641019	*missing*	*missing*	*missing*	**None**
Longview WTP	WAG643001	**12/22/2004**	*12/22/2004*	*12/22/2004*	**1/4/2010**
Lynden WTP	WAG643003	*missing*	*missing*	*missing*	**None**
Morton WTP	WAG641016	*missing*	*missing*	*missing*	**None**
Pasco WTP	WAG647001	**10/5/2004**	*10/5/2004*	*6/26/2001*	*10/5/2004*
Pe Ell WTP (cancelled post 2011)	WAG641024	*missing*	*missing*	*missing*	**None**
Raymond WTP	WAG641007	**9/16/2004**	*9/16/2004*	*9/16/2004*	*9/16/2004*
Richland WTP	WAG645000	**3/14/2013**	**3/14/2013**	**3/14/2013**	**3/14/2013**
Ryderwood WTP	WAG641011	**10/14/2004**	*10/14/2004*	*10/14/2004*	*10/14/2004*
South Bend WTP	WAG641008	*missing*	*missing*	*missing*	**None**
Stevenson WTP	WAG641020	**10/19/2004**	*10/19/2004*	*10/19/2004*	*10/19/2004*
Vader WTP	WAG641004	*missing*	*5/30/2007*	*5/30/2007*	*5/30/2007*
WA DoC McNeil Island WTP	WAG643008	**7/19/2010**	**7/19/2010**	**7/19/2010**	**7/19/2010**
Whatcom County PUD 1 Plant 1	WAG643006	*missing*	*missing*	*missing*	**None**
Whatcom County PUD 1 Plant 2	WAG643007	*missing*	*missing*	*missing*	**None**
Willapa Valley Water District WTP	WAG641013	**4/1/2010**	**4/1/2010**	**4/1/2010**	*9/9/2004*
Woodland WTP	WAG641021	**1/4/2010**	*missing*	*missing*	**None**

O&M = Operations and Maintenance

SWPPP = Stormwater Pollution Prevention Plan

The dates are when the Permittee most recently provided the document to Ecology.

Italics indicate a failure to submit the required document during this permit term.

(a) "**None**" SWPPPs were based on the assumption that those WTP facilities do not "discharge stormwater from their sites to surface water or to a separate stormwater sewer system" per Special Condition S-3.3 (Stormwater Pollution Prevention Plan).

2.5 Compliance with 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 this general permit.

3.0 Permit Limits

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

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the U.S. EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3 and Chapter 173-220 WAC).

- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC), and the National Toxics Rule (40 CFR 131.36).

- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit are based in part on the typical effluent characteristics for this group of discharges. The effluent constituents were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the state of Washington were determined and included in this permit. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, or do not have a reasonable potential to cause a water quality violation.

During the 5-year permit term, a WTP's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [40 CFR 122.42(a)]. If Ecology determines that a WTP is discharging pollutants that are not typical of the industry or at quantities of environmental concern, Ecology may require an individual permit to address the issue.

Also during the 5-year term of this general permit, Ecology may modify the permit based on the results of monitoring for arsenic that Permittees will conduct during the third year (September 2016 through August 2017). Modifications may include additional discharge limits and monitoring requirements for arsenic and other parameters.

3.1 Technology-Based Effluent Limits

Ecology must ensure that facilities provide all known, available, and reasonable methods of prevention, control, and treatment (AKART) when it issues a permit.

The U.S. EPA commissioned Science Applications International Corporation (SAIC) to draft a model permit for the water supply industry. Although the draft permit was not implemented,

SAIC released its findings in a document entitled "Model Permit Package - Water Supply Industry," January 30, 1987. In this document SAIC reported its analyses of the best practicable control technology currently available (BPT) and best conventional pollutant control technology (BCT), which addressed "conventional" pollutants. SAIC did not identify best available technology economically achievable (BAT) requirements, which address "toxic" pollutants, because WTP process effluent contains principally conventional pollutants, and SAIC found insufficient evidence for toxic pollutants in the discharge to justify development of across-the-board limits. SAIC proposed the following limits based on their best professional judgment after considering existing permits, WTP monitoring data, and achievable WTP wastewater treatment levels:

Monthly average total suspended solids (TSS):	30 mg/L
Daily maximum TSS:	45 mg/L
Allowable pH range:	6.0 to 9.0 S.U.

Settleable Solids

In 1975, Ecology proposed effluent guidelines for use when issuing NPDES permits for municipal WTP process wastewater discharges. These guidelines set the settleable solids limit at 0.1 mL/L. (Ecology had determined that settleable solids was a simpler and less costly test than TSS, and that it may provide a more accurate measure of the efficiency of the sedimentation treatment process. Further, a settleable solids measurement of 0.1 mL/L was comparable to a 30 mg/L TSS measurement (letter from Stan Springer, Ecology, to Michael Lorenzo, SAIC, March 12, 1987)). Ecology reaffirmed this guidance in 1985 and justified it under the AKART requirements of RCW 90.52.040.

State legislation passed in 1987 provided a credit adjustment of technology-based effluent limits or standards for WTP facilities on the Chehalis, Columbia, Cowlitz, Lewis, and Skagit rivers that meet the criteria of RCW 90.54.020(3)(b). The adjustment set limits that would effectively allow residual solids to be returned to the river without removal treatment as long as water quality standards were not violated. Applying the federal requirements for BPT and BCT determinations, however, results in limits for residual solids that would not be achievable without removal treatment, per Appendix G-1 (Technology-Based Treatment). A settleable solids limit based on a credit adjustment would, therefore, be in conflict with a settleable solids limit based on BPT/BCT. Further, credit adjustment is only applicable to a few facilities that meet the requirements of RCW 90.54.020(3)(b), and a general permit is not the appropriate vehicle to accommodate the resulting site-specific complexity. Therefore the WTP general permit does not include any provisions for credit adjustment of technology-based effluent limits for facilities that meet the criteria of RCW 90.54.020(3)(b). Those facilities may accept the terms and conditions of the proposed general permit and apply for coverage, but any facility wishing to claim a credit adjustment must request an individual permit and will not be eligible for coverage under the proposed general permit.

Lagoon/settling tank treatment is a relatively inexpensive form of treatment[1] and is effective in significantly reducing the amount of solids that are discharged and provides some reduction in the amount of total residual chlorine (TRC). Lagoon treatment requires about one acre of land per each million gallons per day of production. Design and construction requirements are readily available with no special requirements other than the availability of land. Treatment removes over 90 percent of the solids, reducing the amount of settleable solids from a range of 6 to 20 mL/L to less than 0.1 mL/L. TRC is reduced from as much as 1 mg/L to 0.3 mg/L or less. Cost can be a formidable barrier, however, where there is no room for expansion or when land acquisition is extremely expensive.

pH

In 1975, Ecology proposed effluent guidelines for use when issuing NPDES permits for municipal WTP process wastewater discharges. These guidelines set the allowable pH range to 6.0 to 9.0 S.U. Ecology reaffirmed this guidance in 1985 and justified it under the AKART requirements of RCW 90.52.040.

Normal WTP operation results in wastewater discharge pH in the range of 6.0 to 9.0. WTPs may adjust the pH of incoming water (raw water) to achieve optimal conditions for facility processes. For instance, a pH of 6.5 to 6.8 is usually considered "optimum" for alum coagulation. After filtration, facilities may also adjust pH up to about 7.5 or 8.5 for corrosion control in the distribution system. This adjusted pH water is typically what is used to backflush the filter. Historical discharge monitoring reports for WTP wastewater in Washington State indicate pH has been consistently within the range of 6.0 to 8.5 S.U.

Based on the federal study, existing facilities in Washington State, and "best professional judgment," Ecology sets technology-based limits for WTPs as follows:

Table 6. Technology-Based Limits.

Parameter	Average Monthly Limit	Maximum Daily Limit
Settleable Solids	0.1 mL/L	0.2 mL/L

Parameter	Daily Minimum	Daily Maximum
pH	6.0 S.U.	9.0 S.U.

1 Ecology's economic impact analysis in 1997 found that, based on a 20-year cost averaging, $100 per dry ton (5 cents per pound) was the estimated cost for one large facility to acquire land; design and build the lagoon; and pay operation, maintenance, and disposal costs. A medium sized facility, with 18,000 customers, estimated that its costs for design, build, and operate resulted in a 0.7% to 1% rate increase (based on 20-year cost recovery).

3.2 Water Quality-Based Effluent Limits

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

3.2.1 Designated Uses and Surface Water Quality Criteria

Fresh Water
WTPs in Washington State discharge wastewaters primarily to fresh water surface waters. The following is a list of the potential designated uses assigned to those waters:

- Water supply: Domestic, agricultural, industrial, and stock watering.
- Miscellaneous: Wildlife habitat, harvesting, commerce & navigation, boating, & aesthetics.
- Recreational: Primary and secondary contact recreation.
- Aquatic life: All indigenous fish and non-fish aquatic species.

Only aquatic life uses have surface water quality criteria that pertain to the pollutants that Ecology expects may be present in WTP discharges. The aquatic life uses for fresh water receiving waters are identified below, along with the applicable criteria.

Table 7. Fresh Water Aquatic Life Uses and Associated Criteria.

Char Spawning and Rearing (a)	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 9.5 mg/L.
pH	The pH must be within the range of 6.5 to 8.5, with a human-caused variation within that range of less than 0.2 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 12.0 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 19 µg/L (0.019 mg/L) Maximum chronic exposure: 11 µg/L (0.011 mg/L)
Turbidity	• 5 NTU over background when the background is 50 NTU or less. • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Core Summer Salmonid Habitat (a)	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 9.5 mg/L.
pH	The pH must be within the range of 6.5 to 8.5, with a human-caused variation within that range of less than 0.2 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 16.0 degrees Celsius.

Table 7. Fresh Water Aquatic Life Uses and Associated Criteria.

Total Residual Chlorine	Maximum acute exposure: 0.019 mg/L Maximum chronic exposure: 0.011 mg/L
Turbidity	• 5 NTU over background when the background is 50 NTU or less. • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Salmonid Spawning, Rearing, and Migration (a)	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 8.0 mg/L.
pH	The pH must be within the range of 6.5 to 8.5 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 17.5 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.019 mg/L Maximum chronic exposure: 0.011 mg/L
Turbidity	• 5 NTU over background when the background is 50 NTU or less. • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Salmonid Rearing & Migration Only	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 6.5 mg/L.
pH	The pH must be within the range of 6.5 to 8.5 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 17.5 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.019 mg/L Maximum chronic exposure: 0.011 mg/L
Turbidity	• 10 NTU over background when the background is 50 NTU or less. • A 20 percent increase in turbidity when the background turbidity is more than 50 NTU.
Non-Anadromous Interior Redband Trout	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 8.0 mg/L.
pH	The pH must be within the range of 6.5 to 8.5 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 18.0 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.019 mg/L Maximum chronic exposure: 0.011 mg/L
Turbidity	• 5 NTU over background when the background is 50 NTU or less. • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Indigenous Warm Water Species	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 6.5 mg/L.

Table 7. Fresh Water Aquatic Life Uses and Associated Criteria.

pH	The pH must be within the range of 6.5 to 8.5 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 20.0 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.019 mg/L Maximum chronic exposure: 0.011 mg/L
Turbidity	• 10 NTU over background when the background is 50 NTU or less. • A 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(a) Stricter criteria may apply. See WAC 173-201A-200.

Marine Water

As of December 2013, none of the permitted WTPs in Washington State discharged wastewater directly to marine waters. However, for potential future reference, the following is a list of the potential designated uses assigned to marine waters:

- Shellfish harvesting
- Miscellaneous: Wildlife habitat, harvesting, commerce & navigation, boating, & aesthetics.
- Recreational: Primary and secondary contact recreation.
- Aquatic life: All indigenous fish and non-fish aquatic species, per the following general categories:

    a. Extraordinary quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

    b. Excellent quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

    c. Good quality salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

    d. Fair quality salmonid and other fish migration.

Only aquatic life uses have surface water quality criteria that pertain to the pollutants that Ecology expects may be present in WTP discharges. The aquatic life uses for marine water receiving waters are identified below, along with the applicable criteria.

Table 8. Marine Water Aquatic Life Uses and Associated Criteria.

Extraordinary Quality	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 7.0 mg/L.
pH	The pH must be within the range of 7.0 to 8.5 with a human-caused variation within that range of less than 0.2 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 13.0 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.013 mg/L Maximum chronic exposure: 0.0075 mg/L
Turbidity	• 5 NTU over background when the background is 50 NTU or less. • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Excellent Quality	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 6.0 mg/L.
pH	The pH must be within the range of 7.0 to 8.5 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 16.0 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.013 mg/L Maximum chronic exposure: 0.0075 mg/L
Turbidity	• 5 NTU over background when the background is 50 NTU or less. • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Good Quality	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 5.0 mg/L.
pH	The pH must be within the range of 7.0 to 8.5 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 19.0 degrees Celsius.
Total Residual Chlorine	Maximum acute exposure: 0.013 mg/L Maximum chronic exposure: 0.0075 mg/L
Turbidity	• 10 NTU over background when the background is 50 NTU or less. • A 20 percent increase in turbidity when the background turbidity is more than 50 NTU.
Fair Quality	
Dissolved Oxygen	The lowest allowed 1-day minimum dissolved oxygen concentration must be at least 4.0 mg/L.
pH	The pH must be within the range of 6.5 to 9.0 with a human-caused variation within that range of less than 0.5 units.
Temperature	The greatest allowed 7-day average of the daily maximum temperature must be no greater than 22.0 degrees Celsius.

Table 8. Marine Water Aquatic Life Uses and Associated Criteria.

Total Residual Chlorine	Maximum acute exposure: 0.013 mg/L Maximum chronic exposure: 0.0075 mg/L
Turbidity	• 10 NTU over background when the background is 50 NTU or less. • A 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

3.2.2 Numeric Criteria for the Protection of Aquatic Life and Recreation

The water quality standards for surface waters (Chapter 173-201A WAC) list numeric water quality criteria. They specify the maximum levels of pollutants allowed in receiving water that remain protective of aquatic life and recreation in and on the water. Ecology uses numeric criteria along with chemical and physical data for the wastewater and receiving water to derive effluent limits in discharge permits. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Ecology's evaluation of the need for water quality limits based on specific numeric criteria for aquatic life is presented in Section 3.2.12.

3.2.3 Numeric Criteria for the Protection of Human Health

Washington State water quality standards include 91 numeric human health-based criteria applicable to dischargers that Ecology must consider when writing NPDES permits. The U.S. EPA established these criteria in 1992 in its National Toxics Rule (40 CFR 131.36) to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. These water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances. The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

Ecology has determined that WTP effluent may contain substances of concern for human health, based on data indicating the discharge may contains regulated substances, and the potential that some of the receiving water bodies in Washington State are listed as impaired for a parameter that Ecology expects may be present in the discharge.

Ecology evaluated the potential for WTP dischargers of chlorine to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the U.S. EPA "Technical Support Document for Water Quality-Based Toxics Control" (U.S. EPA, 1991) and the Ecology "Permit Writer's Manual" (Ecology, 2011) to make a reasonable potential determination.

3.2.4 Water Quality Impairments

In December 2013, two of the permitted WTPs in Washington State discharged wastewater to water bodies listed as impaired on the current 303(d) list or for which Ecology is currently conducting or has completed a total maximum daily load (TMDL) analysis for the parameters that Ecology expects WTPs may discharge. Facilities with coverage under this permit must comply with the terms and conditions of completed TMDLs and the detailed implementation plan. Table 9 identifies these two WTPs.

Table 9. Permittees Discharging to Impaired Water Bodies

Water Treatment Plant	Permit No.	Receiving Water	Impaired Parameter
Anacortes WTP	WAG643002	Skagit River	Low pH
Leavenworth WTP	WAG645001	Icicle Creek	Low pH

Impaired waters are those that have been identified and listed pursuant to Section 303(d) of the Clean Water Act. Listed waters may be awaiting further study, in which case applicable law is applied to the portion of the water body that was listed (segment or grid). For other listings, a water clean-up plan or TMDL identifies the actions that must be taken to restore the waters. TMDLs typically apply to a watershed and set conditions for identified contributors to the impairment.

General permit coverage cannot be issued to new facilities that will cause or contribute to the impairment of listed water bodies. Existing facilities that have potential to cause or contribute to impairment of listed water bodies must monitor their discharge for the listed pollutants. If monitoring reveals pollutant concentrations of concern, the facility must demonstrate that there will be no increase in the concentrations of concern and identify steps that can be taken to reduce pollutant concentration. This permit does not include any specific monitoring schedule or reporting requirements for discharges to impaired waters. When applicable, Ecology will set such requirements by Administrative Order, or Ecology will require the facility to apply for an individual permit. Two facilities currently under permit discharge to a water segment impaired for low pH. These facilities must monitor for pH. Ecology may require individual permits if monitoring reveals their discharges may be causing or contributing to excursions of pH criteria for their respectively listed water bodies.

3.2.5 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. The typical discharge from WTPs is not expected to contain pollutants of concern other than those that are identified and discussed in this section. However, the

general permit does not authorize any discharge that will adversely affect the characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. If Ecology determines that any specific discharge may be causing a water quality violation, the Permittee must correct the problem and may need to apply for an individual permit.

3.2.6 Antidegradation

The purpose of the State of Washington's antidegradation policy (WAC 173-201A Part III) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to impact the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).

The antidegradation policy requires that discharges into a receiving water shall not further degrade the existing water quality of that receiving water. In cases where the natural conditions of a receiving water are of lower quality than the assigned criteria, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the assigned criteria, the natural conditions shall constitute the water quality criteria. Dischargers must maintain and protect existing and designated uses and must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in Chapter 173-201A WAC. 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 Chapter 173-201A WAC.

WTP discharges are typically of high quality. The primary pollutants are chlorine and suspended solids. Chlorine dissipates rapidly and is not expected to degrade the receiving water outside of the area of initial discharge. This general permit includes a chlorine limit that addresses water quality concerns in the area of discharge. Suspended solids can degrade water quality in the receiving water. Although settleable solids are not a direct measure of suspended solids, low levels of settleable solids typically indicate low levels of suspended solids. This permit sets a discharge limit for settleable solids. Ecology expects that discharges that comply with that limit for settleable solids will not include suspended solids at levels that degrade the receiving water. Thus, the proposed permit conditions will protect existing and designated uses of the receiving water.

3.2.7 Mixing Zones

A mixing zone is the defined area in the receiving water surrounding the discharge point(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge does not interfere with

designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

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

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

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

The mixing zone analysis produces a numerical value called a dilution factor. A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent is 10% and the receiving water is 90% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life *acute* criterion is based on the assumption that organisms are not exposed to that concentration for more than 1 hour or more often than one exposure in 3 years. Each aquatic life *chronic* criterion is based on the assumption that organisms are not exposed to that concentration for more than 4 consecutive days or more often than once in 3 years.

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

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of 2 liters/day for drinking water.
- A one-in-one-million cancer risk for carcinogenic chemicals.

WTPs typically discharge intermittently relatively small amounts of wastewater into a significantly larger receiving water. However, their typical sidebank discharges do not promote rapid mixing. Most mixing occurs as a result of the initial energy of the discharge entering the water body, and then mixing is slow as the plume moves along. In the case of streams, the plume typically follows the bank of the water body. Mixing zones must be minimized. The mixing zone requirements require selecting the method of determining a mixing zone that is most restrictive. To apply the basic principles of the mixing zone rule, the generalized discharge for typical dischargers was evaluated using conservative assumptions. Analysis developed a typical dilution factor for use with water quality-based determinations. Applying conservative assumptions and the most restrictive results for determining dilution minimizes the mixing zone.

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400). The following conditions must be fulfilled prior to Ecology allowing a mixing zone for WTPs:

1. **The permit must specify both the allowed size and location of the mixing zones.** Since this is a general permit, the size and location of the mixing zones were based on assumptions that accounted for WTPs as a group.

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

3. **Determination of dilution factors must be based on critical discharge conditions.** Since this is a general permit, critical conditions were based on assumptions that accounted for generalized critical conditions for WTPs as a group.

4. **Supporting information must clearly indicate the mixing zone will not:**
   - Have a reasonable potential to cause the loss of sensitive or important habitat.
   - Substantially interfere with the existing or characteristic uses.
   - Cause or contribute to damage to the ecosystem.
   - Adversely affect public health.

   Ecology has concluded that if WTP discharges comply with the permit limits, they will not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristic uses, cause damage to the ecosystem, or adversely affect public health.

5. **The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of the mixing zone.**
   Ecology conducted a reasonable potential analysis, using procedures established by the U.S. EPA and by Ecology, for each pollutant and concluded that if permit limits are met,

the discharge and receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone.

6. **The size of the mixing zone and the concentrations of the pollutants must be minimized.**
   Ecology has effectively minimized the size of the mixing zone authorized in this permit.

7. **Maximum size of mixing zone.**
   The authorized mixing zone does not exceed the maximum size restriction.

8. **Acute mixing zone.**
   - **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.**
     Ecology determined the acute criteria will be met at 10% of the distance (or volume fraction) of the chronic mixing zone at the 10-year low flow.

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

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

9. **Overlap of Mixing Zones.**
   This mixing zone may not overlap another mixing zone.

The water quality standards allow Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized 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 all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100. AKART for WTPs was discussed above and expressed by technology-based limits. Facilities were required under the previous permit to implement any treatment necessary to achieve AKART. Therefore, Ecology expects that all the facilities covered under this permit are at AKART and meet this test of eligibility for a mixing zone.

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

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

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

Chronic Mixing Zone for Estuarine Water
WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge points for a distance greater than 200 feet plus the depth of water over the discharge points and must not occupy more than 25% of the width of the water body as measured during mean low low water.

Acute Mixing Zone for Estuarine Water
WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone.

Chronic Mixing Zone for Oceanic Water
WAC 173-201A-400(7)(c) specifies that mixing zones must not extend in any horizontal direction from the discharge points for a distance greater than 300 feet plus the depth of water over the discharge points as measured during mean low low water.

Acute Mixing Zone for Oceanic Water
WAC 173-201A-400(8)(b) specifies that in oceanic waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone.

The generic mixing zones authorized under this general permit are:

- Acute: A boundary located no more than 30 feet downstream and receiving a discharge not to exceed 2.5% of the receiving water volume.

- Chronic: A boundary located no more than 200 feet in any horizontal direction plus the depth or water over the discharge point and not exceeding 25% of the width of the water body as measured during mean low low water.

3.2.8 Dilution Factors

Ecology determined the most conservative (smallest) dilution factor among those that would occur within the generic acute and chronic mixing zones at generic critical conditions by the use of representative mixing scenarios. For the purposes of analysis, Ecology evaluated the

following three discharge scenarios for assumed critical conditions where the receiving water flow was low, i.e., during the 7Q10 flow:

- 1 cfs assumed maximum discharge rate into a water body with a flow rate of 100 cfs.
- 10 cfs assumed maximum discharge rate into a water body with a flow rate of 1,000 cfs.
- 12 cfs assumed maximum discharge rate into a water body with a flow rate of 60,000 cfs.

Dilution for the acute mixing zone was evaluated at the maximum of 30 feet from point of discharge and at the maximum of 2.5% of the receiving water volume. Dilution for the chronic mixing zone was evaluated at the maximum distance of 200 feet in any horizontal direction from the discharge point plus the depth of water over the discharge point such that the mixing zone did not occupy more than 25% of the width of the water body as measured during mean low low water. In all cases the percent of volume was the more restrictive condition. The dilution factors are:

Table 10. Mixing Zone Dilution Factors.

	Acute	Chronic
Aquatic Life	3.5	26
Human Health, Carcinogen	not applicable	26

3.2.9 Sediment Quality

Ecology has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that Ecology may require Permittees to evaluate the potential for their discharge to cause a violation of applicable standards (WAC 173-204-400). Ecology has determined through a review of WTP operations and their effluent characteristics that the discharges permitted by this WTP general permit present no reasonable potential to violate the sediment management standards.

3.2.10 Ground-Water Quality

Ecology has promulgated ground-water quality standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100). Ecology has determined that since incidental discharge to ground by WTPs is not a substantive risk to the ground waters of the State, permit limits to protect ground-water quality are not required. Ecology will reassess this risk after additional monitoring data become available for total and dissolved arsenic in WTP backwash wastewater (to be collected September 2016 through August 2017).

3.2.11 Whole Effluent Toxicity

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

Ecology's reasonable potential analysis for total residual chlorine showed that WTP discharge has the potential "to discharge toxics in toxic amounts." However, Ecology has determined that WET testing is not a good tool for regulating chlorine toxicity ("Laboratory Guidance and Whole Effluent Toxicity Review Criteria," WQ-R-95-80, December 2008). The volatility of chlorine, aeration of test solutions, elevated test temperature, and duration of the test prevent the WET test method from producing an accurate assessment of chlorine toxicity. The use of U.S. EPA water quality criteria is adequate for determining water quality limits for chlorine. Therefore, this permit does not require WET testing. Ecology may require WET testing in the future if it receives information indicating that toxicity may be present in WTP effluent.

3.2.12 Evaluation of Surface Water Quality-Based Effluent Limits

Pollutants in an effluent may affect the aquatic environment near the point of discharge or at a considerable distance from the point of discharge. Thus, the method of calculating surface water quality-based effluent limits should vary with the point at which the pollutant has its maximum effect. The derivation of surface water quality-based limits must also account for the variability of the pollutant concentrations in both the effluent and the receiving water. Ecology determined the potential impacts of WTP discharges on dissolved oxygen, pH, chlorine, turbidity, and temperature and whether a permit limit and periodic monitoring were required using the dilution factors in the above table.

Dissolved Oxygen

During the first permit cycle from January 1998 through August 2003, Permittees reported the dissolved oxygen concentration in their discharge. Dissolved oxygen values largely exceeded (were better than) standards for surface water bodies. The few exceptions were not expected to violate standards after consideration of available dilution. Therefore, none of the subsequent WTP general permits included monitoring for dissolved oxygen. Based on this information, Ecology did not include limits for dissolved oxygen in the draft permit.

pH

The historical data for WTPs have consistently shown pH values in the range of 6.0 to 8.5 S.U., with a few values greater than 8.5 S.U. The technology based limit for WTPs is a range of pH from 6.0 to 9.0 S.U. Considering the available dilution in and buffering capacity of receiving waters, Ecology predicts no violation of the technology-based pH criteria in fresh waters under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH, and routine monitoring for pH will continue.

Chlorine

Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the water quality standards for surface waters or from having surface water quality-based effluent limits. Ecology conducted a reasonable potential analysis for chlorine (see Appendix H, Technical Calculations) to determine whether it would require effluent limits in this permit.

Chlorine is frequently present in discharges of WTP backwash. Chlorine can cause acute toxicity in a very short exposure period. Chlorine concentrations in WTP discharges often exceed water quality standards and sometimes exceed the technology-based limit. Available dilution is not sufficient to assure that chlorine will not exceed water quality standards outside of the acute mixing zone. Ecology does not consider chronic toxicity to be as great an issue due to the intermittent nature of the discharges and the adequate dilution available in the chronic mixing zone. Therefore, the proposed permit includes water quality-based limits for total residual chlorine based on the acute water quality criterion for aquatic life, and the requirement for routine monitoring will continue.

Ecology reassessed the potential for chlorine to violate water quality standards using the monitoring data reported during the previous two permit cycles. Based on those data, Ecology found that lower discharge limits for acute exposures to chlorine were warranted. Thus, after a 1-year compliance period, the maximum daily discharge limit for total residual chlorine will decrease from 0.15 mg/L to 0.07 mg/L (beginning in September 2015). A spreadsheet summarizing the calculations is included in Appendix H. Since discharges of filter backwash from WTPs are episodic and short-term, Ecology also determined that the existing discharge limits for chronic exposures to chlorine were not relevant. Ecology will therefore eliminate the average monthly effluent limit for total residual chlorine when the maximum daily limit decreases (beginning in September 2015).

Temperature

During the first permit cycle from January 1998 through August 2003, Permittees reported the temperature of their discharge. Temperature values were consistently below 18 degrees Celsius, with only a few exceptions. Those few exceptions would not have violated Washington State temperature standards (WAC 173-201A-200-210 and 600-612) after allowance of the available dilution. Therefore, none of the subsequent WTP general permits (including this one) included monitoring for temperature.

Turbidity

Based on the historical range of turbidity reported in WTP effluents and the typical turbidity of the receiving waters, turbidity is not likely to be a concern for WTP discharges of backwash wastewater. These facilities filter and/or allow a settling time to remove solids prior to discharging their wastewater. After even a small amount of dilution, the remaining turbidity in the discharge will likely not violate standards. However, when the source surface water for a

drinking water facility is very turbid (e.g., during flood conditions) and frequent backwash is required, excessive turbidity may be an issue. A permit limit for turbidity will not be included in the permit, but the requirement for routine monitoring for turbidity will continue.

Arsenic

Ecology does not have sufficient water quality data regarding arsenic in WTP filter backwash effluent to determine whether arsenic presents a reasonable potential to pollute waters of the State. During the next permit term, Ecology proposes to require WTP Permittees to collect samples of their wastewater discharges monthly for 1 year and to analyze them for total and dissolved arsenic.

3.2.13 Summary of Water Quality-Based Effluent Limits

The resultant water quality-based effluent limits are as follows:

Table 11. Surface Water Quality-Based Limits.

Parameter	Basis of Limit	Effluent Limits	
		Average Monthly	Maximum Daily
Total Residual Chlorine	Water Quality	0.07 mg/L Sept 2014 – Aug 2015	0.15 mg/L Sept 2014 – Aug 2015
		Not applicable Sept 2015 – Aug 2019	0.07 mg/L Sept 2015 – Aug 2019

3.3 Comparison of Proposed Effluent Limits with the Currently Issued Permit

The new water quality-based chlorine limit is more stringent than the current limit. Given that the rate of non-compliance with total residual chlorine limits for all Permittees in 2013 was less than 1%, Ecology believes the Permittees will readily be able to comply with the new limit. In any case, Ecology will provide a 1-year "compliance schedule" to allow Permittees to adjust their processes before the new limit takes effect. The table below compares the current effluent limits with the proposed effluent limits and highlights the delayed implementation of the new maximum daily limit for total residual chlorine.

Table 12. Comparison of Current and Proposed Effluent Limits.

Parameter	Basis of Limit	Current Effluent Limits		Proposed Effluent Limits	
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Settleable Solids	Technology	0.1 mL/L	0.2 mL/L	0.1 mL/L	0.2 mL/L

Table 12. Comparison of Current and Proposed Effluent Limits.

Parameter	Basis of Limit	Current Effluent Limits		Proposed Effluent Limits	
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Total Residual Chlorine	Water Quality	0.07 mg/L	0.15 mg/L	0.07 mg/L Sept 2014 – Aug 2015	0.15 mg/L Sept 2014 – Aug 2015
				Not applicable Sept 2015 – Aug 2019	0.07 mg/L Sept 2015 – Aug 2019
Parameter	**Basis of Limit**	**Daily Minimum**	**Daily Maximum**	**Daily Minimum**	**Daily Maximum**
pH	Technology	6.0 S.U.	9.0 S.U.	6.0 S.U.	9.0 S.U.

mL/L = Milliliters per liter.
mg/L = Milligrams per liter.
S.U. = Standard units.

4.0 Monitoring Requirements

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits. Samples and measurements must be representative of the volume and nature of the monitored discharge or pollutant, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality [40 CFR 122.41(j)(1)]. Monitoring must occur at intervals sufficiently frequent to yield data that reasonably characterize the nature of the monitored discharge or pollutant.

Ecology may require monitoring of intake water, influent to treatment facilities, internal waste streams, and/or receiving waters to verify compliance with net discharge limits or removal requirements, to verify the maintenance of proper waste treatment or control practices, or to determine the effects of the discharge on the waters and sediments of the State.

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

4.1 Wastewater Monitoring

Required monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, significance of pollutants, and cost of monitoring. The quantity of wastewater discharged from small facilities is significantly less than from large facilities, but the cost of monitoring for the small facility per residential connection is much greater than for larger facilities. The typical characteristics and treatment of ground water produce less variability in the wastewater discharge than from the treatment of surface water. Therefore, Ecology has divided the monitoring schedule into two tiers based on the capacity of a facility to produce finished water (facility size) and the source of raw water (ground water or surface water). Group 1 facilities are those that have a maximum production capacity of less than 4 million gpd or use only ground water for their source water. Group 2 facilities are those with a maximum production capacity of at least 4 million gpd and treat surface water. For the purpose of distinguishing the sources of raw water, "surface water" includes both surface waters of the State and "ground water under the direct influence of surface water," as defined by the Washington State Department of Health. Sources of ground water under the direct influence of surface water include all infiltration galleries, Ranney wells, springs, and wells less than 50 feet deep within 200 feet of surface water, unless designated otherwise by the Washington State Department of Health.

Depending on the facility, the permit requires monitoring of total residual chlorine, pH, and settleable solids to document compliance with permit limits. Monitoring for peak discharge rate, total discharge volume, and turbidity is also required to further characterize and quantify the effluent. Since WTPs are typically aware of the rates and volumes of their wastewater discharges, providing monthly summaries of these values in their discharge monitoring reports will not be a significant burden. However, Ecology will not require the reporting of the rates and volumes of wastewater discharges until the second year of the permit term (beginning September 1, 2015) so that all facilities have sufficient time to install any additional equipment, if necessary. Flow data will enable Ecology to develop better estimates of total pollutant loadings to State waters. The monitoring schedule is detailed in the proposed general permit under Special Condition S-5 (Monitoring Requirements).

Limited data from filter backwash samples from 15 small WTPs suggest that detectable concentrations of arsenic may be present in the permitted discharges. More data are needed for Ecology to determine whether the WTPs covered by this general permit require discharge limits for arsenic and whether discharges to the ground may pose a threat to ground-water quality due to arsenic in the wastewater. Therefore, Ecology will require Permittees to sample and analyze their treated filter backwash wastewater for total and dissolved arsenic once monthly during the third year of the new permit term (12 samples from September 2016 through August 2017). Ecology believes that monitoring WTP filter backwash discharges beginning in 2016 is appropriate because policy decisions regarding arsenic may have been concluded by then, and the results from the monitoring will be available to inform the reissuance, potentially with modifications, of the WTP general permit in 2019. Ecology may also modify this permit before 2019 based on the monitoring results.

4.2 Laboratory Accreditation

Ecology requires that facilities use a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters specified therein). Facilities that conduct their own analyses for the required monitoring and reporting must be accredited. If a facility must monitor total residual chlorine, then its laboratory must be accredited for total residual chlorine, pH, and turbidity.

4.3 Effluent Limits which are Near Detection or Quantitation Levels

The effluent concentration limits for total residual chlorine and settleable solids are near the limits of current analytical methods to detect or accurately quantify. The method detection level (MDL) is the minimum concentration of a pollutant that a laboratory can measure and report with a 99% confidence that its concentration is greater than zero (as determined by a specific laboratory method). The quantitation level (QL) is the concentration at which a laboratory can reliably report values with a specified level of error. Estimated concentrations are the values between the MDL and the QL. Ecology requires permitted facilities to report estimated concentrations. When reporting maximum daily effluent concentrations, Ecology requires the

facility to report “less than X” where X is the required MDL if the measured effluent concentration falls below that level.

5.0 Other Permit Conditions

5.1 Reporting and Recordkeeping

Ecology based Special Condition S-6 (Reporting and Recordkeeping Requirements) on its authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210). Permittees must submit discharge monitoring reports to Ecology by the 15th of every month using the online Ecology WebDMR program, which is accessible at http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html. Ecology believes the additional requirement for monitoring total and dissolved arsenic will be easily accommodated within the available timeframe for sampling, analyses, and reporting (43 or more days per monitoring period). For example, the NPDES individual wastewater discharge permits, which frequently similarly require laboratory analyses of metals, also require submittal of discharge monitoring reports by the 15th day immediately following the monitoring period.

Ecology will also require all Permittees to submit updated versions of the following planning documents electronically:

- Operation and Maintenance Manual
- Solid Waste Control Plan
- Stormwater Pollution Prevention Plan
- Spill Contingency Plan

Permittees must provide electronic copies of these documents by January 1, 2015, in a portable document format (pdf) via the "Water Quality Permitting Portal" through their SecureAccess Washington accounts at https://secureaccess.wa.gov/ecy/wqwebportal/.

5.2 Non-Routine and Unanticipated Wastewater

Non-routine and unanticipated wastewater consists of process wastewater not identified in Special Condition S-1.2.1 (Process Wastewater), 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.

This reissued general permit authorizes non-routine and unanticipated discharges under certain conditions. The Permittee must characterize the non-routine wastewater for pollutants and examine the opportunities for reuse. Prior to discharging the non-routine wastewater, the Permittee must obtain approval from Ecology on a case-by-case basis.

Any discharges not specified in Special Condition S-1.2.1 (Process Wastewater) must be addressed in accordance with the terms and conditions of this section.

1. Beginning on the effective date of this permit, prior to any discharge of non-routine and unanticipated wastewater, the Permittee must contact Ecology and provide the following information at a minimum:

   (a) The proposed discharge location.
   (b) The nature of the activity that will generate the discharge.
   (c) Any alternatives to the discharge, such as reuse, storage, or recycling of the water.
   (d) The total volume of water it expects to discharge.
   (e) The results of the chemical analysis of the water.
   (f) The date of the proposed discharge.
   (g) The expected rate of discharge, in gallons per minute.

2. The Permittee must analyze the wastewater for all parameters with effluent limits in this permit and must report the results as required by Special Condition S-5 (Monitoring Requirements), along with any other parameter deemed necessary by Ecology, using the methods and quantitation levels specified by Ecology.

3. Depending on the nature and extent of pollutants in the wastewater and any opportunities for reuse, Ecology may:

   - Authorize the facility to discharge the wastewater.
   - Require the facility to treat the wastewater.
   - Require the facility to reuse the wastewater.

   All discharges must comply with the effluent limits established in Special Condition S-2 (Limits and Standards); water quality standards; and any other limits imposed by Ecology.

4. The discharge may not proceed until Ecology has reviewed the Permittee's request and has authorized the discharge by Administrative Order. Once approved and if the proposed discharge is to a municipal storm drain, the Permittee must obtain prior approval from the municipality and notify it when it plans to discharge.

5.3 Spill Plan

Ecology has determined that WTPs typically store a quantity of chemicals that have the potential to cause water pollution if accidentally released. Also, WTPs often employ hyper-chlorination treatment for facility and delivery system sanitation. Disposal of this highly chlorinated water has the potential to cause water pollution if appropriate measures are not taken. Ecology has the authority under Section 402(a)(1) of the FWPCA, RCW 90.48.180, and RCW 90.48.520 to require the Permittee to develop best management plans to prevent the accidental release of chemicals and to require appropriate handling and release of hyper-chlorinated water. Disposal of hyper-chlorinated water to surface water is prohibited.

The reissued permit requires the Permittee to develop, maintain, and implement a spill plan for:

- Preventing the accidental release of pollutants to waters of the State and for minimizing damages if such a spill occurs.

- Managing the safe release of hyper-chlorinated water either through dechlorination or through containment followed by discharge to land.

The Permittee must submit the spill plan to Ecology, and must keep an up-to-date version of the plan readily available on site.

5.4 Solid Waste Control Plan

Lagoon or settling tank treatment to reduce the amount of solids in wastewater discharges produces an accumulation of residual solids. Ecology has determined that the accumulation of residual solids from WTPs has a potential to cause pollution of the waters of the State via leachate from that solid waste. Improper disposal can result in the entry of those solids into surface waters. Inattention to management of accumulating solids can result in pollutants entering ground water. While the residual solids tend to be stable and insoluble, under acidic or anoxic conditions, this stability is not assured. If allowed to build up, solid materials may solubilize and be carried to ground water. Therefore, periodic removal and beneficial use or disposal of the solid residuals is necessary.

Ecology encourages the application of residual solids to a beneficial use rather than to a landfill. In most cases, WTP residuals may be classified as nonhazardous solid waste, but a toxicity characteristic leaching procedure (TCLP) test will likely be necessary to assure that the residuals do not qualify as "hazardous" under federal and State hazardous waste regulations. Beneficial use can include incorporation in a product such as concrete, direct application to soil at an approved agronomic rate, or addition as a component of a soil mix. Any beneficial use must be consistent with any local requirements for a solid waste permit, and approval must be obtained from the jurisdictional health department before undertaking a beneficial use project.

This reissued general permit requires that the Permittee have a solid waste control plan to prevent solid waste from causing pollution of waters of the State. The Permittee must submit the plan to the local permitting agency for approval and to Ecology, and must keep an up-to-date version of the plan readily available on-site.

5.5 Operation and Maintenance Manual

Ecology requires WTPs to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with federal and State regulations [40 CFR 122.41(e) and WAC 173-220-150 (1)(g)]. WTPs must prepare an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the operation and maintenance manual must

ensure compliance with the terms and limits in this permit. Each Permittee must submit the operation and maintenance plan to Ecology, and must keep an up-to-date version of the plan readily available on site.

5.6 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 SWPPP along with 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 technology economically achievable (BAT) for stormwater discharges. Facilities that discharge stormwater from their site to a surface water body or to a stormwater conveyance system that discharges to a surface water body 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.

Each Permittee must continuously review and revise its SWPPP as necessary to assure that stormwater discharges do not degrade water quality. Each Permittee must submit a copy of the SWPPP to Ecology, and must retain the SWPPP on site or within reasonable access to the site and available for review by Ecology.

5.6.1 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.

5.6.2 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," or any revisions thereof, or practices that are demonstrably equivalent to

practices contained in stormwater technical manuals approved by Ecology. This should ensure that BMPs will prevent violations of State water quality standards, and satisfy the State AKART requirements and the federal technology-based treatment requirements under 40 CFR Part 125.3. The SWPPP must document that the selected BMPs provide an equivalent level of pollution prevention, compared to the applicable stormwater management manuals, including the technical basis for the selection of each stormwater BMP (scientific, technical studies, and/or modeling) which supports the performance claims for the selected BMPs.

5.6.3 Operational Source Control BMPs

Operational source control BMPs include a schedule of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial practices to prevent or reduce the pollution of waters of the State. These activities do not require construction of pollution control devices but are very important components of a successful SWPPP. Employee training, for instance, is critical to achieving timely and consistent spill response. Pollution prevention is likely to fail if 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.

5.6.4 Structural Source Control BMPs

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

5.6.5 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.

5.6.6 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," or any revisions thereof. Permittees should identify volume and flow control measures that they can implement over time to reduce the impact of uncontrolled release of stormwater.

5.7 Compliance Schedule

The reissued permit does not include a compliance schedule that would require additional monitoring or reporting beyond that already required. The discharge limits for total residual chlorine will remain unchanged for the first 12 months (September 2014 through August 2015) of the 5-year term of the permit. Ecology expects that WTP operators will use this time, if necessary, to adjust their processes so they may, beginning in September 2015, consistently comply with the new discharge limits for total residual chlorine. Throughout the entire term of the permit, Permittees must provide monthly discharge monitoring reports, which will identify the concentrations of total residual chlorine measured in the permitted discharge.

5.8 Permit Conditions, Special and General

Ecology bases the terms and conditions of its NPDES general permits on State and federal law and regulations, and standardizes the general conditions across all NPDES general permits. The summary below identifies each of the conditions in the WTP general permit, describes their content, and cites the laws and regulations upon which they are based.

Special Condition S-1 Permit Coverage
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; the chemicals and products authorized for use under the permit, and the activities, discharges, and facilities excluded from coverage under the permit.

WAC 173-226-050 (2), (3), and (4)
WAC 173-226-100 (2)

Special Condition S-2 Limits and Standards
Identifies the standards and requirements for compliance with the permit, including discharge limits and other requirements for impaired water bodies.

WAC 173-226-070 (1), (2), (3), and (6) (a)

Special Condition S-3 Planning Requirements
Identifies the procedural documentation and plans that the Permittee must maintain to ensure continuous operational control and permit compliance.

Special Condition S-4 Operational Requirements
Identifies requirements for facility operation and maintenance; operational restrictions; and responding to excursions from compliance with the permit.

40 CFR 122.41 (e) and (m)
RCW 90.48.120
WAC 173-201A-110
WAC 173-226-070 (1) (d) and (3) (d)
WAC 173-226-080 (1) (i)

Special Condition S-5 Monitoring Requirements
Identifies the objectives for monitoring; the required sampling and analytical procedures for monitoring the characteristics and toxicity of discharges; and requirements for effectiveness monitoring, inspections, and operational recordkeeping.

40 CFR 122.41 (j) (1) and (4)
Chapter 173-205 WAC
WAC 173-226-090 (1) (a), (b), (c), (d), and (e); (4); and (5)

Special Condition S-6 Reporting and Recordkeeping Requirements
Identifies the results that the Permittee must record; and the requirements for engineering documentation, notification and posting, reporting, records retention, public access to information, coordination of inspections, and other reporting.

40 CFR 122.41(j) (2) and (3); and (l) (2), (4), (5), (6), and (7)
WAC 173-226-080 (1) (b) and (4)
WAC 173-226-090 (2) and (3) (a)
WAC 173-226-180 (4)

Special Condition S-7 Permit Administration
Identifies the processes and requirements for obtaining and terminating permit coverage; and requirements for when the Permittee is to notify Ecology of certain changes.

WAC 173-226-080 (2)
WAC 173-226-130 (5)
WAC 173-226-200 (1) and (3)

General Condition G-1 Operation and Maintenance
Identifies the activities and discharges authorized by the permit; discharges from activities not covered by the permit; and requirements concerning system failures, removed substances, and upsets.

40 CFR 122.41 (c), (e), and (n)
RCW 90.48.080
WAC 173-226-080 (1) (a), (d), and (j)

General Condition G-2 Other Duties and Responsibilities

Identifies additional requirements and prohibitions of the Permittee, including compliance; monitoring; mitigation; reporting of non-compliance, spills, and other information; and reapplication.

40 CFR 122.41
40 CFR 122.42
RCW 90.48.110(1)
RCW 90.48.170
WAC 173-226-020
WAC 173-226-070 (3) and (5)
WAC 173-226-100 (1)
WAC 173-226-200 (1) and (2)
WAC 173-226-220 (2)
WAC 173-240-110 (1)

General Condition G-3 Enforcement and Penalties

Identifies Permittee's property rights; Ecology's rights of inspection, entry, and enforcement; and the penalties for violating permit conditions and tampering with monitoring equipment and data.

40 CFR 122.41 (a) (2) and (3); (g) and (i); (j) (5); and (k) (2)
RCW 90.48.090
RCW 90.48.140
RCW 90.48.144
WAC 173-226-080 (1) (h)
WAC 173-226-250 (1), (2), (3), and (4)

General Condition G-4 Permit Management and Coordination

Identifies dates of coverage; requirements for appeals, signatures, certifications, and fee payment; and conditions and requirements for permit modification, transfer, termination, and revocation.

40 CFR 122.22
40 CFR 122.41 (f); (k); and (l) (1) and (3)
40 CFR 122.61
40 CFR 122.62
40 CFR 122.63 (d)
RCW 90.48.190
RCW 90.48.195
RCW 90.48.465
Chapter 173-224 WAC
WAC 173-220-040 (5)
WAC 173-220-150 (1) (b)
WAC 173-220-210 (3) (b)
WAC 173-226-080 (1) (b), (e), (f), and (g); (3); and (4)
WAC 173-226-090 (3) (b)
WAC 173-226-180 (5)
WAC 173-226-190
WAC 173-226-200 (2), (3) (d), and (7)
WAC 173-226-210
WAC 173-226-220 (3) and (4)
WAC 173-226-230 (1)
WAC 173-226-240 (1), (2), (4), (5), and (6)

6.0 Permit Issuance Procedures

6.1 Permit Modifications

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

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

6.2 Permit Term

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

7.0 Economic Impact Analysis

In about 1997, Ecology conducted an economic impact analysis to evaluate the impact that the WTP general permit would have on small business. Ecology subsequently included measures in the permit to reduce that impact where legal and feasible pursuant to WAC 173-226-120. Ecology evaluated the cost of implementing and operating typical technology-based treatment based on a 20-year lifespan of operation and cost recovery. The annual cost per connection varied dramatically from about 10 cents per year for a very large facility (400,000 residential connections) to about $20.00 per year for a small facility (1,000 residential connections). Likewise, the cost per customer of monitoring was much less for a large facility than it was for a small facility. Although the increased cost of doing business for a small facility was not so large that it could not be passed on to the consumer, Ecology made the following attempts to mitigate the disparity of economic impact.

1. Facilities with a maximum production capacity of less than 50,000 gpd were excluded from the proposed general permit.

2. Discharges to land and to POTWs typically have not required a permit. Currently a greater percentage of small facilities discharge to land or POTWs than large facilities. These discharge options are also generally more realistic and easier to implement by small facilities than by large facilities.

3. Monitoring frequency was reduced from weekly to monthly for facilities with a maximum production capacity of less than 4,000,000 gpd.

The permit includes a chlorine discharge limit that requires many facilities to implement dechlorination in order to remain in compliance. Dechlorination technology is readily available and relatively inexpensive to implement. Ecology estimated that the initial cost of buying equipment and setting up dechlorination will cost large facilities about $5,000, and that ongoing maintenance and purchase of chemicals will be about $1,000 per year. Small facilities will likely spend $800 to $1,000 initially and no more than $500 per year for ongoing maintenance and chemicals. Although the projected impact of this permit was considered nominal, Ecology provided a compliance schedule to allow Permittees sufficient time to implement dechlorination with minimum economic impact.

Ecology also adjusted monitoring requirements to establish differing schedules for sampling. Large facilities must monitor for all parameters weekly, and small facilities must monitor for all parameters monthly. The additional monitoring frequency was offset by a reduction in the total number of parameters for monitoring.

Ecology expects no significant increase in cost due to this permit reissuance.

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Appendix A. Acronyms and Units of Measure

Acronym	Meaning
AKART	All known, available, and reasonable methods of prevention, control, and treatment
ANSI	American National Standards Institute
BAT	Best available technology economically achievable
BCT	Best conventional pollutant control technology
BMP	Best management practice
BPT	Best practicable control technology currently available
BOD	5-Day biochemical oxygen demand
COD	Chemical oxygen demand
CFR	Code of Federal Regulations
CWA	Clean Water Act
Ecology	Washington State Department of Ecology
EER	Electrodialysis/electrodialysis reversal
EPA	Environmental Protection Agency
FWPCA	Federal Water Pollution Control Act (same as Clean Water Act)
IE	Ion exchange
IX	Ion exchange
MCL	Maximum contaminant level
NPDES	National Pollutant Discharge Elimination System
NSF	National Science Foundation
O&M	Operation and maintenance
PCHB	Pollution Control Hearings Board
PNOD	Public Notice of Draft
POTW	Publicly owned treatment works
QL	Quantitation limit
RCW	Revised Code of Washington State
RO	Reverse osmosis
SAIC	Science Applications International Corporation
SEPA	State Environmental Policy Act, RCW 43.21C
SIU	Significant industrial user
SWPPP	Stormwater pollution prevention plan
TDS	Total dissolved solids
TMDL	Total maximum daily load
TRC	Total residual chlorine
TSS	Total suspended solids
TCLP	Toxicity characteristic leaching procedure
U.S.	United States
WAC	Washington Administrative Code
WET	Whole effluent toxicity
WTP	Water treatment plant

Unit of Measure	Meaning
cfs	Cubic feet per second
gpd	Gallons per day
gal/yr	Gallons per year
kg/day	Kilograms per day
lbs/yr	Pounds per year
mg/L	Milligrams per liter
µg/L	Micrograms per liter
mL/L	Milliliters per liter
NTU	Nephelometric turbidity units
S.U.	Standard units

Appendix B. Definitions

303(d) List
The list of water bodies in Washington State that do not meet the water quality standards specified in Chapter 173-201A WAC. The Washington State Department of Ecology (Ecology) prepares and the U.S. Environmental Protection Agency approves this list periodically (every 2 years). The list is posted on the Ecology web site at http://www.ecy.wa.gov/programs/wq/303d/2008/index.html.

5-Day biochemical oxygen demand (BOD-5 or BOD_5)
The amount of dissolved oxygen needed by aerobic biological organisms to oxidize the decomposable organic material present in a given water sample at 20 degrees Celsius over a 5-day period, which is an indication of the amount of organic pollution present in the water. The analytical procedure for determining this amount is typically Standard Methods for the Examination of Water and Wastewater, Method 507.

Action
Any human project or activity.

Activity
A discernible set of related actions or processes conducted within a facility, operation, or site that may cause a discharge of pollutants. Examples include, but are not limited to, construction; manufacturing; production or use of raw materials, products, or wastes; transportation; and cleanup or treatment of machinery, structures, land, or water.

Acute Toxicity
The adverse effects of a substance or a combination of substances on an organism that result either from a single exposure or from multiple exposures in a short period of time (usually from 48 to 96 hours).

Administrator
The administrator of the U.S. Environmental Protection Agency or an authorized representative.

Adopt
To use as one's own. Permittees may choose to adopt an existing adaptive management plan for organisms treated under this permit as long as the Washington State Department of Ecology (Ecology) has approved and accepted the plan. For example, if the Washington State Department of Fish and Wildlife has an Ecology-approved adaptive management plan for tunicate treatment, the Washington Department of Natural Resources (WDNR) may chose to follow this plan rather than developing a new plan. The adopted plan must include the treatment proposed by WDNR.

Agronomic rate
The application rate of biosolids or other source of nutrients that provides the amount of nutrients necessary for the optimum growth of targeted vegetation, and that does not cause the violation of applicable standards or requirements for the protection of ground water or surface

water. The agronomic rate is the rate at which a viable crop can be maintained with minimal leaching of chemicals (e.g., nutrients) downwards below the root zone. When the application field comprises part of a waste treatment system, the operator must manage the crop for maximum nutrient update.

All known, available, and reasonable methods of prevention, control, and treatment (AKART)
A technology-based approach of decision making for limiting pollutants from discharges. AKART represents the most current methodology for preventing, controlling, and abating pollution that can be installed or used at a reasonable cost.

Ambient
The existing or typical environmental condition of a geographic area or water body at or surrounding a particular location.

Antidegradation policy
The policy stated in WAC 173-201A-070.

Application for coverage
A formal request for coverage under this general permit using the paper or electronic form developed by the Washington State Department of Ecology for that purpose.

Application rate
The quantity of material applied to a specific area within a specific timeframe. For example, the application rate of manure or algaecide onto a field or water body may be a total of X gallons per acre or Y pounds per acre for a given treatment date or growing season.

Average monthly discharge limit (same as Average monthly effluent limit)
The greatest average of daily discharges allowed for a calendar month. To calculate the value of the actual average monthly discharge for comparison with the limit, add the value of each daily discharge measured during a calendar month, and divide this sum by the total number of daily discharges measured.

Average monthly effluent limit (same as Average monthly discharge limit)
The greatest average of daily discharges allowed for a calendar month. To calculate the value of the actual average monthly discharge for comparison with the limit, add the value of each daily discharge measured during a calendar month, and divide this sum by the total number of daily discharges measured.

Background
The biological, chemical, physical, and radiological conditions that exist in the absence of any influences from outside an area potentially influenced by a specific activity.

Best management practice (BMP)
Activity, prohibition, maintenance procedure, or other physical, structural, and/or managerial practice to prevent or reduce pollution of and other adverse impacts to the waters of Washington

State. BMPs include treatment systems, operating schedules and procedures, and practices used singularly or in combination to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

Best professional judgment (BPJ) (same as Best engineering judgment)
The highest quality technical opinion developed by a permit writer after consideration of all reasonably available and pertinent data or information which forms the basis for the terms and conditions of a National Pollutant Discharge Elimination System permit.

Bypass
The diversion of stormwater or a wastestream from any portion of a treatment facility. A bypass may be intentional or unintentional.

Calendar Day
A period of 24 consecutive hours starting at 12:01 A.M. and ending at the following 12:00 P.M. (midnight).

Carcinogen
Any substance or agent that produces or tends to produce cancer in humans. The term carcinogen applies to substances on the U.S. Environmental Protection Agency lists of A (known human) and B (probable human) carcinogens, and any substance which causes a significant increased incidence of benign or malignant tumors in a single, well conducted animal bioassay, consistent with the weight of evidence approach specified in the U.S. Environmental Protection Agency Guidelines for Carcinogenic Risk Assessment.

Categorical standard (same as Pretreatment standard)
Any pollutant discharge limit, including those developed under the Clean Water Act Section 307(b) and (c) and implemented through regulations in 40 CFR Subchapter N, that apply to the discharge of nondomestic wastes to publicly-owned treatment works. Pretreatment standards includes prohibitive discharge limits established pursuant to WAC 173-216-060.

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

Chronic toxicity
The adverse effects of a substance or combination of substances on an organism that result from exposure over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity may affect survival, reproduction or growth rates, or other health-related conditions.

Clean Water Act (CWA)
The primary federal law in the United States governing water pollution and that includes goals for eliminating releases of large amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters will meet standards necessary for

human sports and recreation by 1983. (Federal Water Pollution Control Act, Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117, and 100-4; USC 1251, et seq.)

Color
The optical density at the visual wavelength of maximum absorption, relative to distilled water. One hundred percent transmittance is equivalent to zero optical density. The analytical procedure for measuring this parameter is typically Standard Methods for the Examination of Water and Wastewater, Method 204.

Compliance schedule
A schedule of remedial measures that includes an enforceable sequence of actions or operations leading to compliance with an effluent or other limit, prohibition, or standard.

Contaminant
Any biological, chemical, physical, or radiological substance that does not occur naturally in a given environmental medium or that occurs at concentrations greater than those in the natural or background conditions.

Control
1. To direct, oversee, supervise, manage, perform, or give instruction about any decision, action, or operation of the specific facility, site, field, wastestream, or other object "under control."
2. The partial removal or complete eradication of native plants, non-native non-noxious plants, algae, noxious or quarantine-list weeds, or other nonnative invasive organisms from a water body. The purpose of control activities may be to protect some of the beneficial uses of a water body, such as swimming, boating, water skiing, fishing access, etc. The goal may be to maintain some native aquatic vegetation for habitat, while accomplishing some removal for beneficial use protection. Control activities may include the application of chemical(s) to all or part of a water body.

Control plan
A plan that sets limits on discharges to a specific water body or ground-water recharge area. Examples include total maximum daily load determinations, restrictions for the protection of endangered species, and ground-water management plans.

Conventional pollutants
Pollutants typical of municipal sewage, which include biological oxygen demand, fecal coliform, oil and grease, pH, and total suspended solids.

Conveyance
A mechanism for transporting water, wastewater, or stormwater from one location to another location, including, but not limited to, gutters, ditches, pipes, and/or channels.

Criteria
The numeric values and the narrative standards that represent contaminant concentrations which are not to be exceeded in the receiving environmental media (surface water, ground water, sediment) to protect beneficial uses.

Critical condition
The situation during which the combination of receiving water and waste discharge conditions have the greatest potential for causing the greatest adverse impact on the receiving water environment (e.g., on aquatic biota and existing or designated water uses). A critical condition usually occurs when the flow within a water body is small, and, thus, its ability to dilute the waste discharge is reduced. For steady-state discharges to riverine systems the critical condition may be assumed to be equal to the 7Q10 flow event unless determined otherwise by the Washington State Department of Ecology.

Daily discharge
The amount of a pollutant discharged during any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with limits expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged during the day. For pollutants with limits expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant throughout the day.

Daily maximum
The greatest allowable value for any calendar day.

Daily minimum
The smallest allowable value for any calendar day.

Damage to the ecosystem
Any demonstrated or predicted stress to aquatic or terrestrial organisms or communities of organisms which the Washington State Department of Ecology reasonably concludes may interfere with the health or survival success or the natural structure of such populations. This stress may be due to, but is not limited to, alteration in habitat or changes in water temperature, chemistry, or turbidity, and shall consider the potential build-up of discharge constituents or temporal increases in habitat alteration which may create such stress in the long term.

Dangerous waste
Any discarded, useless, unwanted, or abandoned nonradioactive substances, including but not limited to certain pesticides, or any residues or containers of such substances which are disposed of in such quantity or concentration as to pose a substantial present or potential hazard to human health, wildlife, or the environment because such wastes or constituents or combinations of such wastes: (1) Have short-lived, toxic properties that may cause death, injury, or illness or have mutagenic, teratogenic, or carcinogenic properties; or (2) Are corrosive, explosive, flammable, or may generate pressure through decomposition or other means. The exact definition of dangerous waste is provided at WAC 173-303-040.

Date of receipt
Five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes

sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed 45 days from the date of mailing. (RCW 43.21B.001(2))

Demonstrably equivalent
The technical basis for the selection of all stormwater best management practices are documented within a stormwater pollution prevention plan (SWPPP). The SWPPP must document: (1) The method and reasons for choosing the stormwater best management practices selected; (2) The pollutant removal performance expected from the practices selected; (3) The technical basis supporting the performance claims for the practices selected, including any available existing data concerning field performance of the practices selected; (4) An assessment of how the selected practices will comply with State water quality standards; and (5) An assessment of how the selected practices will satisfy both applicable federal technology-based treatment requirements and State requirements to use all known, available, and reasonable methods of prevention, control, and treatment.

Designated uses
Those uses specified in Chapter 173-201A WAC for each water body or segment, regardless of whether or not the uses are currently attained.

Detection limit
The minimum observed result such that the lower 100(1- α) percent confidence limit of the result is greater than the mean of the method blanks.

Detention
The temporary collection of water into a storage device or pond, with the subsequent release of that water either at a rate slower than the collection rate or after a specified time period has passed since the time of collection. The purposes of detention include, but are not limited to, improving the quality of the water released and reducing or smoothing the mass flow rate of its discharge over time.

Detention pond
Man-made structure constructed specifically to collect and manage stormwater. Detention ponds are generally dry until a significant storm event and subsequently gradually release the accumulated stormwater through an outlet.

Dilution factor (DF)
A measure of the amount of mixing of effluent and receiving water that occurs at the mixing zone boundary, expressed as the inverse of the effluent fraction. For example, a dilution factor of 16 means that, assuming complete mixing at the mixing zone boundary, the effluent comprises 6.25 percent by volume, and the receiving water comprises 93.75 percent by volume of the mixture of effluent and receiving water [DF = 1/(6.25/100) = 16].

Dilution zone (same as Mixing zone)
That portion of a water body adjacent to an effluent discharge point where mixing dilutes the effluent with the receiving water. The water within this zone need not meet numeric water quality criteria, but must allow passage of aquatic organisms and not upset the ecological balance

of the receiving water. The permit specifies the mixing area or volume fraction of the receiving water surrounding the discharge point.

Discharge (the noun form is the same as Effluent)
To release or add material to waters of the State, including via surface runoff.

Discharge limit (same as Effluent limit)
Any restriction, including schedules of compliance, established by the local government, the Washington State Department of Ecology, or the U.S. Environmental Protection Agency on quantities, rates, and/or concentrations of biological, chemical, physical, radiological, and/or other characteristics of material discharged into any site including, but not limited to, waters of the State of Washington.

Discharge to ground water
A discharge of water into an unlined impoundment or onto the surface of the ground that allows the discharged water to percolate, or potentially percolate, to ground water. Discharge to ground water, discharge to land, and discharge to ground all have the same meaning.

Discharger
An owner or operator of any facility, operation, or activity subject to regulation under Chapter 90.48 of the Revised Code of Washington State or the federal Clean Water Act.

Domestic wastewater
Waste and wastewater containing human wastes, including kitchen, bath, and laundry wastes from residences, buildings, industrial establishments, or other places, together with such ground-water infiltration or surface waters as may be present.

Effluent (same as the noun form of Discharge)
Material (usually an aqueous liquid) released to waters of the State, including via surface runoff.

Effluent limit (same as Discharge limit)
Any restriction, including schedules of compliance, established by the local government, the Washington State Department of Ecology, or the U.S. Environmental Protection Agency on quantities, rates, and/or concentrations of biological, chemical, physical, radiological, and/or other characteristics of material discharged into any site including, but not limited to, waters of the State of Washington.

Entity (same as Party)
Any person or organization, including, but not limited to, cities, counties, municipalities, Indian tribes, public utility districts, public health districts, port authorities, mosquito control districts, special purpose districts, irrigation districts, state and local agencies, companies, firms, corporations, partnerships, associations, consortia, joint ventures, estates, industries, commercial pesticide applicators, licensed pesticide applicators, and any other commercial, private, public, governmental, or non-governmental organizations, or their legal representatives, agents, or assignees.

Erosion
The detachment and movement of soil or rock fragments and the wearing away of the land surface by precipitation, running water, ice, wind, or other geological agents, including processes such as gravitational creep.

Erosion and sediment control best management practices (ESC BMPs)
Best management practices (BMPs) intended to prevent erosion, sedimentation, or the release of sediment-laden water from the site. Examples include preserving natural vegetation, seeding, mulching and matting, and installation of plastic covering, filter fences, sediment traps, or ponds. (synonymous with stabilization and structural BMPs)

Existing condition
The land cover, native vegetation, drainage systems, soils, and impervious surfaces that exist at a site prior to any changes associated with achieving proposed development conditions which may require approved permits and engineering plans. If a site has impervious areas and drainage systems that were built without approved permits, then the existing condition is that which existed prior to the issue date of this permit. The existing condition may be verified by using aerial photography or other records. Hydrologic analysis of a site typically employs its existing condition unless a City or County imposes other requirements.

Facility (same as Operation)
The physical premises (including the land and appurtenances thereto) owned or operated by a Permittee from which wastewater or stormwater is discharged subject to regulation under the National Pollutant Discharge Elimination System program.

Fact Sheet
A document prepared by the Washington State Department of Ecology and issued with every permit which summarizes the general activities of the Permittee, explains the reasoning behind the Conditions of the permit, and tells how the public may comment.

Federal Register (FR)
The U.S. government periodical in which draft and final regulations are published.

Federal Water Pollution Control Act (FWPCA) (same as Clean Water Act)
The primary federal law in the United States governing water pollution and that includes goals for eliminating releases of large amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters will meet standards necessary for human sports and recreation by 1983. (Clean Water Act, Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117, and 100-4; USC 1251, et seq.)

General permit
A single permit that covers multiple characteristically similar dischargers of a point source category within a designated geographical area, in lieu of many individual permits that are specifically tailored and issued separately to each discharger.

Ground water (same as Underground water)
The water located in a saturated zone or stratum beneath the surface of the land or below a surface water body. Ground water is a water of the State and includes interflow, which is a type of perched water, and water in all other saturated soil pore spaces and rock interstices, whether perched, seasonal, or artificial. Although underground water within the vadose zone (unsaturated zone) also is a type of ground water, the Washington State ground-water quality standards do not specifically protect soil pore water or soil moisture located in the vadose zone.

Hardness
The amount of calcium and magnesium salts present in water, typically expressed as milligrams of calcium carbonate per liter. The analytical procedure for determining this amount is typically Standard Methods for the Examination of Water and Wastewater, Method 314.

Hazardous waste
That waste designated by 40 CFR Part 261, and regulated by the U.S. Environmental Protection Agency.

Highly permeable soil
Soil with permeability greater than 10^{-6} centimeters per second.

Individual permit
A permit that covers only a single point source, discharger, or facility.

Industrial user
Those industries identified in the Standard Industrial Classification Manual, Bureau of the Budget, 1967, as amended and supplemented, under the category ‘‘Division D—Manufacturing’’ and such other classes of significant waste producers as, by regulation, the Administrator of the U.S. Environmental Protection Agency deems appropriate.

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

Interflow
Underground water derived directly from rainfall or snowmelt that percolates into the shallow soil, travels a relatively short distance laterally through the soil near the land surface, and subsequently seeps either: (1) Back onto the land surface where it may evaporate, mix with runoff, or discharge to a surface water body, or (2) Below the surface into a surface water body. The presence and amount of interflow is a function of the soil system depth, permeability, and water-holding capacity.

Jurisdiction
1. The practical authority granted to a formally constituted legal body to deal with and make pronouncements on legal matters and, by implication, to administer justice within a defined area of responsibility.
2. The geographical area or subject-matter to which such practical authority applies.

Land application
The spreading, spraying, injection below the land surface, or other means of incorporation of waste (for the confined animal feeding operation permit, specifically agricultural waste, such as manure, litter, and process wastewater) or biosolids to a field to provide nutrients to support plant growth.

Land application site
An area where wastes are applied onto or incorporated into the soil surface for treatment or disposal, excluding manure spreading operations.

Landfill
An area of land or an excavation in which wastes are placed for permanent or temporary disposal and which is not a land application site, surface impoundment, injection well, and/or waste pile.

Leachate
Water or other liquid that has percolated through soil, raw material, product, or waste and that contains or may contain substances in solution or suspension as a result of its contact with those materials.

Load allocation (LA)
Within the context of a total maximum daily load, that portion of the loading capacity of a pollutant entering a water body attributed to: (1) Existing or future nonpoint sources of pollution (i.e., all sources not covered by a National Pollutant Discharge Elimination System permit); and (2) Natural background sources. Wherever possible, nonpoint source loads and natural loads should be distinguished. LA does not include reserves for future growth or a margin of safety.

Loading capacity
The greatest amount of pollutant that a water body can receive and still meet water quality standards.

Maximum contaminant level (MCL)
The maximum concentration of a contaminant established by the U.S. Environmental Protection Agency under the Federal Safe Drinking Water Act (42 U.S.C. 300f) and published in 40 CFR 141, as presently promulgated or as subsequently amended or repromulgated. A maximum contaminant level is an enforceable health-based standard which reflects the effects of certain risk management factors, such as laboratory confidence limits and economics.

Method detection limit (MDL)
Minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, and is determined from analysis of

a sample in a given matrix containing the analyte. The MDL (or simply "detection limit") is the smallest measured amount or concentration of analyte in a sample that gives rise to a Type I error tolerance of alpha under the null hypothesis that the true amount or concentration of analyte in the sample is equal to that of a blank. (The alternative hypothesis is that the true amount or concentration of analyte is greater than that of a blank).

Migration (same as Translocation)
Any natural movement of an organism or community of organisms from one locality to another locality.

Mixing zone (same as Dilution zone)
That portion of a water body adjacent to an effluent discharge point where mixing dilutes the effluent with the receiving water. The water within this zone need not meet numeric water quality criteria, but must allow passage of aquatic organisms and not upset the ecological balance of the receiving water. The permit specifies the mixing area or volume fraction of the receiving water surrounding the discharge point.

Monthly average
The sum of all daily measurements obtained during a calendar month divided by the number of days measured during that month (arithmetic mean).

Municipality
A political unit incorporated for local self-government, such as a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created by or pursuant to state law; an authorized Indian tribe or tribal organization; or a designated and approved management agency under Section 208 of the Clean Water Act. Municipalities include special districts created under state law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity.

National Pollutant Discharge Elimination System (NPDES)
The federal wastewater permitting system for discharges of pollutants from point sources to the navigable waters of the United States authorized under Section 402 of the Clean Water Act. The U.S. Environmental Protection Agency has authorized the State of Washington to issue and administer NPDES permits for non-federal point sources within the State.

Natural condition
The environmental condition that existed before the introduction of any human-cause pollution or other disturbance. For estimating natural conditions in the headwaters of a disturbed watershed, a potentially useful reference condition may be the less disturbed condition of a neighboring or similar watershed.

Nonpoint source
A source from which pollutants may enter waters of the State that is not readily discernible, such as any dispersed land-based or water-based activities including, but not limited to, atmospheric deposition; surface water runoff from agricultural lands, urban areas, or forest lands; subsurface

or underground sources; or discharges from boats or marine vessels not otherwise regulated under the National Pollutant Discharge Elimination System program.

Occasionally
From time to time or intermittently.

Operation (same as Facility)
The physical premises (including the land and appurtenances thereto) owned or operated by a Permittee from which wastewater or stormwater is discharged subject to regulation under the National Pollutant Discharge Elimination System program.

Operational source control best management practice (Operational source control BMP)
The schedule of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial best management practices to prevent or reduce the pollution of waters of the State.

Organism
Any individual life form: an animal, plant, fungus, protistan, or moneran.

Outfall
The location of a point source where a discharge leaves a facility, site, or municipal separate storm sewer system and flows into waters of the State. Outfalls do not include open conveyances connecting two municipal separate storm sewers; or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State (e.g., culverts).

Party (same as Entity)
Any person or organization, including, but not limited to, cities, counties, municipalities, Indian tribes, public utility districts, public health districts, port authorities, mosquito control districts, special purpose districts, irrigation districts, state and local agencies, companies, firms, corporations, partnerships, associations, consortia, joint ventures, estates, industries, commercial pesticide applicators, licensed pesticide applicators, and any other commercial, private, public, governmental, or non-governmental organizations, or their legal representatives, agents, or assignees.

Permeable
Porous; capable of allowing liquids or gases to pass through.

Permit
An authorization, license, or equivalent control document issued by a formally constituted legal body, such as the Washington State Department of Ecology, to a facility, activity, or entity to treat, store, dispose, or discharge materials or wastes, specifying the waste treatment and control requirements and waste discharge conditions. Unless the context requires differently, "permit" refers to individual and general permits authorized under the National Pollutant Discharge Elimination System program.

Permittee
The entity who receives notice of coverage under this general permit.

Person
Any individual or organization, including, but not limited to, cities, counties, municipalities, Indian tribes, public utility districts, public health districts, port authorities, mosquito control districts, special purpose districts, irrigation districts, state and local agencies, companies, firms, corporations, partnerships, associations, consortia, joint ventures, estates, industries, commercial pesticide applicators, licensed pesticide applicators, and any other commercial, private, public, governmental, or non-governmental organizations, or their legal representatives, agents, or assignees.

pH
A measure of the acidity or alkalinity of water. A pH of 7.0 is defined as neutral. Large variations above or below 7.0 are harmful to most aquatic life. Mathematically, pH is the negative logarithm of the activity of the hydronium ion (often expressed as the negative logarithm of the molar concentration of the hydrogen ion). The analytical procedure for determining this amount is typically Standard Methods for the Examination of Water and Wastewater, Method 423.

Point source
Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters of the State, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft. Point source does not include agricultural stormwater discharges and return flows from irrigated agriculture. See 40 CFR 122.3 for exclusions.

Pollutant (in water)
Any discharged substance or pathogenic organism that would: (1) Alter the biological, chemical, physical, radiological, or thermal properties of any water of the State, or (2) Would be likely to create a nuisance or render such water harmful, detrimental, or injurious (a) to the public health, safety, or welfare, (b) to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or (c) to any animal or plant life, either terrestrial or aquatic, either directly from the environment or indirectly by ingestion through the food chain.

Pollutants may include, but are not limited to, the following: solid waste, incinerator residue, garbage, sewage, sewage sludge, filter backwash, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, dredged spoil, rock, sand, cellar dirt, and other industrial, municipal, and agricultural wastes.

Pollutant does not mean: (1) Sewage from marine vessels or a discharge incidental to the normal operation of a vessel of the Armed Forces, within the meaning of Section 312 of the Clean Water Act (CWA); (2) Dredged or fill material discharged in accordance with a permit issued under Section 404 of the CWA; or (3) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well used either to facilitate production or for disposal is approved by

authority of the Washington State Department of Ecology (Ecology), and if Ecology determines that such injection or disposal will not result in the degradation of ground-water or surface water resources.

Pollution (of water)
The man-made or man-induced contamination or other alteration of the biological, chemical, physical, or radiological properties of any water of the State, including change in temperature, taste, odor, color, or turbidity of the water; or such discharge of any solid, liquid, gaseous, or other substance into any water of the State that will, or is likely to, create a nuisance or render such water harmful, detrimental, or injurious to: (1) The public health, safety, or welfare; (2) Domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or (3) Any animal or plant life, either terrestrial or aquatic, either directly from the environment or indirectly by ingestion through the food chain.

Pollution Control Hearings Board (PCHB)
A three-member board appointed by the governor to hear and decide appeals of the decisions, orders, and permits or certain State regulatory agencies, including the Washington State Department of Ecology. (See Chapter 371-08 WAC.)

Pretreatment
The reduction of the amount or concentration of pollutants, elimination of pollutants, or alteration of the nature of pollutant properties to a less harmful state prior to or in lieu of discharging wastewater to a treatment plant. This reduction or alteration may be obtained by biological, chemical, or physical processes, by process changes, or by other means, except by diluting the pollutants.

Pretreatment standard (same as Categorical standard)
Any pollutant discharge limit, including those developed under the Clean Water Act Section 307(b) and (c) and implemented through regulations in 40 CFR Subchapter N, that apply to the discharge of nondomestic wastes to publicly-owned treatment works. Pretreatment standards include prohibitive discharge limits established pursuant to WAC 173-216-060.

Publicly-owned treatment works (POTW)
1. A sewage treatment plant and its collection system that is owned by a municipality, the State of Washington, or the federal government. A POTW includes the sewers, pipes and other conveyances that convey wastewater to the treatment plant, and any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature.
2. The municipality or other entity that has jurisdiction over the indirect discharges to and the discharges from the treatment works.

Putrescible waste
Solid waste that contains material capable of being decomposed by micro-organisms.

Quantitation limit (QL)
The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. The QL is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed. The QL is calculated by multiplying the method detection limit (MDL) by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10n, where n is an integer.

Reasonable potential
A probability calculated or projected as likely that an effluent or discharge will cause an excursion of a pollutant beyond a water quality criterion at the point of compliance in the receiving water, based on several factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

Receiving water
The water body at the point of discharge, whether that discharge is through a point source or via sheet flow. If the discharge is to a stormwater conveyance system, either surface or subsurface, the receiving water is the water body to which the stormwater conveyance system discharges. Systems designed for ground-water drainage, redirecting stream natural flows, or conveyance of irrigation water/return flows that coincidentally convey stormwater, are considered the receiving water. Receiving waters may also be ground water to which surface runoff is directed by infiltration.

Redevelopment
On a site that is already substantially developed (i.e., impervious surface covers at least 35 percent of its surface): (1) Creation, addition, or improvement of impervious surfaces; (2) Expansion of a building footprint; (3) Structural development, including construction, installation, expansion, or replacement of a building or other structure; (4) Replacement of impervious surface that is not part of a routine maintenance activity; or (5) Land disturbing activities.

Representative (sample)
A sample that yields data that accurately characterizes the nature of a discharge or other sampled matrix for the parameters of concern. A representative sample should account for the factors that contribute to the variability of the parameters, such as the quantity of the discharge, the date and time of the sampling event, and whether the particular sampling location or associated physical events may affect the material sampled. Combining grab samples collected from multiple outfalls from a designated area of the facility during a certain time range to create a flow-weighted composite sample may be required to obtain a representative sample.

A random sample may not be a representative sample. Representative sampling schemes should vary based on the population distribution and variability. For a relatively constant discharge, a grab sample is representative. For a discharge that varies greatly over time or space, a grab sample would likely not be representative.

Runoff
Water derived directly from rainfall or snowmelt that travels across the land surface and discharges: (1) To water bodies either directly or through a constructed collection and conveyance system, or (2) To the subsurface through a constructed collection and conveyance system.

Sanitary sewer
A sewer designed to convey domestic wastewater.

Saturated zone
The subsurficial zone in which all soil pore spaces and rock interstices are completely filled with ground water. Saturated zones include aquifers, whether or not they produce a significant yield, areas of perched ground water, and interflow.

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

Sediment management standards (SMS)
Numerical and narrative criteria for sediments to protect the beneficial uses of the waters of the State. Sediment management standards are identified within Chapter 173-204 WAC.

Sediment quality standards
The standards for sediments that identify chemical concentration and biological toxicity criteria that (a) Correspond to no observable acute or chronic adverse effects on biological resources, and (b) Do not pose a significant health threat to humans. Sediment quality standards are a basis for identifying contaminated surface sediments and for limiting toxic discharges to waters of the State (WAC 173-204 Part III).

Sedimentation
The deposition or formation of sediment.

Sensitive area
For the construction stormwater permit, a water body, wetland, stream, aquifer recharge area, or channel migration zone.

Settleable solids
The material that settles out of suspension within a certain timespan measured volumetrically. The analytical procedure for determining this amount is typically Standard Methods for the Examination of Water and Wastewater, Method 209E.

Significant industrial user (SIU)
All industrial users subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to a publicly-owned treatment works (POTW) (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a

process wastestream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the POTW; or is designated as such by the POTW control authority on the basis that the industrial user has a reasonable potential for adversely affecting the operation of the POTW or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)). Upon finding that an industrial user that meets the criteria above has no reasonable potential for adversely affecting the operations of the POTW or for violating any pretreatment standard or requirement, the control authority may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

Site

1. The land or water area where any facility, operation, or activity is physically located or conducted, including any adjacent land or buffer areas used in connection with such facility, operation, or activity.
2. The land or water area receiving any effluent discharged from any facility, operation, or activity.

Small business

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 50 or fewer employees.

Solid waste

All putrescible, nonputrescible, solid, and semisolid waste. Examples of solid waste are: garbage, rubbish, ashes, industrial wastes, swill, demolition and construction wastes, abandoned vehicles or parts thereof, discarded commodities, sludge from wastewater treatment plants and septic tanks, woodwaste, contaminated soils, contaminated dredged material, dangerous waste, and problem wastes.

Source control best management practice (Source control BMP)

Best management practice intended to prevent or reduce the release of pollutants. Two types of source control BMPs exist: (1) Structural, which include physical, structural, or mechanical devices or facilities (e.g., roofs covering storage and working areas); and (2) Operational, which include management of activities that are sources of pollutants (e.g., directing wash water and similar discharges to the sanitary sewer or a dead-end sump).

Spent

The condition of a chemical solution or other material where prior usage has substantially reduced its effectiveness.

State

The State of Washington.

State Environmental Policy Act (SEPA)

The Washington State law intended to prevent or eliminate damage to the environment that requires State and local agencies to consider the likely environmental consequences of

development proposals prior to their approval (Chapter 43.21C RCW, as implemented through Chapter 197-11 WAC).

State waste discharge permit
A wastewater discharge permit issued under State authority (Chapter 90.48 RCW) to control the discharge of pollutants to waters of the State. State waste discharge permits are generally issued for discharges to ground water and for industrial discharges to a municipal sewage system when that municipal system does not have a delegated pretreatment program.

Storm drain
Any constructed inlet that drains directly into a storm sewer, usually found along roadways or in parking lots.

Stormwater
Water derived directly from rainfall or snowmelt that either: (1) Travels across the land surface and discharges to water bodies either directly or through a collection and conveyance system; or (2) Percolates into the shallow soil, travels laterally through the soil near the land surface, and subsequently seeps back onto the land surface where it mixes with runoff or discharges to a surface water body. (Same as Runoff plus Interflow)

Stormwater Management Manual (SWMM)
The two technical manuals published by the Washington State Department of Ecology (Ecology) for use by local governments that describe stormwater management techniques and contain descriptions of and design criteria for best management practices to prevent, control, or treat pollutants in stormwater. One of the manuals applies to sites in eastern Washington (SWMMEW), and the other to sites in western Washington (SWMMWW). Ecology periodically updates the two manuals.

Stormwater pollution prevention plan (SWPPP)
The written plan that describes the measures to be employed at a facility to identify, prevent, and control the contamination of point source discharges of stormwater.

Substantial
Of considerable size, quality, value, degree, amount, extent, or importance.

Surface water
Lakes, rivers, ponds, streams, inland waters, wetlands, marine waters, estuaries, and all other fresh or brackish waters and water courses, plus drainages to those water bodies. Surface waters do not include hatchery ponds, raceways, pollution abatement ponds, and wetlands constructed solely for wastewater treatment.

Surface waters of the State of Washington
All waters within the geographic boundaries of the State of Washington defined as "waters of the United States" in 40 CFR 122.2, and all waters defined as "waters of the state" in RCW 90.48.020 excluding underground waters. These include lakes, rivers, ponds, streams, inland waters, wetlands, marine waters, estuaries, and all other fresh or brackish waters and water

courses, within the jurisdiction of the State of Washington, plus drainages to those water bodies. Surface waters of the State do not include hatchery ponds, raceways, pollution abatement ponds, and wetlands constructed solely for wastewater treatment.

Technology-based discharge limit (same as Technology-based effluent limit)
A permit limit that is based on the ability of a treatment method to reduce the amount (e.g., concentration) of a pollutant.

Technology-based effluent limit (same as Technology-based discharge limit)
A permit limit that is based on the ability of a treatment method to reduce the amount (e.g., concentration) of a pollutant.

Total dissolved solids (TDS)
Those materials capable of passing through a specified glass fiber filter, dried to a constant weight at 180 degrees Celsius. The analytical procedure for determining the amount of this material is typically Standard Methods for the Examination of Water and Wastewater, Method 508.

Total maximum daily load (TMDL)
1. An estimate of the maximum amount of a pollutant that a specific impaired water body or water-body segment can receive in a day and still be protective of its designated beneficial uses, i.e., meet water quality standards. The TMDL must incorporate seasonal variation, include a margin of safety, and account for all of the point and nonpoint sources that contributed to the impairment of the specific water body.
2. A water cleanup plan and a mechanism for establishing water quality-based controls on all point and nonpoint sources of pollutants within a watershed basin, sub-basin, or hydrographic segment associated with a specific impaired water body. Percentages of the TMDL of a single pollutant are allocated to the various pollutant sources as waste load allocations for point sources and load allocations for nonpoint sources and background. A TMDL becomes effective after the U.S. Environmental Protection Agency has reviewed and approved it.

Total residual chlorine
The amount of chlorine remaining in water or wastewater, which is equivalent to the sum of the combined residual chlorine (non-reactive) and the free residual chlorine (reactive). The analytical procedure for determining this amount is typically Standard Methods for the Examination of Water and Wastewater, Method 408.

Total suspended solids (TSS)
The amount of particulate material in water, either that which floats on the surface or remains in suspension. Large quantities of suspended solids may cause solids to accumulate in receiving waters. Apart from any toxic effects attributable to substances leached from the solids by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries or by clogging their gills and respiratory passages. Suspended solids can also screen out light and can promote and maintain noxious conditions through oxygen depletion. The analytical procedure for determining this amount is typically Standard Methods for the Examination of Water and Wastewater, Method 209C.

Toxic
Causing death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in any organism or its offspring upon exposure, ingestion, inhalation, or assimilation.

Toxic amount
Any amount, concentration, or volume of a pollutant which causes, or could potentially cause, the death of, or injury to, fish, animals, vegetation, or other resources of the State, or otherwise causes, or could potentially cause, a reduction in the quality of waters of the State below the standards set by the Washington State Department of Ecology or, if no standards have been set, causes significant degradation of water quality.

Toxic substance (same as Toxin)
Poison or substance, which if present in sufficient quantity or concentration, is capable of producing a toxic or adverse effect in a native or test organism.

Toxicity
The quality or state of being toxic.

Toxicity test
A procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect a specific chemical or effluent has on exposed test organisms.

Toxin (same as Toxic substance)
Poison or substance, which if present in sufficient quantity or concentration, is capable of producing a toxic or adverse effect in a native or test organism.

Translocation (same as Migration)
Any natural movement of an organism or community of organisms from one locality to another locality.

Treat
1. To apply an algaecide, herbicide, or other control product to the water, vegetation, or soil to control or kill algae, vegetation, insects, or some other pest or target species, or to remove or inactivate bioavailable phosphorus.
2. To remove a pollutant from wastewater or to perform some other manipulation of wastewater to reduce or control the adverse effects of a pollutant therein.

Treatment
1. The application of an algaecide, herbicide, or other control product to the water, vegetation, or soil to control or kill algae, vegetation, insects, or some other pest or target species, or to remove or inactivate bioavailable phosphorus.
2. The removal of a pollutant from wastewater or some other manipulation of wastewater to reduce or control the adverse effects of a pollutant therein.

Treatment best management practice (Treatment BMP)
Best management practice intended to remove pollutants from wastewater, such as detention ponds, oil/water separators, biofiltration, and constructed wetlands.

Turbidity
The optical property of water that causes light to be scattered and absorbed rather than transmitted in a straight line. 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. Turbidity is a measure of water clarity using a calibrated turbidimeter according to the analytical procedure described typically by Standard Methods for the Examination of Water and Wastewater, Method 214A.

Upset
An exceptional incident in which an unintentional and temporary non-compliance with technology-based, permit effluent limits occurs due to factors beyond the reasonable control of the permittee. An upset does not include non-compliance to the extent caused by operational error, improperly designed treatment facilities, inadequate storage or treatment facilities, lack of preventive maintenance, or careless or improper operation.

Vadose zone
The subsurficial zone where soil pore spaces and rock interstices are typically occupied at least partially by air. The vadose zone may extend from the surface of the ground down to the top of the water table, i.e., the top of the saturated zone, whether perched or not.

Waste
Any discarded, abandoned, unwanted, or unrecovered material, except the following are not waste materials for the purposes of this permit: (1) Discharges into the ground or ground water of return flow, unaltered except for temperature, from a ground-water heat pump used for space heating or cooling, provided that such discharges do not have significant potential, either individually, or collectively, to affect ground-water quality or uses; and (2) Discharges of stormwater that is not contaminated or potentially contaminated by industrial or commercial sources.

Wasteload allocation (WLA)
The portion of the total loading capacity of a receiving water allocated to a particular existing or future point source of pollution. As an individual water quality-based effluent limit, the WLA is the numeric water quality criterion multiplied by the dilution factor.

Water quality (WQ)
The biological, chemical, physical, and radiological characteristics of water, usually with respect to its suitability for a particular purpose.

Water quality-based discharge limit (same as Water quality-based effluent limit)
A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving

water. The limit may include a dilution factor if all known, available, and reasonable methods of prevention, control, and treatment have been accomplished and other restrictions are met.

Water quality-based effluent limit (same as Water quality-based discharge limit)
A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water. The limit may include a dilution factor if all known, available, and reasonable methods of prevention, control, and treatment have been accomplished and other restrictions are met.

Waters of the State of Washington
All waters within the geographic boundaries of the State of Washington defined as "waters of the United States" in 40 CFR 122.2, and all waters defined as "waters of the state" in RCW 90.48.020. These waters of the state include lakes, rivers, ponds, streams, inland waters, wetlands, marine waters, estuaries, underground waters, and all other fresh or brackish waters and water courses within the jurisdiction of the State of Washington, plus drainages to those waters.

Waters of the United States
All waters within the geographic boundaries of the State of Washington defined as "waters of the United States" in 40 CFR 122.

Well
A bored, drilled, or driven shaft, or dug hole whose depth is greater than the largest surface dimension.

Wellhead protection area
That defined portion of a zone of contribution of a well, well field, or spring based on the criteria established by the Washington State Department of Health.

Wetland
Any area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Jurisdictional wetlands are wetlands that have been identified as such by local, state, or federal agencies. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

Whole effluent toxicity (WET)
The total toxic effect of an effluent measured directly with a toxicity test so that the interaction of all toxicants present in the effluent are assessed.

Appendix C. Guidance for Regulatory Oversight of Water Treatment Plants: Wastewater and Solid Waste Disposal.

Wastestream Generator	Wastestream Characteristics (daily volume, content, etc.)	Disposal Method	Agency with Regulatory Oversight Authority
Water Treatment Plant (≥50K gpd max capacity; not IE, RO, or slow filtration)	**Wastewater (not the settled sludge)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Discharge to surface water	Department of Ecology (WTP General Permit)
Water Treatment Plant (≥50K gpd max capacity; not IE, RO, or slow filtration)	**Wastewater (not the settled sludge)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Discharge to ground	Department of Ecology (no reasonable potential to pollute) Department of Health (wellhead protection policy)
Water Treatment Plant (≥50K gpd max capacity; not IE, RO, or slow filtration)	**Wastewater (not the settled sludge)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Discharge to POTW	Local municipality
Water Treatment Plant (>50K gpd max capacity; not IE, RO, or slow filtration)	**Settled sludge (from wastewater)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Agronomic or silvicultural use	Land application: Local health jurisdiction Statewide Beneficial Use Determination: Department of Ecology
Water Treatment Plant (≥50K gpd max capacity; not IE, RO, or slow filtration)	**Settled sludge (from wastewater)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Landfill	Local health jurisdiction
Water Treatment Plant (<50K gpd max capacity; not IE, RO, or slow filtration)	**Wastewater (not the settled sludge)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Discharge to surface water	Department of Ecology (no reasonable potential to pollute)

Appendix C. Guidance for Regulatory Oversight of Water Treatment Plants: Wastewater and Solid Waste Disposal.

Wastestream Generator	Wastestream Characteristics (daily volume, content, etc.)	Disposal Method	Agency with Regulatory Oversight Authority
Water Treatment Plant (<50K gpd max capacity; not IE, RO, or slow filtration)	**Wastewater (not the settled sludge)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Discharge to ground	Department of Ecology (no reasonable potential to pollute) Department of Health (wellhead protection policy)
Water Treatment Plant (<50K gpd max capacity; not IE, RO, or slow filtration)	**Wastewater (not the settled sludge)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Discharge to POTW	Local municipality
Water Treatment Plant (<50K gpd max capacity; not IE, RO, or slow filtration)	**Settled sludge (from wastewater)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Agronomic or silvicultural use	Land application: Local health jurisdiction Statewide Beneficial Use Determination: Department of Ecology
Water Treatment Plant (<50K gpd max capacity; not IE, RO, or slow filtration)	**Settled sludge (from wastewater)** (generated by filter backwash (including from microfiltration and ultrafiltration), sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Landfill	Local health jurisdiction
Water Treatment Plant (IE, RO, EER, microfiltration, ultrafiltration, or nanofiltration; desalinization)	**IE or RO brine, or filter backwash** that contains dissolved solids removed from the source water (consisting of regeneration liquid, ionic pollutants, and rinse water)	Discharge to surface water	Department of Ecology (Individual NPDES permit, except for discharges from desalinization processes of up to 5,000 gpd to salt waters)
Water Treatment Plant (IE, RO, EER, microfiltration, ultrafiltration, or nanofiltration)	**IE or RO brine, or filter backwash** that contains dissolved solids removed from the source water (consisting of regeneration liquid, ionic pollutants, and rinse water)	Discharge to ground	Department of Ecology (site-specific: may need an Individual NPDES permit or a State Wastewater Discharge Permit)

Appendix C. Guidance for Regulatory Oversight of Water Treatment Plants: Wastewater and Solid Waste Disposal.

Wastestream Generator	Wastestream Characteristics (daily volume, content, etc.)	Disposal Method	Agency with Regulatory Oversight Authority
Water Treatment Plant (IE, RO, EER, microfiltration, ultrafiltration, or nanofiltration)	**IE or RO brine, or filter backwash** that contains dissolved solids removed from the source water (consisting of regeneration liquid, ionic pollutants, and rinse water)	Discharge to POTW	Local municipality and Department of Ecology (site-specific: may need a State Wastewater Discharge Permit)
Water Treatment Plant (IE, RO, EER, microfiltration, ultrafiltration, or nanofiltration)	**IE or RO brine, or filter backwash** that contains dissolved solids removed from the source water (consisting of regeneration liquid, ionic pollutants, and rinse water)	Agronomic or silvicultural use	Department of Ecology (site-specific: may need a State Wastewater Discharge Permit; except that single domestic or point-of-use systems present no reasonable potential to pollute)
Water Treatment Plant (IE, RO, EER, microfiltration, ultrafiltration, or nanofiltration)	**Settled sludge (from wastewater)** (generated by filter backwash, sedimentation/presedimentation basin washdown, sedimentation/clarification, and filter-to-waste processes)	Landfill or recycling	Local health jurisdiction

EER = Electrodialysis/electrodialysis reversal

IE = Ion exchange

RO = Reverse osmosis

The main assumption for this table is that wastes and discharges are "typical," i.e., they do not contain unusually large amounts of pollutants. In other situations, Ecology may require an individual permit.

Appendix D. Public Involvement Information

Ecology proposes to reissue this National Pollutant Discharge Elimination System (NPDES) general permit to the water treatment plant industry. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the industry and Ecology's reasons for requiring permit conditions.

Ecology has placed a Public Notice of Draft on April 16, 2014, in the Washington State Register to inform the public and to invite comment on the proposed draft NPDES permit and fact sheet.

The notice:

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest Ecology regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Announces a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

A copy of this Public Notice is provided on pages 89 and 90.

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

Individuals may obtain further information from Ecology by telephone, email, or by writing to one of the addresses listed below.

Water Quality Permit Coordinator Department of Ecology 360-407-6000 JaMM461@ecy.wa.gov	
Northwest Regional Office 3190 160th Avenue SE Bellevue, WA 98008-5452 425-649-7000 Tonya.Lane@ecy.wa.gov	Southwest Regional Office P.O. Box 47775 Olympia, WA 98504-7775 360-407-6300 Carey.Cholski@ecy.wa.gov
Central Regional Office 15 West Yakima Avenue, Suite 200 Yakima, WA 98902 509-575-2490 Ian.Laseke@ecy.wa.gov	Eastern Regional Office 4601 North Monroe Street Spokane, WA 99205-1295 509-329-3400 Jim.Chulos@ecy.wa.gov

Ecology has tentatively determined to reissue the general permit for certain categories of water treatment plants. The permit contains conditions and effluent limits which are described in the rest of this fact sheet. Ecology announced its intent to reissue the water treatment plant general permit in a letter to Permittees dated November 8, 2013; emails to Permittees and interested parties dated December 4, 2013; and on Ecology's water treatment plant webpage [http://www.ecy.wa.gov/programs/wq/wtp/index.html].

Ecology will publish a Public Notice of Draft (PNOD) in early April 2014, in the Washington State Register to inform the public that a draft permit and fact sheet are available for review. The Public Notice will also announce the public hearing on the draft permit. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 AM and 5:00 PM weekdays, by appointment, at the headquarters office listed below. These documents will also be available on Ecology's web site: www.ecy.wa.gov/programs/wq/wtp

Written comments should be mailed to:

James M. Maroncelli
Department of Ecology, Headquarters
PO Box 47600
Olympia, Washington 98504-7600

The public workshop and hearing on the proposed general permit will be held on May 14, 2014. The purpose of the workshop is to explain the general permit, what has changed from the previous permit, answer questions, and facilitate meaningful testimony during the hearing. The purpose of the hearing is to provide interested parties an opportunity to give formal oral testimony and comments on the proposed general permit. The workshop and hearing will be held at this location:

Washington State Department of Ecology
Headquarters Building
300 Desmond Drive
Lacey, Washington

The public workshop and hearing will begin at 1:30 PM and conclude as soon as public testimony is completed but no later than 3:30 PM.

Any interested party may comment on the draft permit or request an additional public hearing on this draft permit within the 45-day comment period to the address above. The request for an additional hearing shall indicate the interest of the party and reasons why another hearing is warranted. Public notice regarding the upcoming hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Written comments on the draft permit must be postmarked by midnight, **May 31, 2004**. Ecology will consider all comments received within the allotted time in formulating a final determination

to issue, revise, or not issue the general permit. Ecology's response to all significant comments will be included in Appendix E of this fact sheet.

Further information may be obtained from Ecology by telephone, (360) 407-6588 [For TDY, dial 711 or 1-800-833-6388], by email at JaMM461@ecy.wa.gov, or by writing to James M. Maroncelli at the address listed above.

This permit and fact sheet were written by James M. Maroncelli.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

PUBLIC NOTICE

Announcing the Public Comment Period and Hearing for the Draft Water Treatment Plant General Permit and Fact Sheet

The Department of Ecology (Ecology) proposes to re-issue the Water Treatment Plant National Pollutant Discharge Elimination System Waste Discharge General Permit (permit). The permit was last issued in July 2009 and is scheduled to expire at the end of August 2014. The new draft permit and fact sheet, which explains the technical bases for the permit, are available for review and public comment from **April 16, 2014, through May 31, 2014, at 5 PM.** Ecology will host an informational workshop and a public hearing on the draft permit.

Purpose of the Permit: The permit provides coverage for certain water treatment plants located in Washington state that produce potable or industrial supply water and discharge backwash effluent from certain water treatment filtration processes. Under federal and state water quality law (Federal Clean Water Act and State Water Pollution Control Act), a permit is required for the discharge of wastewater. The federal definition of wastewater includes backwash effluent from water treatment plants. Certain water treatment plant facilities that produce finished water at a rate of at least 35,000 gallons per day and that discharge wastewater either directly or indirectly to surface water must obtain permit authorization for their discharge.

Applying for Coverage Under the Permit: Facilities that applied for coverage and are covered under the existing permit will also be covered under the new permit. New or unpermitted facilities may obtain coverage under the permit by submitting a complete permit application to Ecology and satisfying all applicable public notice and State Environmental Policy Act requirements (WAC 173-226-200). Access to the application is available on-line at www.ecy.wa.gov/programs/wq/wtp/application.html.

Copies of the Draft Permit and Fact Sheet: The draft permit and fact sheet are available on-line at www.ecy.wa.gov/programs/wq/wtp/currentnextpermit.html. You may also request copies from Kim Adams at (360) 407-6401 or by e-mail at kjun461@ecy.wa.gov.

Submitting Written Comments: Ecology will accept written comments on the draft permit and fact sheet from **April 16, 2014, through May 31, 2014, at 5 PM.** All comments, including those sent by e-mail, must contain the commenter's name and postal address. Comments should reference specific permit text when possible.

Ecology prefers that comments be submitted by e-mail to WaterTreatmentPlantGPComments@ecy.wa.gov.

Submit written, hard copy comments to James M. Maroncelli, Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600.

All comments must be postmarked or received via e-mail no later than **May 31, 2014, at 5 PM.**

Public Workshops: On May 14, 2014, a public workshop on the draft water treatment plant general permit will be held in Lacey, Washington. The purpose of the workshop is to explain the proposed new permit. Schedule and location information on the workshop is listed below, under public hearing.

Public Hearing: On May 14, 2014, Ecology will host a public hearing to provide an opportunity for people to give formal oral testimony and comments on the draft permit. The public hearing will begin immediately following the public workshop.

Public Workshop begins: May 14, 2014, 1:30 PM
Public Hearing begins: Immediately following the public workshop
Ecology headquarters building, room ROA-32
300 Desmond Drive
Lacey, Washington 98503

Issuing the Permit: After Ecology receives and considers all public comments, it will issue the final permit and a response to comments. Ecology expects to issue the new permit and response to comments in July 2014, with an effective date of September 1, 2014.

Appendix E. Response to Comments

No person provided testimony at either of the public hearings that occurred on May 14 and 22, 2014. Three persons provided written testimony during the allotted public comment period. These comments and Ecology's numbered responses (in blue font) are provided below.

COMMENTS from Darlene Schanfald, Olympic Environmental Council, Sequim, Washington:

Introduction

The current Water Treatment Plant General Permit was reissued with minor changes on July 15, 2009, became effective September 1, 2009, expires August 31, 2014, and covers over 31 permittees. The Draft Water Treatment Plant General Permit now under comment becomes effective September 1, 2014 and covers permittees through August 31, 2019.

Changes in Draft

There are some substantial changes between the current WTP general permit and the Draft permit under review. They include which WTPs are to be permitted, the total residual chlorine limit, and new monitoring for arsenic.

Size Determination for Permittees

The Draft general permit up for review applies to WTPs with an actual production rate equal to or greater than 35,000 gallons per day. The current permit covers those WTPs with a maximum capacity of 50,000 gallons per day or greater. Despite the change from maximum capacity to actual production rate, all of the current permitted WTPs will remain under the draft permit to be approved.

Response No. 1

Based on the information available to Ecology at this time, your summary is correct.

Decrease in Chlorine

The allowable maximum daily discharge for total residual chlorine will decrease from 0.15 mg/L to 0.07 mg/L starting September 2015. This decrease is water quality- based which is more stringent than the technology-based limits. However, the water quality limit is based on discharging to a freshwater water body and, although none of the WTPs discharge directly to marine waters, as a coastal state, some may not be far upstream from marine waters. The marine acute limit is 0.013 mg/L (daily maximum) and the chronic is 0.0075 mg/L (average monthly)

Response No. 2

The proposed maximum allowable daily effluent concentration of residual chlorine is 0.07 mg/L. Based on Ecology's "reasonable potential" calculation, this limit will achieve the water quality criterion for acute exposure of freshwater

aquatic life (0.019 mg/L) at the boundary of the mixing zone, located 30 feet downstream of the outfall. The resultant mixing zone dilution factor is thus:

$$\frac{0.07}{0.019} = 3.68 \approx 3.5$$

To further dilute residual chlorine to 0.013 mg/L would require a larger dilution factor:

$$\frac{0.07}{0.013} = 5.38 \approx 5.4$$

with a correspondingly larger mixing zone:

$$\left(\frac{5.4}{3.5}\right)(30 \text{ feet}) = 46 \text{ feet}$$

About three-fourths of the permitted WTP outfalls are located on freshwater bodies more than 5 miles upstream from marine waters. The outfall for the Washington Department of Corrections WTP on McNeil Island (WAG 643008) is the closest to marine waters, a distance of at least 300 feet from Puget Sound and apparently between approximately 10 and 20 feet above mean sea level. Therefore, Ecology believes that the proposed effluent limits are protective of aquatic life for all of the currently permitted WTPs. Ecology will reassess effluent limits as needed for any future applicants for coverage under this permit who intend to discharge into or near marine waters.

Arsenic Monitoring

During the third year of this new 5-year permit, WTPs must analyze and report total and dissolved arsenic concentrations. The results of these analyses will inform whether or not arsenic will continue to be monitored. Neither the factsheet nor the permit discusses the possible water quality limits to be imposed once the analyses are completed.

Response No. 3

This is correct. Following the completion of arsenic analyses, if Ecology determines that a modification to the permit is required, Ecology will employ the appropriate water quality criteria existing at that time to develop any additional needed discharge monitoring or limits.

Of the small sampling of WTPs (15 total) prior to this general permit, three had arsenic levels above 60 µg/L, which is much greater than the drinking water and water quality standards for human health. All three of these facilities, Bayview Beach, Ledgewood Beach Water District, and Westside Water System, are not listed as facilities under the current or Draft general permit. Of these three facilities, Bayview was marked as having an "unknown treatment process" (Table 3, WTP factsheet). With such high arsenic levels, the factsheet should indicate what permit and monitoring schedule they are under, or why they are excluded from the general permit

Response No. 4

These three WTPs are not covered by the current or proposed NPDES general permit. However, the Washington State Department of Health (DoH) is responsible for issuing operating permits to community water suppliers. Among the responsibilities of providers of drinking water is to prevent contaminants from adversely affecting their water supply sources. The DoH administers the Washington Source Water Protection Program under Chapter 246-290 WAC, and ensures the adequacy of the required local programs for managing wellhead protection and sanitary control areas.

Still being Monitored

The permit still requires monitoring of pH, settleable solids, and turbidity.

pH

The permit requires monitoring and technology-based limits for fresh waters (6.0 – 9.0 S.U.). As noted above, water quality-based limits are usually more stringent than technology-based limits.

Response No. 5

Ecology conducted a "reasonable potential" analysis with the available pH data to determine whether the proposed technology-based pH limits were sufficient to protect water quality. None of the assumed conditions yielded pH excursions beyond water quality criteria (pH values of 6.5 to 8.5) at the boundary of the mixing zone, except for two extreme and unlikely cases in the acute exposure scenario. These extreme scenarios included: (1) The greatest alkalinity in the effluent relative to the ambient receiving water (5-fold greater), along with (2) Ambient receiving water pH values already at the water quality criteria bounds (pH values of 6.5 and 8.5). Ecology's use of the U.S. EPA methodology was conservative because, although the method assumes continuous discharge, the actual discharges from WTPs are episodic and short-term. Based on the results of this analysis, the intermittent nature of WTP discharges, and the large fraction of those discharges that enter relatively large receiving waters, Ecology has concluded that no reasonable potential exists for the pH of WTP effluents to violate water quality standards.

Also see Response No. 15.

Settleable solids

The WTP general permit requires monitoring and an effluent limit for settleable solids. However, the factsheet notes that settleable solids are not a direct measure of suspended solids, which can degrade water quality in the receiving water. More evidence indicating that the settleable solids limit will ensure low levels of suspended solids is required.

Turbidity

Turbidity is still being monitored, but there is no required limit. Total suspended solids, which can contribute to turbidity, are also not monitored, but the suspended solids in the influent could

contribute to the increase in THM, where organic matter comes in contact with chlorine in the treatment process.

Response No. 6

The technology-based limit for settleable solids is 0.1 mL/L (see page 24 of the fact sheet); no water quality-based limit exists for settleable solids. No technology-based limit exists for turbidity; the water quality-based limit for turbidity is either 5 or 10 NTU greater than background when background is 50 NTU or less, or a 10 or 20 percent increase in turbidity when background is greater than 50 NTU (see Table 7 of the fact sheet). Neither a technology-based nor a water quality-based limit exists for total suspended solids. Ecology has elected to use the existing technology-based limit for settleable solids to monitor and control the performance of the treatment systems used by WTPs for their filter backwash wastewater.

The tendency for chlorine to produce harmful halogenated carbon compounds is not due simply to the presence of suspended solids, settleable solids, or light-reflecting particulate material (the cause of turbidity), themselves. Organic matter, whether solid or dissolved, is the substance that may react with chlorine to produce trihalomethane compounds (THMs). Since the large majority of the solids in WTP filter backwash discharges consist of inorganic material, the potential production of THMs in these discharges is not directly related to the amount of solids or turbidity.

Also see Response No. 15.

Removed from Monitoring

Back in the 2003 re-issuing of the general permit, the permit dropped monitoring of dissolved oxygen (DO), temperature, trihalomethanes (THM), and the rate and total volume of discharges. The general permit approved in 2009, i.e. the current permit, did not contain any substantial changes. The Draft permit under review now still does not require monitoring of DO, temperature, or THM, and only requires the rate and total volume of discharge later in the permit period.

The permit notes that large facilities must monitor for all parameters weekly and small facilities monitor all parameters monthly, and that the additional monitoring frequency was offset by a reduction in the total number of parameters for monitoring. Less frequent monitoring of some parameters is preferably to dropping them completely.

Dissolved Oxygen

Low dissolved oxygen is often the first sign of a significant water quality issue and should not be dropped from regular monitoring. However consistent DO may have been during monitoring in the past, it follows that if pH monitoring results have been just as consistent, and pH has not been dropped from monitoring, DO should not be either. As climate changes, oxygen stress will become a greater problem with more significant consequences in the future.

Response No. 7

Water treatment processes often include the addition of oxidizing chemicals to destroy organic matter and to remove iron, manganese, and other substances. The wastewater produced from filter backwashing must typically undergo a settling period of at least several hours, often in the open air, which is a source of oxygen. Since the backwash wastewater contains little organic matter, minimal potential exists for the consumption of dissolved oxygen during the settling period. It is true that avoiding discharges of large amounts of wastewater low in oxygen content will minimize additional stress on the aquatic biota as climate change progresses. However, two permit cycles ago Ecology found that the available data did not indicate that episodic discharges of settled filter backwash would substantially reduce the dissolved oxygen content of receiving waters. Since that decision to forgo dissolved oxygen monitoring, Ecology has found no reason to revisit the question.

Trihalomethanes

Trihalomethanes are the product of the disinfectant chlorine reacting with components of the influent water. These components can be natural organic matter, not just other chemicals in the water as suggested in the WTP general permit factsheet. A growing component of influent water to WTPs is antibacterials, which possess electron-rich functional groups that readily interact with chlorine. The actual byproducts formed from these interactions rely on multiple conditions, including the water's pH, temperature, and dissolved organic material. THMs are potential carcinogens and are an obvious human health concern.

Response No. 8

Ecology reviewed the available historical THM data for the wastewater discharged by the permitted WTPs (quarterly maximum and annual maximum values). Detectable concentrations of THM compounds were present in the discharges from 13 of the 30 permitted WTPs, ranging from 3.5 to 142 ug/L. The four greatest detected concentrations (ranging from 73 to 142 ug/L) were in the discharges to the relatively larger receiving water bodies, i.e., the Cowlitz, Hoquiam, Nooksack, and Willapa Rivers. Three of the nine remaining maximum values were in the discharges to other large receiving water bodies, i.e., the Cowlitz, Lewis, and Skagit Rivers.

Ecology conducted a "reasonable potential" analysis with the available THM data to determine whether THM compounds required effluent limits. This analysis used the following freshwater human health water quality criteria and the same U.S. EPA numerical modeling methodology as identified in the Fact Sheet for total residual chlorine:

- Chlorodibromomethane: 0.41 ug/L
- Chloroform: 5.7 ug/L
- Dichlorobromomethane: 0.27 ug/L
- Trichloroethylene: 2.7 ug/L

Ecology's use of this U.S. EPA methodology was conservative because, although the method assumes continuous discharge, the actual discharges from WTPs are episodic and short-term. Based on the results of this analysis, the intermittent nature of WTP discharges, the large fraction of those discharges that enter relatively large receiving waters, and the volatility and photosensitivity of THM compounds, Ecology has concluded that no reasonable potential exists for THMs in WTP effluent to violate water quality standards.

Also see Response Nos. 11 and 15.

Temperature

Temperature is another simple characteristic that can be easily monitored for the benefit of indicating a greater water quality concern. Although there was an overall consistent temperature, there were still exceedances in monitoring done in the past.

Response No. 9

The potential for a discharge to violate water quality criteria is one of the primary reasons monitoring may be required for specified parameters. The relative simplicity or expense of an analysis, alone, is not sufficient reason to monitor or not to monitor. However, where more than one parameter may characterize an impact on water quality, Ecology may select only one for monitoring to support the goal of protecting water quality. In these instances, the convenience and cost of measuring the different parameters may be considered.

As shown in Table 7 of the fact sheet, the water quality criteria for temperature vary from 12.0 to 20.0 degrees Celsius depending on the specific water body, and in all cases the specified criteria are the 7-day average of the daily maximum temperature. Ecology reviewed the available historical temperature data for the permitted WTPs (weekly average and weekly maximum values). Of the 212 values, 45 percent were greater than 12.0 degrees Celsius, and 4 percent were greater than 20.0 degrees Celsius. However, of the values potentially exceeding the local temperature criteria, 85 percent were for discharges to a relatively larger receiving water body, e.g., the Columbia, Cowlitz, Kalama, Lewis, Nooksack, and Skagit Rivers. Since discharges from WTPs are episodic and short-term and most often to mixing zones in relatively much larger receiving water bodies, Ecology has not required monitoring for temperature.

Rate and Total Volume of Discharge

The WTP factsheet notes that WTPs are typically aware of their rates and volumes of wastewater discharges. However, Ecology is not requiring reporting of the rates and volumes of wastewater discharges until the second year of the permit term so that "facilities have sufficient time to install additional equipment." As the flow data will enable Ecology to better estimate total pollutant loadings to State waters, it is not understood why it is not being monitored outright.

Response No. 10

Ecology agrees that no reason exists not to require tracking the amount of wastewater discharged by WTPs if that information is already available. Therefore, Ecology will change Special Condition S-5.2.1 (Event Criteria, Frequency, and Timing) to indicate that if a Permittee has flow information for monitoring periods within the first year of permit coverage (September 2014 through August 2015), they should report that information. All Permittees must report flow information beginning in September 2015. Ecology will split the third paragraph of Special Condition S-5.2.1 (Event Criteria, Frequency, and Timing) on page 13 of the draft permit and add the underlined language as shown below:

> The first monitoring period begins on the effective date of this permit.
>
> During the first year of this permit term, i.e., from September 2014 through August 2015, Permittees must report the total daily volume of their discharge and the total daily number of discharge events only if that information is readily available. Beginning in the second year of this permit term, i.e., beginning in September 2015, all Permittees must monitor for and report these two flow parameters.
>
> Monitoring for total and dissolved arsenic is required for only the 12 monitoring periods of the third year of this permit term, i.e., from September 2016 through August 2017 for existing and covered Permittees, or for the first 12 months of coverage for new Permittees whose coverage begins after September 2016.

Ecology will also clarify the Sampling Frequencies for the total daily volume of discharge and the total daily number of discharge events in the tables for Testing Schedules A and B to show for each the additional underlined language below:

Daily
Year 1: If available
Years 2-5: Required

Emerging Contaminants and Cumulative Risk

The WTP general permit factsheet states that there is no development of technology for "toxic pollutants" as they are not considered to be in WTP process effluent. However, this needs to be better defined, as we know that pharmaceuticals and personal care products are continuing to be concentrated and released from WTPs. They exist at very low concentrations but have a cumulative effect on environment and human health.

Response No. 11

Ecology agrees that antibacterials and other complex compounds (e.g., pharmaceuticals and endocrine disruptors) are noteworthy contaminants in and of themselves. However, reactions of these compounds with chlorine and other treatment chemicals used by WTPs are likely to degrade and decrease their

adverse impacts. Also, these pollutants are typically associated with the effluents from domestic wastewater treatment plants and animal feeding operations, rather than from WTPs.

Public Involvement

Ecology hosted a Workshop and Listening Session on January 13, 2014 and a Workshop and Public Hearing will be held May 14, 2014. As there were no comments last time, it is not clear how Ecology will adjust their process to seek public input on this version of the regulations.

Response No. 12

The applicable regulations concerning the general permit for WTPs are not presently undergoing changes. Ecology has solicited input from the public for this version of the WTP general permit in the following ways:

- Since mid-2013: Periodically updated the Ecology website with news and plans for the revision and reissuance of the WTP general permit (http://www.ecy.wa.gov/programs/wq/wtp/index.html).

- October 1, 2013: Gave a presentation concerning "Water Treatment Plant Residuals" to the staff and other invitees at the Washington State Department of Health.

- November 8, 2013: Sent email and hardcopy reminders to all current Permittees concerning their deadline for reapplication for permit coverage.

- December 2013: Published an article about the upcoming permit reissuance in *The Water Tap* newsletter, volume 28, number 4.

- January 13, 2014: Sponsored a public listening session at Ecology Headquarters in Lacey to solicit ideas of how to improve the WTP general permit.

- April 16, 2014: Published in the State Register the formal notice of the draft permit, solicitation of public comments from April 16 through May 31, and the date of the public workshop and hearing.

- April 16, 2014: Sent emails to those persons listed in Ecology's Water Quality ListServe (1,005 each), the State WACTrack list (1,469 each), and a list of persons who had expressed a special interest in the WTP general permit since mid-2013 (31 each) to point out the draft permit, solicit public comments from April 16 through May 31, and announce the public workshop and hearing.

- May 5, 2014: Updated the Ecology Public Participation Calendar (http://apps.ecy.wa.gov/pubcalendar/calendar.asp) to identify the public

review period from April 16 through May 31 and the two planned public workshops and hearings.

- May 14, 2014: Sponsored a public workshop and a public hearing at Ecology Headquarters in Lacey to explain the draft permit and solicit comments.

- May 22, 2014: Sponsored a public workshop and a public hearing at Ecology Headquarters in Lacey to explain the draft permit and solicit comments.

COMMENT from Jacki Masters, City of Longview, Washington:

Several references to the exclusion of treatment facilities that discharge to land or to sewage treatment plants (POTWs) appear in the Draft Fact Sheet:

Section 1.2 Activities, Discharges, and Facilities Excluded from Coverage under this Permit
Section 7.0 Economic Impact Analysis
Appendix B Definitions
Appendix C Guidance for Regulatory Oversight of Water Treatment Plants
Appendix G Discharge to Land or POTWs

However, the only mention of this exclusion in the Draft Permit is in Appendix B – Definitions. The exclusion is not mentioned in Section 1.2 of the Draft Permit – Activities, Discharges, and Facilities Excluded from Coverage under this Permit. The Permit should include language to specifically exclude treatment facilities that discharge to land or to sweater [*sic*] treatment plants (POTWs).

Response No. 13

Ecology will add the following language as new second and third paragraphs in Special Condition S-1.4 (Activities, Discharges, and Facilities Excluded from Coverage under this Permit) of the permit to clearly exclude from coverage treatment facilities that discharge wastewater to land or to sewage treatment plants.

> Discharges of wastewater from water treatment filtration processes to publicly-owned treatment works are excluded from coverage under this permit.
>
> Discharges of wastewater from water treatment filtration processes to the land are excluded from coverage under this permit only if that discharged wastewater has no potential, during all weather conditions, to runoff or overflow into surface water. The operator of a facility that discharges such wastewater to the land must inform the appropriate Ecology Regional Office, identified in Special Condition S-6.2.1 (Notification of Non-

Compliance) so that Ecology may determine whether that facility must apply for coverage under an individual State waste discharge permit to ensure that waters of the State (both underground and surface) are protected from degradation.

COMMENTS from Karen Burgess, U.S. EPA, Seattle, Washington:

Ecology states in the fact sheet (Page 36) that mixing zones will be authorized; however, the permit neglects to explicitly authorize mixing zones in the general permit. Mixing zones are needed for pH since the allowable effluent limitations of 6.0 to 9.0 may cause or contribute to excursions above the water quality standards for pH in some receiving waters. The EPA recommends that the permit explicitly authorize the mixing zones as described in the fact sheet.

Response No. 14

The second bullet item in Special Condition S-2.1 (Compliance with Standards) states that the permit does employ mixing zones to support effluent limits. Ecology will clarify this bullet item by adding the underlined language as shown below:

- Surface water quality criteria for the protection of human health and aquatic biota, after accounting for a mixing zone consistent with Chapter 173-201A WAC. The resultant fresh water mixing zones were:

  Acute exposure: 30 feet downstream from the point of discharge with an effluent unit volume no greater than 2.5 percent of the receiving water unit volume.

  Chronic exposure: 300 feet downstream from the point of discharge with an effluent unit volume no greater than 25 percent of the receiving water unit volume.

Ecology concludes in the fact sheet (Page 15) that there is no reasonable potential for the discharge of trihalomethanes to violate water standards. Ecology alludes to the availability of data to support the conclusion in the fact sheet, but no data is provided and no reasonable potential analysis (based on worst case assumptions for example) is presented. The EPA suggests that Ecology support this conclusion with data, if available.

Response No. 15

Ecology has used the available historical data to conduct "reasonable potential" evaluations for chlorodibromomethane, chloroform, dichlorobromomethane, and trichloroethylene (which together represent total trihalomethanes), and for pH. The data for the trihalomethanes came from the DMR submissions of WTP Permittees from 1999 through 2004. The data for pH came from the DMR submissions of WTP Permittees from 1999 through 2012. Ecology has

consequently added two additional spreadsheets with those "reasonable potential" calculations to Appendix H of the fact sheet. The results of these evaluations are consistent with Ecology's original determination that the trihalomethanes potentially in, and the pH of, the permitted WTP effluents are unlikely to cause a violation of water quality standards.

Appendix F. 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 receipt of the final permit. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

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

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this permit on Ecology in paper form by mail or in person (see addresses below). E-mail is not accepted.

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

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

Appendix G. Industrial Process Descriptions

Appendix G-1. Technology-Based Treatment

The Washington State Department of Ecology (Ecology) has concluded that:

1. Using the criteria for setting case-by-case limits pursuant to 40 CFR Part 125.3(d) results in effluent limits that require the removal of residual solids from water treatment plant (WTP) effluent; and

2. The credit adjustment allowed under RCW 90.54.020(3)(b) is in conflict with the federal requirements for applying technology-based effluent limits.

Residual Solids are Pollutants

It has been suggested that returning residual solids to the same water body as is the source of the solids does not constitute an addition of pollutants to navigable waters of the United States under the Federal Clean Water Act and hence technology-based treatment of these solids is not required. This line of logic is often supported by some case law involving pollutants that pass through a hydroelectric facility. In these cases the pollutants that pass through the hydroelectric facility never leave the water body, unlike WTPs that physically alter and remove the pollutants. The Ninth Circuit has made it clear that the resuspension of pollutants that originally come from a navigable water body constitutes the addition of a pollutant under the Clean Water Act.

In Rybachek v. EPA, 904 F.2d 1276 (9th Cir. 1990), placer miners argued that they do not "add" pollutants to navigable waters of the United States within the meaning of the Clean Water Act. Id. at 1285. In rejecting this argument, the Ninth Circuit concluded;

> even if the material discharged originally comes from the streambed itself, such resuspension may be interpreted to be an addition of a pollutant under the Act. See Avoyelles Sportsmen's League, Inc. v. Marsh, 715 F.2d 897, 923 (5th Cir. 1983) (stating that "[t]he word 'addition', as used in the definition of the term 'discharge,' may reasonably be understood to include 'redeposit'") Rybachek, 904 F.2d at 1285-86.

Technology-Based Considerations Independent of Water Quality

The Clean Water Act (CWA) set a national goal of zero discharge of pollutants and a way to achieve this goal through technology-based treatment. Recognizing that technology-based treatment would not produce zero discharge immediately and would not always be protective of receiving waters, water quality-based standards were also set. The important distinction between these approaches is that technology-based treatment considerations were not dependent on receiving water conditions but require an industry to apply reasonable treatment without regard to the impact of a discharge on a specific water body. It is instructive to consider the performance standards that have been developed by the United States Environmental Protection Agency (EPA) for industrial categories. These are national standards and as such are not based on the water quality of specific receiving waters but on industry wide characteristics and treatment options. Although the EPA has not developed performance standards for water

treatment plants (WTPs), this same process of evaluating industry wide characteristics and treatment options would apply to a case-by-case determination of technology-based limits for an individual facility.

Determining Technology-Based Limits

In the case of WTPs, there is a substantial amount of information available on technology-based determinations. In a WTP general permit just developed by Ohio EPA, and in WTP general permits issued by other states in the last few years, limits are consistently being set on the suspended solids in the wastewater discharge. Although the amount of suspended solids allowed varies some, from about 15 mg/L monthly average to 50 mg/L daily maximum, the limits all reflect treating the discharge to remove residual solids before discharge.

The U.S. EPA commissioned Science Applications International Corporation (SAIC) to draft a model permit for the water supply industry. SAIC released their findings in a document entitled *Model Permit Package - Water Supply Industry*, January 30, 1987. In this document SAIC conducted both best practicable control technology (BPT) and best conventional pollutant control technology (BCT) analyses which addressed "conventional" pollutants. Best available control technology economically achievable (BAT) requirements, which address "toxic" pollutants, were not developed since WTP process effluent is characterized as principally containing conventional pollutants, with insufficient evidence of toxic pollutants for development of across-the-board limits. SAIC proposed limits based on their "Best Professional Judgment" after considering existing permits and WTP monitoring data and achievable WTP wastewater treatment levels.

In determining technology-based limits for the WTPs in Washington State, considerations were based on the references above, a review of facilities currently permitted by the State, telephone interviews with additional facilities operating in the State, current and past policies of Ecology, a review of the literature, and site visits. This approach provided the necessary information for developing technology-based treatment requirements and addressed both the spirit and intent of the CWA and the factors that must be considered when making a case-by-case determination.

Total Cost vs. Effluent Reduction Benefits

The BPT economic reasonableness test evaluates the cost of applying a treatment against the amount of pollutants removed. The BPT economic reasonableness test is not an evaluation of cost versus environmental benefits received. If the treatment is very effective, then it is likely to be acceptable. The intent of the BPT cost-benefit requirement is to avoid requiring wastewater treatment where the additional degree of effluent reduction is wholly out of proportion to the costs of achieving such marginal level of reduction. The EPA weighs more heavily the cost per pound of pollutants removed by the treatment technology than the effect of the annual cost of the treatment technology on the profitability of the facility. Settling solids is very effective treatment for WTP wastewater, resulting in very low costs per pound of solids removed.

The intent of the CWA has been to give the EPA broad discretion in considering the cost of pollution abatement in relation to its benefits and to preclude the EPA from giving the cost of compliance primary importance. An economic analysis, however, does include a consideration of the impact on prices, production, employment, profits, and the ability to finance expansion

and pass costs on to consumers. In the case of WTPs, for instance, not providing drinking water is not a viable option and, therefore, the costs associated with technology-based treatment could never be so great that drinking water would no longer be considered affordable.

A BPT consideration must include a review of the treatment options that are available, the effectiveness of the treatment options, and the cost of treatment. There is not a wide range of treatment options for backwash and sedimentation solids. WTPs either do not treat the wastewater at all or they incorporate some type of solids settling strategy. Settling retention time may be for no more than an hour in a settling basin or it may be hours to days in one or more lagoons. For most WTPs that do incorporate wastewater treatment, settling has been very effective. Ninety percent or more of the solids can be expected to be removed from the effluent by settling. The cost associated with this removal appears to be reasonable. Based on a 20 year cost averaging, $100/dry ton or 5 cents a pound, was the estimated cost for one large facility to acquire land, design and build the lagoon, and pay operation and maintenance and disposal costs. A medium sized facility, around 18,000 customers, estimated that their costs to design, build, and operate resulted in a 0.7 percent to 1 percent rate increase (based on a 20-year cost recovery). Twelve of the fifteen WTPs in this state that have had NPDES permits currently provide solids settling treatment. It would appear that, at least for most facilities, the costs incurred from implementing treatment can be covered by a water rate that is affordable.

While this BPT determination found the cost of settling solids effective and economically reasonable, the current level of treatment required by the CWA is BCT. In determining the level of treatment which represents BCT it is assumed that BPT has been established and is in place. As a result, when evaluating BCT it is the marginal cost and treatment effectiveness of going beyond BPT which is evaluated.

BCT has a very specific economic test to determine cost effectiveness. It is a two part test and the increased level of treatment must meet both parts. These tests are applied to treatment options that could further reduce the amount of pollutants discharged. Ecology agrees with the SAIC report that the treatment options available beyond BPT to further reduce the amount of pollutants in WTP wastewater discharge will not pass the BCT economic test and, therefore, BCT treatment requirements are presently considered to be the same as BPT.

Age of Equipment and Facility

Treatment technology utilized at WTPs has not changed significantly in many years. WTPs continue to use the basic operation of solids removal through simple settling. Age is not a relevant factor because age does not affect either the characteristics of the process wastewater or the treatment of wastewater. Therefore, the age of facilities is not a factor in the development of technology-based limits.

Process Employed

Operations used for settleable solids removal are essentially the same in all WTPs. Although wastewater quality and quantity may vary from plant to plant, residual solids removal technology is equally applicable to all WTPs and similar final effluent concentrations of settleable solids should be achieved by all WTPs. Therefore, processes employed are not a relevant factor in the development of limits for settleable solids.

Engineering Aspects
Operations used for settleable solids removal will be substantially the same at all WTPs, with the exception of capacity from plant to plant. The settleable solids technologies in use are well known and feasible in their application. Therefore, the design and construction of appropriate treatment facilities are not relevant factors in the development of limits for settleable solids.

Process Changes
There are no limits being considered that are based on process changes at WTPs. Therefore, this factor is not significant in evaluating subcategorization in this industry.

Non-Water Quality Environmental Impact
Non-water quality environmental impacts of WTP waste and wastewater treatment processes include residual solids disposal, air pollution, and energy consumption.

The major non-water quality environmental impact of WTP treatment processes is residual solids disposal. Residual solids consist of fine sands, silt, clay, and various organic materials. Coagulation residuals and iron and manganese removal residuals are usually nontoxic and may be safely land applied. Ecology encourages the application of residual solids to a beneficial use rather than to a landfill. Beneficial use can include incorporation in the production of a product such as concrete, direct application to soil at an approved agronomic rate, or as a component of a soil mix. Because land application and other beneficial uses are available for disposal of this nontoxic material, residual solids disposal is not a limiting factor in technology-based treatment considerations.

Implementation of sedimentation technologies have minimal, if any, air pollution impacts, and is therefore not a limiting factor in developing effluent limits.

Solids settling is not energy intensive, nor is removal exceptionally energy consumptive compared to the solids removed. Energy consumption is not a significant factor in the development of technology-based effluent limits for this industry.

Appendix G-2. Ion Exchange and Reverse Osmosis

Issue

Wastewater discharges from ion exchange (IX) and reverse osmosis (RO) are very high in total dissolved solids (TDS) and may contain specific ions of concern such as arsenic (as arsenite or arsenate) or nitrate. Ecology proposes an approach to assess the environmental impact of these discharges and provide guidance on best management practices and permitting requirements.

Background

Ion exchange/inorganic adsorption uses resins and other media to remove cations/anions when more inexpensive solutions cannot remove the undesirable substance. IX can be used to soften water (remove hardness) and to remove inorganics (e.g., nitrates, iron, manganese, barium, arsenate, selenate, fluoride, lead, chromate, radionuclides). The typical IX systems in use in Washington State are the water softener type and are used primarily by single domestic systems and some small, group domestic systems (less than 500 residential connections). Although these IX systems remove hardness, they are most frequently employed to remove dissolved iron and manganese from ground water. When the resins become saturated with iron and manganese ions, they must be regenerated with a concentrated brine, typically salt brine (most often sodium chloride, but potassium chloride can also be used). IX system wastewater discharge is composed of brine, dissolved iron and manganese, and rinse water, with a volume that is 1.5 to 10.0 percent of the raw water. The discharge from an average single domestic IX unit can be characterized as:

Discharge	7,000 gal/yr
TDS	15,000 - 35,000 mg/L
Salt	312 lbs/yr
Total Iron:	100 to 200 mg/L
Total Manganese:	70 to 100 mg/L

Oxidative filters such as greensand are not ion exchange systems. These filters act as catalysts and facilitate chemical reactions (e.g., oxidation of manganese) and require continuous or periodic activation with an oxidant such as potassium permanganate, but result in the filtration of a precipitate (iron oxide, manganese oxide). The nature and characteristics of the filter backwash from these systems is much more consistent with other filtration processes than with the discharge from IX.

Reverse osmosis uses water under pressure and semipermeable membranes to separate water and dissolved solids. It is one of several membrane processes (e.g., reverse osmosis, ultrafiltration, nanofiltration, microfiltration, and electrodialysis/electrodialysis reversal) which are used to treat water. Raw water (feedwater) is usually pretreated, which may consist of filtering, adding an antiscalant, and adjusting pH to 5.5 to 7.0. RO is very effective in removing dissolved salts but has a high wastewater discharge volume (up to 80 percent of the raw water volume) which is very site-specific in composition but typically has a concentrated salt content and may classify as brine. RO is also very effective at removing hardness ions, dissolved organics, undesirable color, trihalomethane precursors, specific inorganics, and radionuclides.

There are very few RO systems currently in operation in the State, and none of those identified had more than 100 residential connections. However, it is expected, that RO desalination will become more common in the State in order to meet increased water demand for limited fresh water resources. RO technology is also advancing improved membranes and units designed to meet a variety of applications from small point-of-use models, producing from 5 to 30 gallons per day and operating on water line pressure, to large municipal units, producing from 150,000 to 5 million gallons per day. The discharge from a typical RO unit can be characterized as:

	Point-of-Use	Point-of-Entry	Municipal
Wastewater (percent of raw water)	70 to 90%	15 to 25%	10 to 25%
Average TDS (raw water, brackish)	15,000 mg/L	40,000 mg/L	50,000 mg/L
Average TDS (raw water, salt water)	20,000 mg/L	50,000 mg/L	60,000 mg/L

Electrodialysis/electrodialysis reversal (EER) is another membrane type process that produces a discharge that is not eligible for coverage under this WTP general permit and should be disposed with the same considerations as RO wastewater. EER is very effective at desalting brackish water and, depending on the makeup of the feedwater, removing specific inorganics and radionuclides. The pollutants in the wastewater discharge are concentrates of the feedwater and are therefore also site-specific. For example, the salts in brackish feedwater may be concentrated 3 to 10 times greater in the wastewater discharge resulting from the EER process.

Other membrane-type processes include microfiltration, ultrafiltration, and nanofiltration. Microfiltration and ultrafiltration are effective at removing particulates, microorganisms, and larger organics and typically have an associated wastewater discharge that is similar in character to traditional filtration processes. Microfiltration and ultrafiltration would likely qualify for coverage under the WTP general permit because their typical wastewater discharge is similar to filter backwash from conventional filtration processes.

Nanofiltration is very effective in removing hardness ions, dissolved organics, undesirable color, trihalomethane precursors, and depending on the feedwater constituents, removing specific inorganics and radionuclides. Nanofiltration is not likely to qualify for coverage under the WTP general permit because the typical wastewater discharge is similar to RO wastewater. In all cases, the pollutants in the wastewater discharge are concentrates of the feedwater and are site- and process-specific. If the process is removing suspended solids, produces finished water at a rate of 35,000 gpd or more, and discharges backwash effluent to surface water, then an application for coverage under this WTP general permit must be submitted. If the process is removing dissolved solids and discharging wastewater to surface water, then an application for an individual permit must be submitted.

Discharge of RO and IX wastewater may be to ground, to a POTW, or to surface water. Most single domestic and small group domestic IX systems discharge to ground. A telephone survey during the initial issuance of the WTP general permit identified three IX systems with more than 100 residential connections that discharged to ground, one to a POTW, and none to surface water. The State ground-water criteria have been set for regulated contaminant substances including chlorides (250 mg/L), total dissolved solids (500 mg/L), arsenic (0.05 μg/L), nitrate (10 mg/L), nitrite (1 mg/L), and total nitrogen (10 mg/L). Corresponding surface water criteria

for fresh waters are set for dissolved chloride (860 mg/L acute, 230 mg/L chronic) and arsenic (360 µg/L acute, 190 µg/L chronic). The beneficial uses of a specific surface water body must also be protected and any RO or IX wastewater discharge that would degrade the water quality, impacting a beneficial use such as water supply, stock watering, or aquatic life would be prohibited.

The composition of the wastewater discharge from an IX process varies greatly from individual system to system. There can be three distinct phases: backflush (plain water used to remove any suspended solids from the resin medium), regeneration (saturated brine solution to reactivate the resins), and final rinse (plain water used to remove the excess brine before production of drinking water resumes). The amount of water used to backflush and to rinse the system versus the concentration and quantity of the brine will affect the concentration of dissolved solids that is discharged in the wastewater. The discharge may also be direct, producing variable concentrations with a peak concentration, or controlled, allowing mixing of the different phases and a timed release of the discharge thereby producing a relatively constant concentration of dissolved solids. Careful analysis is typically necessary to accurately characterize the wastewater discharge of an individual system and to evaluate its impact.

Arsenic Removal

Arsenic occurs naturally in ground water in at least 16 counties in Washington State at concentrations high enough to be a public health concern. The source of this arsenic is arsenopyrite and other arsenic rich minerals located throughout the Cascade Mountains foothills and the mining districts in the northeastern part of the State. These minerals dissolve into ground water to form inorganic arsenic ions, arsenate (AsO_4^{-3}) and arsenite (AsO_3^{-3}). Both arsenate and arsenite can occur in ground water. Most of the arsenic in State aquifers occurs as arsenate. However, arsenite is the predominant form in oxygen-poor environments, such as those found in deeper aquifers. Arsenic may also be found in its soluble pentavalent state, arsenic acid (H_2AsO_4), in shallow aquifers.

In several locations the arsenic concentrations from both public and private water distribution systems routinely exceeded the drinking water standard of 0.010 mg/L, and thereby required treatment to remove arsenic. Some methods of treatment require the oxidation of arsenite to arsenate. Treatment results in the generation of waste products, which must be properly managed to avoid a negative impact on the environment.

Arsenic binds strongly to iron and aluminum oxides. As a result, two of the main types of arsenic treatment employ this principle to remove arsenic from ground water. When the concentration of iron in ground water is high, iron can be oxidized and the iron oxide precipitate filtered, removing arsenic from the water. The column must be backwashed frequently to prevent the accumulated oxide particles from clogging the filter. This process is more effective when the mass ratio of iron to arsenic is at least 20 to 1 and the pH is less than 7.5.

Similarly, a column packed with iron or aluminum oxides can be used to remove arsenic from water. Periodically, the column must be backwashed to remove accumulated precipitates and replaced once the finished water exceeds State Drinking Water Standards. The replacement period can be from weeks to years depending upon the type of oxide particles and raw water

quality to be treated. The used iron and aluminum oxides are typically stable enough for disposal in a "351" municipal solid waste landfill.

Ion exchange (IX) is another form of arsenic treatment that may be used. While anionic resins may be used, IX typically uses activated alumina (AlO_3) and has been shown to be effective in removing 90 to 95% of the arsenic from the source water. However, pretreatment with a strong oxidant and pH adjustment may be necessary to achieve maximum efficiency, and the alumina column may be regenerated by washing periodically with 4% NaOH to remove the captured arsenic. However, this treatment process generates a concentrated liquid waste stream with high concentration of arsenic that may make disposal problematic.

Reverse osmosis (RO) may be practical for domestic or smaller water systems where the arsenic concentration in the source water does not exceed 0.10 mg/L, and where extensive oxidative pretreatment has occurred. However, RO creates a large volume of reject water that contains several times the source water concentration of arsenic which may create a disposal problem.

Nitrate Removal

Nitrate contamination of ground water has become an increasing concern in Washington State. Pregnant women and infants are at risk if nitrate levels exceed 10 mg/L. Larger systems that have a nitrate-contaminated ground-water source will generally have other water sources which are not contaminated and they may blend their sources of water to achieve a product that is less than 10 mg/L. Small systems will typically have to treat the water before distribution or at the point-of-use for persons at risk.

IX with strong base resins can be used to remove nitrate from water, but sulfate ions will also be removed which can significantly reduce the efficiency of the IX process. Salt brine (sodium chloride) is used to regenerate the resin and nitrate levels in the spent brine can be as high as 6,000 mg/L. RO can also be used to remove nitrate. The newer polyamide thin-film composite membranes provide improved nitrate rejection over traditional cellulose acetate membranes. Small counter-top and under-counter units are available for point-of-use applications, as are larger point-of-entry units and very large commercial/municipal sized units. If the wastewater discharge from IX or RO is suitable for agronomic purposes, vegetation can effectively treat the nitrates when the wastewater is applied at appropriate agronomic rates and growing conditions.

Considerations - Discharge to Land

Ion exchange wastewater is typically discharged to land in Washington State. Wastewater from reverse osmosis may also be discharged to land and if so, the considerations put forth here would be equally applicable to an RO discharge. IX/RO wastewater discharges to land include discharges to an infiltration pond/trench, drain field, swale, or land irrigation. While the soil and vegetation may afford some treatment, pollutants are likely to travel to ground waters of the State. Treatment options to remove or reduce the dissolved solids before discharge to land are unavailable or economically prohibitive. Chapter 173-200 WAC establishes water quality criteria of 250 mg/L for chloride and 500 mg/L for total dissolved solids. Criteria are threshold limits which should never be exceeded in ground water. However, the criteria are not the ground-water protection goal for ground-water quality. The standards also contain an antidegradation policy which protects existing high-quality ground water. Therefore, the intent

is to protect existing conditions and not allow ground-water degradation beyond the criteria. These standards protect all ground water in the saturated zone and their protection is not limited to drinking water aquifers.

Ecology assessed whether a reasonable potential existed for certain major constituents in the episodic discharges from WTPs to pollute surface waters and ground waters. The methods for this assessment were those provided in Sections 3.3.1 and 3.3.2 of the "Technical Support Document for Water Quality-Based Toxics Control" (U.S. EPA, 1991). One set of calculations addressed a one-time discharge of briny wastewater to the ground, and another set addressed a continual daily discharge to the ground.

The charts in Figure G-1 and the isoconcentration curves in Figure G-2 summarize the results of several computer modeling exercises designed to predict the potential impact to ground water of salt brine wastewater discharges with no attempt to factor in retardation or sorption. The model contained the assumptions that only one source was present within a 0.25-acre area, and subsurficial dispersion characteristics were typical across the State. The assessment was based on not exceeding the water quality criteria. The charts in Figure G-1 depict the impact of a one-time discharge to ground of varying volumes of wastewater containing varying concentrations of total dissolved solids. Wastewater discharges that fall above the line in the charts present a reasonable potential to violate the State ground-water standards, and those below the line are not likely to do so. The isoconcentration curves in Figure G-2 depict the impact on the ground water of an ongoing daily discharge of salt brine wastewater to the ground, along with the model variables.

Ecology has not developed a "one-size-fits-all" threshold for reasonable potential to violate ground-water standards for WTP discharges, primarily due to the episodic nature of the discharges. Also, reasonable potential varies from site to site based on the volume of discharge, soil characteristics, depth to the aquifer, the background concentrations of the subject constituents in the ground water, and exceptional sensitivities such as aquifers with limited recharge or saltwater intrusion. Group domestic facilities that discharge regeneration brine should consult with the appropriate Ecology regional office to determine if a discharge permit is required for their facility.

At this time the most cost effective and environmentally responsible method of arsenic removal and management of the concentrated arsenic appears to be ion exchange with the disposal of spent resin/alumina column without regeneration. Arsenic contained in this waste product is likely to be stable enough for disposal in a "351" municipal solid waste landfill. It may also be possible to market the solid waste to industry or recycling operations. Options that remove arsenic through sorption may also be used as long as the sorption media is properly disposed and does not result in a discharge of concentrated arsenic.

Considerations - Discharge to POTW

Saltwater brines from IX or RO treatment systems can have an adverse impact on a POTW (sewage treatment plant and its delivery system). The typical discharge is high in chloride ions and may be corrosive to materials it contacts, especially concrete components and metal surfaces which are particularly vulnerable to corrosion from the salt brine. The impact of the wastewater

discharge will be influenced by: the total discharge volume and flow rate; the hydraulic capacity of the POTW; the peak and average concentration of dissolved solids; and the size, age, and physical characteristics of the sewer collection system.

A discharge to a POTW from IX/RO systems which remove toxic substances such as arsenic are typically unacceptable. Additionally, biological processes of the treatment works may be adversely impacted if the concentration at the headworks of the POTW of some compounds typical to IX/RO wastewater discharges exceed acceptable levels. The threshold concentrations of concern are listed in the table below. These concentrations far exceed typical domestic wastewater concentrations and set reasonable potential for concern at 25 percent of levels that have been recognized to cause inhibition.

Pollutants	**Threshold Concentration of Concern as Measured at Headworks of the POTW**
NaCl (Sodium chloride)	2,500 mg/L (Kincannon, PhD thesis Oklahoma State U., 1965, and Lawton/Eggert JWPCF #29, pp. 1228-1242)
Na + (Sodium ion)	2,000 mg/L (Kugelman & McCarty, 1964*)
K+ (Potassium ion)	3,000 mg/L
Ca++ (Calcium ion)	2,000 mg/L
Mg++ (Magnesium ion)	500 mg/L

* See the 1964 Proceedings of the 19th Industrial Waste Conf., Purdue University, pp 667-686. References cited in *Federal Guidelines: Pretreatment of Pollutants Introduced Into Publicly Owned Treatment Works,* October 1973.

Considerations - Discharge to Surface Water

Federal and State law requires an NPDES permit for wastewater discharge to surface waters. A discharge of wastewater from desalinization processes to salt water may pose no environmental threat. However, without significant dilution, discharge of wastewater from IX/RO treatment systems to fresh water will likely violate the State surface water quality standards as stipulated in Chapter 173-201A WAC. The discharge of high levels of dissolved solids to fresh water can have a negative impact on aquatic life and can degrade the water quality, limiting water supply and stock watering uses. Likewise, the discharge of wastewater high in arsenic or nitrates is likely to degrade the receiving water quality and impair uses associated with the surface water body.

That said, Ecology did assess reasonable potential for certain constituents. Figure H-1 is an example worksheet that shows a summary of this analysis using the U.S. EPA procedures that assumed continuous discharge. Since the wastewater discharges from WTPs are not continuous, Ecology employed reasonable discretion in applying the results of the analyses.

Conclusion - Discharge to Land

Land application will most often be the best disposal option for wastewater from ion exchange systems that remove iron and manganese. RO wastewater discharges may also be land applied if the discharge does not contain significant levels of any toxics or ground-water primary pollutants and the volume and concentration of dissolved solids does not demonstrate reasonable potential

to contaminate ground water. Small IX/RO systems that discharge wastewater containing less than 25 pounds of salt per day (Figure G-1) do not typically demonstrate reasonable potential to violate ground-water criteria for chloride and total dissolved solids and, therefore, will not typically be required to apply for a State wastewater discharge permit. Ecology may require such a discharge permit, however, if the discharge is to a shallow aquifer, highly permeable soil, an aquifer with limited recharge, or when ground-water quality appears to be threatened. Discharge to a "dry well" is technically underground injection and is prohibited under the State Underground Injection Control Act, Chapter 173-218 WAC. Discharge to a drain field, infiltration pond or trench, although not prohibited, should be utilized only when discharge via land application (irrigation) or into a grass-lined swale is not possible. Wastewater discharges must be properly managed so that there is no reasonable potential to discharge to surface water, cause soil erosion, or deteriorate land features.

Discharge to land from single domestic and point-of-use treatment for arsenic will not be prohibited, although ion exchange treatment for arsenic without regeneration is recommended. An individual State wastewater discharge permit will be required for systems (excluding single domestic and point-of-use systems) that provide arsenic or nitrate removal treatment either by reverse osmosis or ion exchange with regeneration.

Conclusion - Discharge to POTW

Discharge to a POTW from a single domestic or point-of-use IX/RO water treatment system will typically not be required to obtain a wastewater discharge permit. However, larger IX/RO water treatment systems will be required to obtain an individual State wastewater discharge permit (unless they discharge to a POTW that has been fully delegated) under any of the following conditions:

1. They designate as a significant industrial user (SIU) as defined by 40 CFR § 403.3;
2. The wastewater TDS exceeds 20,000 mg/L;
3. The wastewater contains significant levels of toxics (e.g. those from arsenic removal); or
4. Ecology determines that it is necessary for any reason.

IX/RO systems that are not required to obtain an individual State wastewater discharge permit are still required to properly identify the character and quantity of their discharge to the POTW, identify and mitigate potential corrosion problems, and provide discharge control as necessary to minimize any negative impact on the POTW. Failure to do so may result in the requirement to obtain an individual wastewater discharge permit.

Conclusion - Discharge to Surface Water

It is recommended that the wastewater from desalinization processes be discharged to salt water provided the outfall is properly located to assure mixing and avoids environmentally sensitive areas such as estuaries. An application for a wastewater discharge permit shall be submitted to Ecology for all desalinization systems where the discharge of wastewater exceeds 5,000 gallons per day.

It is recommended that under most other circumstances, wastewater from RO/IX should not be discharged to surface water. However, if the wastewater discharge (excluding single domestic

and point-of-use systems) from RO/IX processes must go to a surface water body, an application for an individual wastewater discharge permit must be submitted to Ecology.

Appendix G-3. Discharge to Land or POTWs

Issue – Discharge to Land

No pollutants may be discharged from any commercial or industrial operation into waters of the State except as authorized under a valid wastewater discharge permit. In Washington State as of December 1997, 20 water treatment plants (WTPs) with more than 100 residential connections were identified as discharging wastewater to land. The WTP general permit under development could include WTPs that discharge to land if that discharge had reasonable potential to pollute ground water. However typical discharges of filtration backwash to land will not have reasonable potential to pollute ground water (discussed below), and land application of filtration backwash is not included the WTP general permit.

Issue – Discharge to POTW

Both federal law and State law have established permitting requirements to implement the national pretreatment standards for industrial wastewater discharges to publicly owned treatment works (POTWs). The pretreatment standards have been implemented to control pollutants which pass through or interfere with treatment processes in POTWs or which may contaminate sewage sludge. In Washington State as of December 1997, ten WTPs with more than 100 residential connections discharge wastewater to a POTW. The WTP general permit under development could include WTPs that discharge to a POTW if that discharge requires a permit.

- Is the discharge subject to pretreatment standards under section 307 of FWPCA?
- Are these significant industrial users (SIUs)?
- Are they exempt under WAC 173-216-050?

Background

The WTP general permit is being developed for facilities that have a wastewater discharge from filtration processes. Authorization for discharge from WTPs that employ ion exchange (IX) or reverse osmosis (RO) will not be included in the proposed general permit. Potable water production from surface water or from ground water can employ filtration as part of the treatment necessary to comply with drinking water standards. Typical surface water treatment applies filtration to remove organic and inorganic matter and to remove pathogenic organisms. Typical ground-water treatment precipitates dissolved minerals followed by filtration to remove the minerals. Regardless, filters loose their effectiveness as the solids accumulate and must be cleaned to avoid breakthrough and unacceptable head loss. Filter cleaning is accomplished by reversing the flow of water and backflushing the filter, producing wastewater composed of the solids and backflush water. The solids include substances removed from the raw water as well as additives applied to enhance filtration, and the backflush water may include additives such as chlorine. This wastewater is known as backwash and constitutes the majority of the wastewater discharge.

The frequency of discharge is highly variable, from several times a day for large WTPs with several filters to once or twice a week for small WTPs. Likewise, the quantity of the discharge varies somewhat by the size of WTP from about 3,000 gallons to backflush a small filter to 60,000 gallons for large filters. The duration of backwash discharge, however, is relatively constant, about 10 to 15 minutes per episode. Following a backflush of the filter, WTPs may

also discharge the filtered water for a period of time while the filter settles and "cures" (filter-to-waste).

Processes can vary depending on the treatment the raw water requires. Treatment of ground water most frequently removes dissolved iron and manganese and typically includes oxidation (e.g. ozonation, addition of chlorine or potassium permanganate) to precipitate the iron and manganese followed by filtration to remove the iron and manganese oxides. The typical backwash from these oxidation/filtration processes can be characterized as follows:

Total Iron:	100 to 200 mg/L
Total Manganese:	70 to 100 mg/L
Total Residual Chlorine (TRC):	0.6 to 1 mg/L

Surface water is most frequently treated by filtration to remove suspended solids and may incorporate presedimentation and sedimentation basins before filtration. Precipitation, coagulation and flocculation are frequently used to increase the effectiveness of filtration and sedimentation. Aluminum sulfate, alum, is the most common additive and is used by WTPs for coagulation. Polymers are another common additive that may be used to enhance coagulation, flocculation, or filtration. Chlorine may be added before filtration as an oxidizing agent for precipitation and to remove unwanted taste and color and is frequently added after filtration for disinfection purposes producing the "finish water" for distribution as drinking water. This chlorinated finish water is typically used to backflush the filters. Filter backwash from standard coagulation/flocculation processes associated with treating surface water can be characterized as follows:

Suspended Solids:	50 to 400 mg/L
Aluminum Hydroxide or Ferric Hydroxide (additive)	25 to 50%
Clay/Silt (source water)	35 to 50%
Organic Matter (source water)	15 to 25%
Total Residual Chlorine, TRC (additive):	0.1 to 1 mg/L

Filtration processes, whether associated with ground water or surface water, remove suspended solids. Neither the physical processes nor process additives tend to add significant levels of dissolved solids or chemicals with the exception of TRC. Suspended solids are the pollutants of concern in WTP process wastewater discharge and they are readily removed by the filtering capacity of the land application site or typical POTW processes.

Considerations - Discharge to Land

Discharges to land are those discharges which are designed to be completely contained by land with no reasonable potential, during all weather conditions, of discharging to surface water. Discharge to land includes discharges to a drain field, infiltration pond/trench, swale, or land application (irrigation) as long as the discharge is contained and there is no overflow or runoff to surface water. Surface water includes all lakes, rivers, ponds, streams, inland waters, salt waters, and associated intermittent streams and wetlands.

Many WTPs obtain their raw source water from ground-water aquifers. Ground water frequently contains dissolved iron and manganese at concentrations that require removal to meet drinking water standards. Under typical, natural, aerobic conditions and in most filter backwash discharges, iron and manganese exist as relatively stable and nonmobile oxides. When WTPs discharge this wastewater to soil, the soil acts as a filter and prevents the oxides from migrating down to the ground water. However, nonmobility is not as certain for anionic contaminants, such as nitrate and arsenic (as arsenate or arsenite), and when quantities of precipitates build up in the soil, are exposed to anoxic conditions, and thereby become soluble and likely to migrate to ground water. Therefore, appropriate removal and disposal of the residuals is necessary to assure that iron and manganese precipitates do not become mobile and pollute waters of the State.

Many WTPs obtain their raw source water from surface water bodies. Surface water is typically treated by filtration to remove silt, clay, organics, and pathogens. When the solid residue is discharged to land, the soil itself will act as a filter making it unlikely for these substances to be carried to ground water. However, material from this discharge could be carried to ground water if the residual solids are allowed to build up and acidic or anoxic conditions develop. Additionally, land application of alum residuals could cause a reduction in available phosphorus. However, application rates of up to 7.34 tons/acre-year should not cause environmental degradation. Therefore, appropriate management and disposal of the residual solids is necessary to assure that the residual solids remain nonmobile and do not pollute waters of the State.

Chlorine can combine with organic material in water and produce toxic and carcinogenic byproducts, trihalomethanes, which are regulated under the State water quality standards as well as by the Washington State Department of Health. The State drinking water standards prohibit these substances to exceed certain maximum levels in the finished product (potable water). The WTP process wastewater should contain these chlorine-related substances at a concentration level that is very close to that found in the potable water and those concentrations are unlikely to exceed water quality standards. Residual chlorine may also be found in the process wastewater. Because of its highly reactive and volatile nature, however, it will quickly dissipate and it is highly unlikely to persist and pollute ground water.

“Toxics in toxic amounts” should not be found in additives used by the WTP industry. ANSI/NSF Standard 60 defines requirements for the control of potentially adverse human health effects from products added to drinking water for treatment. Only certified chemicals that meet Standard 60 requirements are acceptable for use in the treatment of drinking water. Certification assures that water treatment chemicals will not exceed a maximum allowable limit which, in general, is set at 1/10th of the maximum contamination level (MCL) set by the EPA for drinking water and 1/10th of the maximum drinking water levels (based on toxicological criteria) for unregulated contaminants.

Total dissolved solids (TDS) are not typically increased by filtration processes and should not be a problem for WTP process wastewater unless the source water (raw water) is already unacceptably high in TDS. Likewise, “toxics in toxic amounts” do not typically result from water treatment processes unless the source water has significant levels of toxics. Since the product is drinking water, it is unlikely that the source water would contain significant concentrations of toxics or high levels of TDS.

Sometimes, however, WTPs in Washington State must rely on a raw water source that contains significant amounts of arsenic, usually ground water. In those cases, depending on the type of treatment employed by the WTP, significant concentrations of arsenic may be present in the filter backwash wastewater. Figure G-3 presents some of the results of an Ecology study ("Investigation of Discharges from Water Treatment Plant Filter Backwash," in preparation). Figure G-3 shows the total arsenic concentrations detected in the wastewaters of 15 small WTPs in correspondence with the treatment processes that each of those WTPs employed.

While it is true that detention ponds, whether lined or unlined, as well as infiltration ponds and drying beds have the potential to discharge to ground water, the question is whether that discharge will contain pollutants. Since the primary pollutants are suspended solids they are likely to be filtered by the ground and are not likely to reach ground water. Under typical conditions it is also highly unlikely that there will be contaminants in the source water or from process additives that will persist and be carried to ground water.

The Washington State Department of Health has implemented a risk reduction/ pollution prevention wellhead protection policy which prohibits the discharge of filter backwash within the short-term recharge areas of public drinking water wells. While there does not appear to be a significant probability of chemical pollutants that would affect the ground-water quality and compromise drinking water standards, there is some concern about the possibility of microbial pathogens in the discharge. Therefore, all infiltration ponds or trenches should be located outside of any delineated 1-year time-of-travel wellhead protection areas.

Considerations - Discharge to POTW

Under federal law, pretreatment may be required of any industrial user that discharges to a POTW and has the potential to introduce pollutants that will pass through the POTW or interfere with the operation of the POTW. This control may be affected by issuing a wastewater discharge permit and for significant industrial users, a permit or equivalent individual control mechanism must be issued. Significant industrial users (SIUs) are: (1) all industrial users that are subject to categorical pretreatment standards; (2) industrial users that discharge an average of 25,000 gallons per day or more of process wastewater; (3) industrial users that contributes a wastestream which makes up 5 percent of more of the average dry weather hydraulic or organic capacity of the POTW; or (4) industrial users which are designated as such. Although WTPs are not designated as subject to categorical pretreatment standards, some of the WTPs in Washington State do discharge an average of 25,000 gallons per day or more of process wastewater. These WTPs would qualify as SIUs unless there is a determination that there is no reasonable potential to adversely affect the POTW's operation and the discharge will not violate any pretreatment standard or requirement. Such a determination appears appropriate based on the characteristics of this wastewater discharge.

Filter backwash from WTPs should not introduce pollutants that will pass through the POTW. Backwash contains solids that are typically nontoxic and will readily settle out at the POTW. It would be possible if the raw water contained a substance such as arsenic, that that substance could be concentrated by the filtration process and contaminate the sewage sludge. It is improbable, however, that any raw water that can be treated to meet drinking water standards

would contain contaminates at levels that would have this result. It would also be possible to cause hydraulic loading problems if a large WTP were discharging to a small POTW and discharges from WTPs can overload delivery systems if the sewer system is operating near design capacity or undersized for the instantaneous flow of backwash. Filter backwash may also be more abrasive than typical sanitary wastes, resulting in a reduced life span for pumps and other system components.

One WTP has tested the amount of total suspended solids (TSS) in their effluent and compared it to TSS in the POTW influent. Both had concentrations that varied between 170 to 320 mg/L demonstrating a similarity to domestic wastewater. WTP wastewater is typically low in organic content, does not contain significant levels of BOD or COD that would be of concern, and has a relatively neutral pH range. WTP process additives are not likely to introduce any toxicity of consequence nor interfere with POTW operation. Polymers used in WTP processes are similar in nature and function and sometime the same as those polymers used by POTWs. Settling of solids can occur in sanitary delivery lines but this is no more likely than typical sanitary wastes. WTP wastewater may be more abrasive than typical sanitary wastewater but requires no special delivery system other than a delivery system that is appropriately sized for flow demands. Typical WTP wastewater does not appear to pose any operational concern for those POTWs that have the capacity to accept the wastewater.

Conclusion - WTP Discharge to Land

Based on current information, WTPs that discharge process wastewater from filtration processes associated with the production of potable water shall be conditionally exempt from State-based permit requirements for discharge to ground. This exemption will be subject to periodic review of WTP processes and discharge characteristics, and the following conditions must all be met:

1. Discharge must be free of additives that have the potential to reach waters of the State;

2. Infiltration ponds/trenches must have sufficient free board to prevent over-topping and be managed so that there is no reasonable potential to discharge to surface water;

3. Discharge must not result in unmanaged soil erosion or deterioration of land features;

4. Residual solids that accumulate in infiltration ponds/trenches must be disposed of as necessary to avoid a build up and concentration of these materials; and

5. Disposal of solids must be consistent with requirements of local health department.

Conclusion - WTP Discharge to POTW

WTPs are not subject to categorical pretreatment standards and typical discharge does not have reasonable potential to adversely affect the POTW's operation or introduce pollutants that will pass through the POTW, nor will it violate any pretreatment standard or requirement. Therefore it is reasonable to conclude that WTPs that discharge to a POTW are not significant industrial users and hence are not inherently subject to permit requirements under federal law. Typical process wastewater from filtration processes has about the same concentration of suspended solids as domestic wastewater, with lower BOD and fewer pollutants than domestic wastewater.

The strength and character of the effluent is no greater risk to the POTW than normal domestic wastewater. Therefore, WTP wastewater discharge is not necessarily subject to permits under Chapter 173-216 WAC.

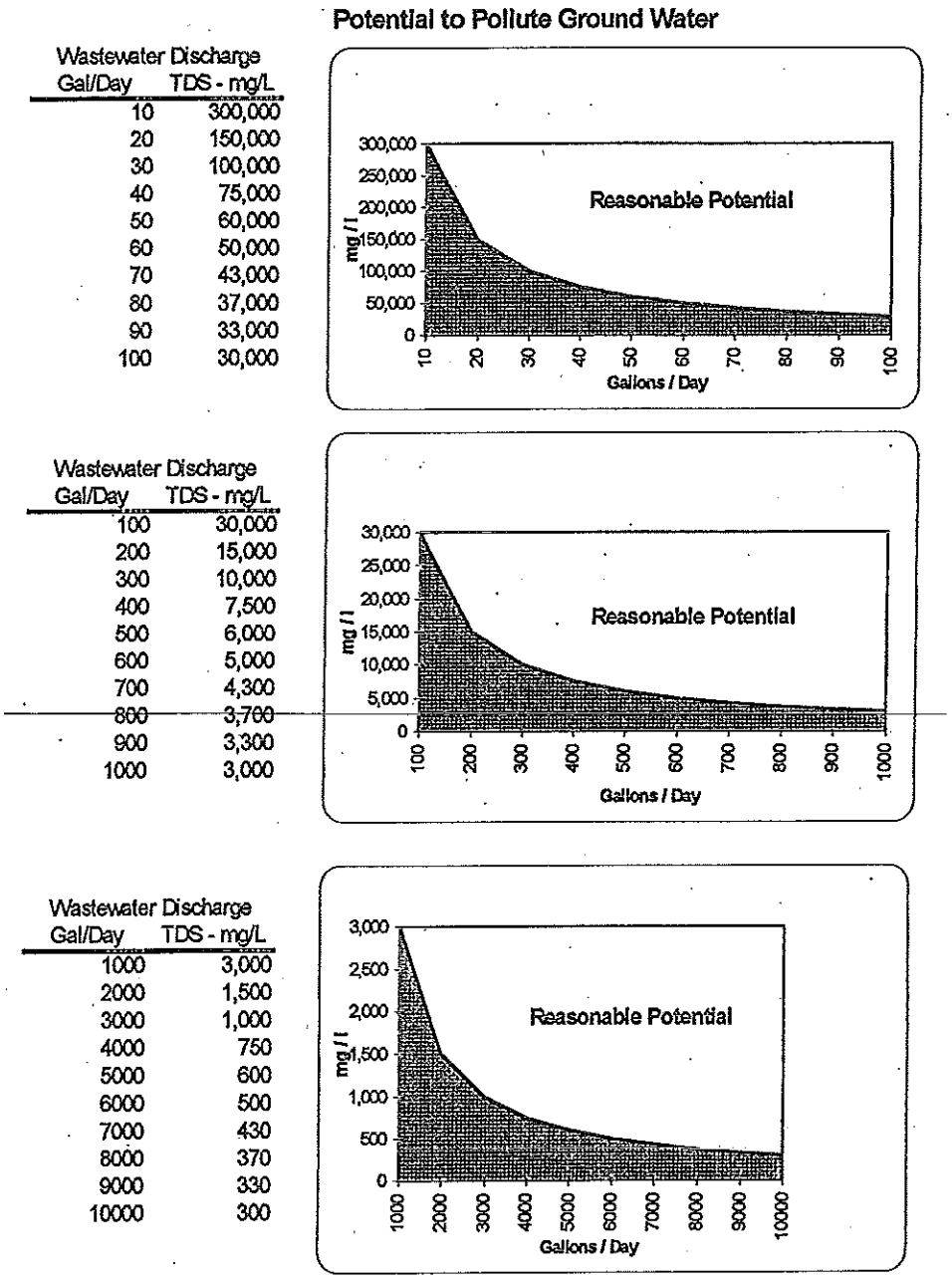
WTPs that discharge process wastewater from filtration processes associated with the production of potable water shall be conditionally exempt from State-based permit requirements for indirect discharge to non-delegated POTWs (have not received the authority to issue permits under RCW 90.48.165). This exemption will be subject to periodic review and the following conditions must both be met:

1. The POTW has agreed to accept the wastewater; and

2. Process wastewater discharge will not overload the delivery system or design capacity of the POTW.

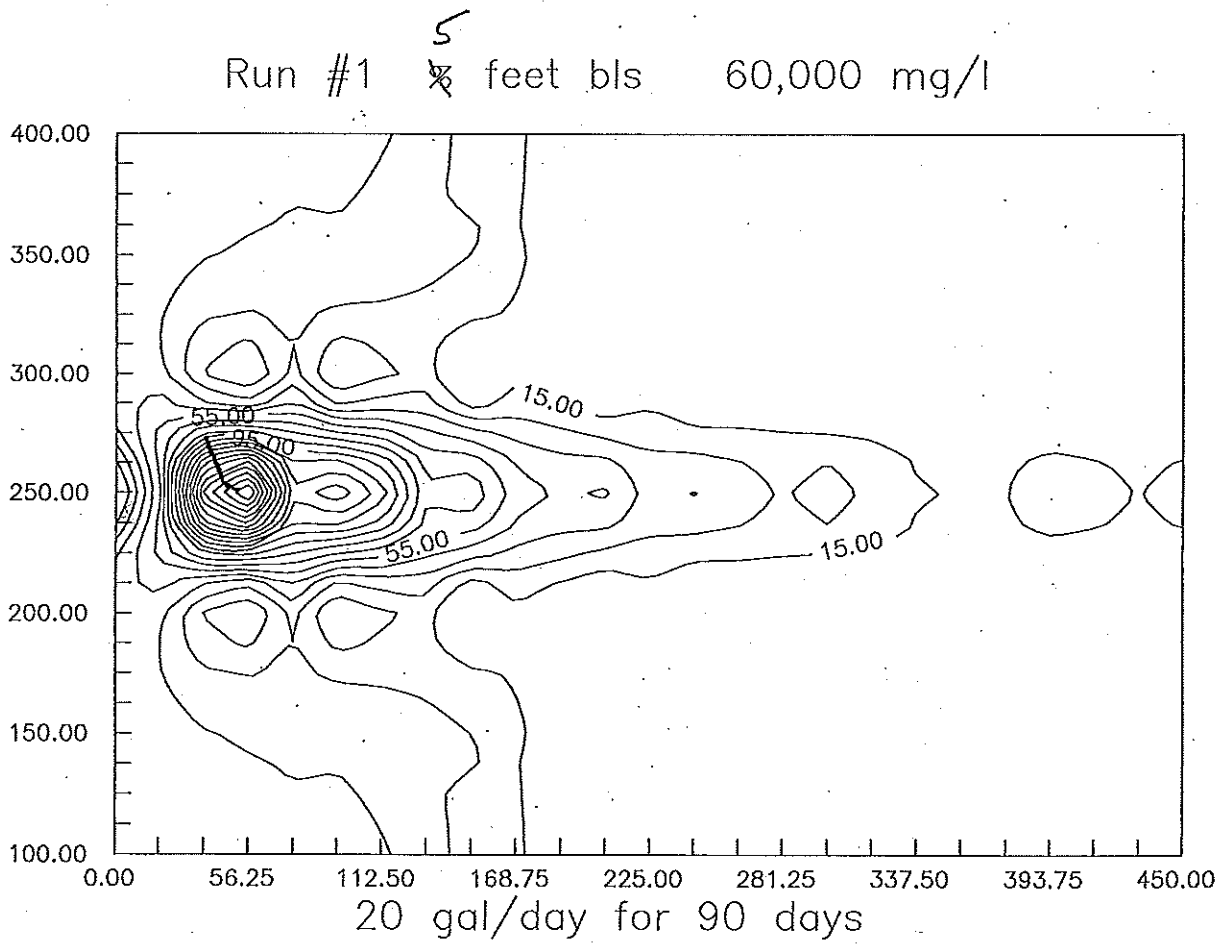
State-based discharge permit decisions are not applicable to a POTW that has received the authority to issue permits under RCW 90.48.165 (delegated POTW). This proposal has no effect on and is not intended to affect any requirements of WTPs by municipalities with delegated authority.

Figure G-1. Potential to Pollute Ground Water through a One-Time Discharge



Volume of aquifer impacted: 0.25 acres x 10 feet
Soil porosity: 0.25

Figure G-2. Potential to Pollute Ground Water through an Ongoing Daily Discharge



Wastewater brine concentration: 60,000 mg/L as Chloride
Volume discharged: 20 gallons per day for 90 days (episodic)
Area of discharge: 50-foot radius
Total depth of aquifer: 10 feet deep
Soil porosity: 0.25 to 0.30
Darcy velocity: 2 to 3 feet per day
Longitudinal dispersivity: 5
Horizontal and vertical dispersivity: 1
The x- and y-axes are expressed as feet from an arbitrary origin.
The isopleth labels are expressed as mg/L of chloride in the ground water.

Figure G-3. Results of Total Arsenic Analyses of Filter Backwash Wastewater.

Study Location Name	Code	Treatment Process	Arsenic (µg/L)
Bayview Beach	--	Unknown.	**140**
Harbor Hills Water System	--	Unknown.	<60
Naches Water Treatment	--	Unknown.	<60
Outlook	--	Unknown.	**6.9**
Mountain Road Estates	**AC**	Remove arsenic, taste, and odor, and dechlorinate. Use anthracite/activated carbon filter.	<60
Mariners Cove Beach Club	**GS**	Remove iron and manganese. Use a green sand filter.	<60
Mutiny View Manor Community Club	**GS**	Remove iron and manganese. Use a green sand filter.	<60
Ridgeview Estates	**GS**	Remove iron and manganese. Use aeration and a green sand filter.	<60
Boxx Berry Farm	**IE**	Remove nitrate. Use ion exchange.	<60
Bummer #2	**Ox**	Remove arsenic. Use ferric chloride and chlorine to oxidize, then filter.	<60
Coupeville	**Ox**	Remove arsenic, iron, and manganese. Use aeration to oxidize, then filter.	<60
Ledgewood Beach Water District	**Ox**	Remove iron and manganese. Use aeration to oxidize, then filter.	**150**
Lost Lake	**Ox**	Remove iron and manganese. Use ozonation to oxidize, then filter.	<60
Westside Water System	**Ox**	Remove arsenic. Use oxidation, then filter.	**190**
Mission Ranch Estates	**RO**	Remove chloride. Use reverse osmosis.	<60

Appendix H. Technical Calculations

Simple Mixing

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

$$MC = [EC + (AC \times DF)]/(1 + DF)$$

where:

EC = Effluent Concentration
AC = Ambient Concentration
DF = Dilution Factor

Reasonable Potential Analysis

Ecology's PermitCalc workbook at http://partnerweb/sites/WQ/pwg/permitWritingTools/PermitCalcFebruary18-2014.xlsm determines: (1) Whether a proposed wastewater discharge presents a reasonable potential to violate aquatic life and human health water quality standards or to exceed water quality criteria; and, if so, (2) Effluent limits protective of aquatic life and human health. The workbook also accounts for mixing zones and the ambient water quality. The process and formulas in this workbook are taken directly from the "Technical Support Document for Water Quality-based Toxics Control," (EPA 505/2-90-001). The adjustment for autocorrelation is from U.S. EPA (1996a and 1996b). Figure H-1 shows the reasonable potential analyses for chlorine discharged to fresh water and to marine water. Figure H-2 shows the reasonable potential analyses for trihalomethanes discharged to fresh water. Figure H-3 shows the reasonable potential analysis for pH pollution caused by wastewater discharged to fresh water.

Figure H-1. Reasonable Potential Calculations for Chlorine

Reasonable Potential Calculation (assuming continuous discharge)

		Dilution Factors:	Acute	Chronic
Facility	Water Treatment Plants	Aquatic Life	3.5	26.0
Water Body Type	Freshwater	Human Health Carcinogenic		26.0
Rec. Water Hardness	Enter Hardness on DFCalc Tab	Human Health Non-Carcinogenic		

Pollutant, CAS No. & NPDES Application Ref. No.			CHLORINE (Total Residual) 7782505					
Effluent Data	# of Samples (n)		4590					
	Coeff of Variation (Cv)		0.6					
	Effluent Concentration, ug/L (Max. or 95th Percentile)		170					
	Calculated 50th percentile Effluent Conc. (when n>10)							
Receiving Water Data	90th Percentile Conc., ug/L		0					
	Geo Mean, ug/L							
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	19					
		Chronic	11					
	WQ Criteria for Protection of Human Health, ug/L		-					
	Metal Criteria Translator, decimal	Acute	-					
		Chronic	-					
	Carcinogen?		N					

Aquatic Life Reasonable Potential

Effluent percentile value			0.950
s	$s^2=\ln(CV^2+1)$		0.555
Pn	$Pn=(1-\text{confidence level})^{1/n}$		0.999
Multiplier			1.00
Max concentration (ug/L) at edge of…		Acute	48.571
		Chronic	6.538
Reasonable Potential? Limit Required?			**YES**

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		4
LTA Coeff. Var. (CV), decimal		0.6
Permit Limit Coeff. Var. (CV), decimal		0.6
Waste Load Allocations, ug/L	Acute	66.5
	Chronic	286
Long Term Averages, ug/L	Acute	21.352
	Chronic	150.85
Limiting LTA, ug/L		21.352
Metal Translator or 1?		1.00
Average Monthly Limit (AML), ug/L		**33.1**
Maximum Daily Limit (MDL), ug/L		**66.5**

Ref: Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Reasonable Potential Calculation (assuming continuous discharge)

Facility	Water Treatment Plants
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	3.5	26.0
Human Health Carcinogenic		26.0
Human Health Non-Carcinogenic		

Pollutant, CAS No. & NPDES Application Ref. No.			CHLORINE (Total Residual) 7782505
Effluent Data	# of Samples (n)		4590
	Coeff of Variation (Cv)		0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		170
	Calculated 50th percentile Effluent Conc. (when n>10)		
Receiving Water Data	90th Percentile Conc., ug/L		0.00
	Geo Mean, ug/L		
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	13
		Chronic	7.5
	WQ Criteria for Protection of Human Health, ug/L		-
	Metal Criteria Translator, decimal	Acute	-
		Chronic	-
	Carcinogen?		N

Aquatic Life Reasonable Potential

Effluent percentile value			0.950
s	$s^2=\ln(CV^2+1)$		0.555
Pn	$Pn=(1\text{-confidence level})^{1/n}$		0.999
Multiplier			1.00
Max concentration (ug/L) at edge of…		Acute	48.571
		Chronic	6.538
Reasonable Potential? Limit Required?			**YES**

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		4
LTA Coeff. Var. (CV), decimal		0.6
Permit Limit Coeff. Var. (CV), decimal		0.6
Waste Load Allocations, ug/L	Acute	45.5
	Chronic	195
Long Term Averages, ug/L	Acute	14.609
	Chronic	102.85
Limiting LTA, ug/L		14.609
Metal Translator or 1?		1.00
Average Monthly Limit (AML), ug/L		**22.7**
Maximum Daily Limit (MDL), ug/L		**45.5**

References: WAC 173-201A,

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Figure H-2. Reasonable Potential Calculations for Trihalomethanes

Reasonable Potential Calculation (assuming continuous discharge)

			Dilution Factors:	Acute	Chronic
Facility	Water Treatment Plants		Aquatic Life	3.5	26.0
Water Body Type	Freshwater		Human Health Carcinogenic		26.0
Rec. Water Hardness	Enter Hardness on DFCalc Tab		Human Health Non-Carcinogenic		

Pollutant, CAS No. & NPDES Application Ref. No.			CHLORODIBROMOMETHANE 124481 8V	DICHLOROBROMOMETHANE 75274 12V	CHLOROFORM 67663 11V	TRICHLOROETHYLENE 79016 29V		
Effluent Data	# of Samples (n)		76	74	39	34		
	Coeff of Variation (Cv)		2.16	1.48	1.34	1.21		
	Effluent Concentration, ug/L (Max. or 95th Percentile)							
	Calculated 50th percentile Effluent Conc. (when n>10)		0	1	2.1	18		
Receiving Water Data	90th Percentile Conc., ug/L							
	Geo Mean, ug/L		0	0	0	0		
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	-	-	-	-		
		Chronic	-	-	-	-		
	WQ Criteria for Protection of Human Health, ug/L		0.41	0.27	5.7	2.7		
	Metal Criteria Translator, decimal	Acute	-	-	-	-		
		Chronic	-	-	-	-		
	Carcinogen?		Y	Y	Y	Y		

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	1.317	1.0771	1.0139	0.949646		
Pn	Pn=(1-confidence level)1/n	0.961	0.960	0.926	0.916		
Multiplier		0.0976	0.1511	0.2306	0.27059		
Dilution Factor		26	26	26	26		
Max Conc. at edge of Chronic Zone, ug/L		0.000	0.038	0.081	0.692		
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**		

References: WAC 173-201A

Technical Support Document for Water Quality-based Toxics Control, US EPA, March 1991, EPA/505/2-90-001, pages 56/99

Figure H-3. Reasonable Potential Calculations for pH

Calculation of pH of a Mixture of Two Flows (assuming continuous discharge)

Based on the U.S. EPA DESCON program, EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling.
Spreadsheet calculates pH at mixing zone boundary. You can override this by entering your own data in these cells.

INPUT																
	At Acute Boundary								At Chronic Boundary							
1. Dilution Factor in Mixing Zone	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
2. Ambient/Upstream/Background																
Temperature (deg C):	1.60	1.60	22.00	22.00	1.60	1.60	22.00	22.00	1.60	1.60	22.00	22.00	1.60	1.60	22.00	22.00
pH:	6.50	6.50	6.50	6.50	8.50	8.50	8.50	8.50	6.50	6.50	6.50	6.50	8.50	8.50	8.50	8.50
Alkalinity (mg CaCO3/L):	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00
3. Effluent Characteristics																
Temperature (deg C):	22.00	22.00	1.60	1.60	22.00	22.00	1.60	1.60	22.00	22.00	1.60	1.60	22.00	22.00	1.60	1.60
pH:	7.94	7.94	6.30	6.30	9.94	9.94	6.30	6.30	7.94	7.94	6.30	6.30	7.94	7.94	6.30	6.30
Alkalinity (mg CaCO3/L):	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00
OUTPUT																
1. Ionization Constants																
Upstream/Background pKa:	6.55	6.55	6.37	6.37	6.55	6.55	6.37	6.37	6.55	6.55	6.37	6.37	6.55	6.55	6.37	6.37
Effluent pKa:	6.37	6.37	6.55	6.55	6.37	6.37	6.55	6.55	6.37	6.37	6.55	6.55	6.37	6.37	6.55	6.55
2. Ionization Fractions																
Upstream/Background Ionization Fraction:	0.47	0.47	0.58	0.58	0.99	0.99	0.99	0.99	0.47	0.47	0.58	0.58	0.99	0.99	0.99	0.99
Effluent Ionization Fraction:	0.97	0.97	0.36	0.36	1.00	1.00	0.36	0.36	0.97	0.97	0.36	0.36	0.97	0.97	0.36	0.36
3. Total Inorganic Carbon																
Upstream/Background Inorganic Carbon (mg CaCO3/L)	11	2	9	2	5	1	5	1	11	2	9	2	5	1	5	1
Effluent Total Inorganic Carbon (mg CaCO3/L):	1	5	3	14	1	5	3	14	1	5	3	14	1	5	3	14
4. At Mixing Zone Boundary																
Temperature (deg C):	7.43	7.43	16.17	16.17	7.43	7.43	16.17	16.17	2.38	2.38	21.22	21.22	2.38	2.38	21.22	21.22
Alkalinity (mg CaCO3/L):	3.86	2.14	3.86	2.14	3.86	2.14	3.86	2.14	4.85	1.15	4.85	1.15	4.85	1.15	4.85	1.15
Inorganic Carbon (mg CaCO3/L)	7.89	2.99	7.01	5.22	3.90	2.15	4.39	4.70	10.26	2.24	8.47	2.21	4.90	1.17	4.95	1.50
pKa:	6.49	6.49	6.41	6.41	6.49	6.49	6.41	6.41	6.54	6.54	6.37	6.37	6.54	6.54	6.37	6.37
RESULTS																
pH at Mixing Zone Boundary:	**6.47**	**6.89**	**6.50**	**6.25**	**8.47**	**8.89**	**7.27**	**6.33**	**6.49**	**6.57**	**6.50**	**6.41**	**8.49**	**8.40**	**8.04**	**6.89**