FACT SHEET FOR NPDES GENERAL PERMIT

WATER TREATMENT PLANTS - WASTEWATER DISCHARGE

SUMMARY

This fact sheet is a companion document to the National Pollutant Discharge Elimination System (NPDES) General Permit for Water Treatment Plants. It explains the nature of the discharges, the Department of Ecology's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions. Public involvement information is contained in Appendix A. Definitions are included in Appendix B.

The State of Washington Department of Ecology (Ecology) has tentatively determined to reissue a general permit to the water treatment plant industry operating in the State of Washington (State) for the discharge of wastewater resulting from the production of potable water. Water treatment plants that provide primary treatment and produce "industrial water" will also be included if water treatment is the primary function of the facility. The proposed general permit has been developed to provide coverage for wastewater discharge from water treatment plants (WTPs) that discharge filter backwash and sedimentation basin waste to surface waters of the State. The proposed general permit will not provide coverage for wastewater resulting from ion exchange or reverse osmosis, nor for WTPs with a maximum production capacity of less than 50,000 gallons a day.

The general permit includes technology-based limits for pH and settleable solids. There is a water quality-based limit for chlorine and a compliance schedule for implementing treatment if it is required. Data from the previous permit cycle were reviewed and no additional water quality-based effluent limits are required. However facilities are required to continue monitoring discharge turbidity. All facilities under this permit must be in compliance with the technology-based limits. The proposed terms, limitations and conditions contained herein are tentative and may be changed as a result of comments and public hearings.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) of permits, which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the state of Washington on the basis of Chapter 90.48 Revised Code of Washington (RCW) which defines the Department of Ecology's (Ecology) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing general permits [Chapter 173-226 Washington Administrative Code (WAC)], water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-226-110) for issuing a general permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least 30 days before the permit is issued (WAC 173-226-130). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of this fact sheet for more detail on the Public Notice procedures).

After the public comment period has closed, Ecology will summarize the substantive comments and a response to comments. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Ecology's response. Comments and the resultant changes to the permit will be summarized in Appendix G--Response to Comments.

DISCHARGE PERMIT REQUIRED

The discharge of wastewater from water treatment plants (WTPs) to surface water requires a permit. 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 a point source discharge. The proposed general permit is intended to satisfy the legal requirement for an NPDES permit for WTPs that employ filtration processes and discharge wastewater to surface water. Filtration processes include oxidative filters (birm, green sand) as well as conventional, direct, and in-line filtration systems. In addition to facilities that produce potable water, this general permit is intended to be applicable 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 establishment of a general permit for the water treatment plant industry is appropriate because:

1) the wastewater characteristics among facilities are similar,
2) a standard set of permit requirements can effectively provide environmental protection, and
3) facilities in compliance with permit conditions are expected to be in compliance with water quality standards.

The water treatment plant general permit provides coverage for facilities with a maximum production capacity of at least 50,000 gallons per day 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

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.

NOT INCLUDED IN GENERAL 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 the proposed general permit. WTPs with a maximum production capacity of less than 50,000 gallons per day will not be covered under the proposed general permit. The general permit will establish 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.

The proposed general permit does not cover water treatment plant (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 the proposed general permit.

Ion Exchange (IX) is a type of water treatment process used by some relatively small WTPs and single domestic water systems in this state. As the name implies, ions are removed from the water as they pass over a media and then 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 media. The wastewater consists of regeneration liquid, the removed ions, and rinse water. Whereas filtration processes are removing suspended solids and cleaning the filter with water, ion exchange is removing dissolved solids and adding a regeneration liquid to the wastestream. Hence the characteristics of the resulting wastewater are quite different. The proposed general permit will not apply coverage to WTPs that discharge wastewater from ion exchange processes but guidance on the permitting and best management practices required for the discharge of wastewater from these processes are included in Appendix D.

Reverse Osmosis (RO) is another water treatment process used by a few, very small water treatment systems in this state. Pressure and semipermeable 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 potable water produced and the resulting wastewater is very high in dissolved salts, quite different from the wastewater associated with filtration processes. The proposed general permit will not apply coverage to WTPs that discharge wastewater from reverse osmosis processes but guidance on the permitting and best management practices required for the discharge of wastewater from these processes are included in Appendix D.

Additionally, discharges to land and to sewage treatment plants (POTWs, publicly owned treatment works) by filtration WTPs will not be covered under the proposed general permit. Water treatment filtration processes are typically removing 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. Discharges to land are those discharges that will completely infiltrate/evaporate, with no reasonable potential, during all weather conditions, of discharging to surface water (see Appendix E). It has also been determined that typical WTP discharge does not have a reasonable potential to adversely affect a POTW's operation or introduce pollutants that will interfere with or pass through the POTW, nor will it violate any pretreatment standard or requirement. Additionally, the discharge has about the same concentration of suspended solids as domestic wastewater, with lower BOD and fewer pollutants than domestic wastewater, and therefore, a state-based discharge permit will not be required for typical WTP discharges to POTWs (see Appendix E).

FACILITIES CURRENTLY UNDER PERMIT

WATER TREATMENT PLANT	PERMIT	LOCATION	RECEIVING WATER
Anacortes Water Treatment Plant	WAG643002A	Mount Vernon	Skagit River
Camas Water Treatment Plant	WAG641006A	Camas	Lacamas Lake
Cathlamet Water Treatment Plant	WAG641009A	Cathlamet	Elochoman River
Chehalis Water Treatment Plant	WAG641012A	Chehalis	Dillenbaugh Creek
Chinook Water District Water Treatment Plant	WAG641018A	Chinook	Wetlands
Cusick Water Treatment Plant	WAG647000A	Cusick	Pend Oreille River
Friday Harbor Water Treatment Plant	WAG643005A	Friday Harbor	Haro Strait
Hoquiam Water Treatment Plant	WAG641000A	Hoquiam	Davis Creek
Indian Creek Water Treatment Plant	WAG641001A	Ilwaco	Bear Creek
Kalama Drinking Water Treatment Facility	WAG641023A	Kalama	Kalama River
LISECC, Inc.	WAG643004A	Lummi Island	No Name Creek
Long Beach Water Treatment Plant	WAG641019A	Long Beach	Willapa Bay
Longview Water Treatment Plant	WAG641003A	Longview	Cowlitz River
LUD No. 1 Treatment Plant	WAG641010A	Port Angeles	Morse Creek
Leavenworth Water Treatment Plant	WAG645001A	Leavenworth	Icicle Creek
Lynden Water Treatment Plant	WAG643003A	Lynden	Nooksack River
Morton Water Treatment Plant	WAG641016A	Morton	Tilton River
Ocean Shores Water Treatment Plant	WAG641002A	Ocean Shores	Grays Harbor
Pasco Water Treatment Plant	WAG647001A	Pasco	Columbia River
Pe Ell Water Treatment Plant	WAG641024A	Pe Ell	Unnamed Ditch
Raymond Water Treatment Plant	WAG641007A	Raymond	S F of Willapa River
Richland Water Treatment Plant	WAG645000A	Richland	Columbia River
Ryderwood Water Treatment Plant	WAG641011A	Ryderwood	Campbell Creek
South Bend Water Treatment Plant	WAG641008A	South Bend	Martin Creek
Stevenson Water Treatment Plant	WAG641020A	Stevenson	Rock Creek
Vader Water Treatment Plant	WAG641004A	Vader	Olequa Creek
Whatcom County PUD 1 Plant 1	WAG643007A	Ferndale	Nooksack River
Whatcom County PUD 1 Plant 2	WAG643006A	Ferndale	Nooksack River
Willapa Valley Water Treatment Plant	WAG641013A	Raymond	Stringer Creek
Woodland Water Treatment Plant	WAG641021A	Woodland	Lewis River

BACKGROUND INFORMATION

INDUSTRY SKETCH

There are more than 500 water treatment plants that use some form of water filtration in the treatment of drinking water. Almost 90 percent of these facilities are very small facilities producing less than 50,000 gallons of drinking water a day. Of the larger facilities, about half discharge to land or a sewage treatment plant and the others discharge to a surface waterbody. Chlorine continues to be the primary disinfectant in the state used by water treatment plants in the production of drinking water. This is significant in that chlorine treated water is typically used in backflushing the filters.

INDUSTRIAL PROCESS

Typical water treatment plant filtration processes include presedimentation, oxidation, coagulation, flocculation, sedimentation and filtration. Although any one facility may not utilize all the processes, the wastestream produced by any combination of processes is relatively similar. When the raw water or source water has significant levels of suspended solids such as sand, an initial settling tank may be employed to remove these solids. The settling tank can be designed to allow for continuous removal of the solids or periodically the tank may be drained and the solids removed. These solids may be disposed of separately as a solid waste or may be washed 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 of 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 there are many other coagulants 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, flocculation and filtration.

A wide variety of polymers are available for use in the production of drinking water to enhance coagulation, settling (flocculation), 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. They are very susceptible to ultraviolet radiation and to microbes, thus they break down readily. Coagulant aids are the cationic polymers and are expensive and generally used in dilute amounts, in the range of 0.2 to 2 mg/L (ppm). Settling aids are anionic polymers and are used to make a heavy floc that will readily settle. These very large molecules entrap suspended particles that then settle with the polymer. The dose rates are generally in the range of 1 to 5 mg/L (ppm). Nonionic polymers are primarily used 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 µg/L (ppb).

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. The product here is also drinking water and the quality of that product cannot be compromised by additives. Drinking water with a "pink tinge" from the addition of too much potassium permanganate, for example, would not be acceptable.

Source water (raw water) may be either surface water or ground water and the typical processes associated with water treatment varies with the source of the water. Typical surface water treatment applies filtration to remove organic and inorganic matter and to remove pathogenic organisms. Coagulation and flocculation are key to treating surface water. Typical ground water treatment precipitates dissolved minerals followed by filtration to remove the minerals and hence oxidation processes are key to treating ground water. Both treatment strategies apply filtration and filters lose their effectiveness as the filtrate accumulates 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 filtrate and backflush water. The filtrate 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 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 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 the filtered water for a period of time while the filter settles and "cures", a procedure known as filter-to-waste.

DISCHARGE OUTFALL

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. The typical discharge of wastewater from a water treatment plants is through a pipe at the edge of the waterbody. This side bank discharge is only submerged when the level of the receiving water rises above normal levels. Diffusers and submerged discharge pipes are not used by most facilities.

WASTEWATER CHARACTERIZATION

WTPs may use either ground water or surface water as their source water and processes can vary depending on the treatment the source water requires. Ground water is most frequently treated to remove 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:

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, TRC (additive): 0.1 to 1 mg/L

PERMIT STATUS

The water treatment plant general permit was first issued December 3, 1997. It expired on February 1, 2003, and was administratively extended for those facilities already under the permit. No new facilities have been authorized under this permit pending reissuance of the permit.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

From December 1997 through December 2003, there were 696 permit violations from 29 of the 33 facilities that have been permitted under the NPDES Water Treatment Plant general permit. There were 425 permit violations due to non-reporting from 23 facilities. The non-reporting was due to operator error.

There were 115 permit limit violations 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 six violations for pH from four facilities, there was only one pH violation in 2002, and no violations for pH since.

There were 151 violations for settleable solids from 15 different facilities; 82 of the violations were from one facility. This facility is in the process of upgrading its water treatment plant. The violations are due to several different causes, a few of the causes are: wrong sampling location, operator error in sampling and sample reading, and needed facility upgrade.

Ecology has provided technical assistance to majority of the facilities that have continual violations to help them come into compliance. Ecology has also sent four Administrative Orders, two Civil Penalties, nine Notice of Corrections, and three Notice of Violations to promote compliance. Ecology has also sent 253 Warning Letters to 21 of the facilities to make them aware that they are out of compliance.

SEPA COMPLIANCE

Existing discharges from WTPs are categorically exempt from State Environmental Policy Act (SEPA) review (WAC 197-11-855) but any new facilities must demonstrate compliance with SEPA as part of project authorization and approval in order to be eligible for coverage under the proposed general permit.

PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail 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 pollutants that may be present in the effluent**.** 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**.** If it is determined that a water treatment plant is discharging pollutants that are not typical of the industry and at quantities of environmental concern, an individual permit may be required to address the issue.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

USEPA commissioned Science Applications International Corporation (SAIC) to draft a model permit for the water supply industry. Although the draft has not been implemented, SAIC released its findings in a document entitled *Model Permit Package - Water Supply Industry*, January 30, 1987. In this document SAIC conducted BPT and BCT analyses which addressed "conventional" pollutants. 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 the following limits based on their "Best Professional Judgment" after considering existing permits and WTP monitoring data and achievable WTP wastewater treatment levels:

Monthly Average TSS:	30 mg/l
Daily Maximum TSS:	45 mg/l
Allowable pH range:	6.0-9.0

In 1975, the Washington State Department of Ecology proposed effluent guidelines to be used in issuing NPDES permits for municipal WTP process wastewater discharges. These guidelines set the allowable pH range at 6.0 to 9.0 standard units and a settleable solids[1] (SS) limit of 0.1 ml/L. This guidance was reaffirmed by Ecology in 1985 and justified under the AKART requirements of RCW 90.52.040.

State legislation passed in 1987 provided a credit adjustment of technology-based effluent limitations 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 would set limits that would effectively allow the 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 (see Appendix D). A settleable solids limit based on a credit adjustment would, therefore, be in conflict with a settleable solids limit based on BPT/BCT, setting up a legal conflict that makes issuance of an NPDES permit moot. 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

[1] Ecology has determined that SS is a simpler and less costly test than TSS and may provide a more accurate measure of sedimentation treatment process efficiency. Further, an SS measurement of 0.1 ml/L is comparable to a 30 mg/L TSS measurement (letter from Stan Springer, Ecology, to Michael Lorenzo, SAIC, March 12, 1987).

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.

Normal WTP operation will result 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 to 7.5-8.5 for corrosion control in the distribution system. This adjusted pH water would typically be used to backflush the filter. Discharge monitoring reports pH data for WTP wastewater discharges in the state indicate pH has been consistently within the range of 6.0 to 8.5 standard units.

Lagoon/settling tank treatment is a relatively inexpensive form of treatment[2] 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/day of production. Design and construction requirements are readily available with no special requirements other than the availability of land. Treatment provides over 90 percent removal 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 would be extremely expensive.

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

settleable solids	0.1 ml/L monthly average 0.2 ml/L daily maximum
pH range	6.0 to 9.0 standard units
TRC (see water quality-based consideration)	
	0.3 mg/L monthly average 0.5 mg/L daily maximum

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving

[2] Based on a twenty (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, 18,000 customers, estimated that their costs for design, build, and operate resulted in a 0.7% to 1% rate increase (based on 20-year cost recovery).

water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters. The chlorine used as a disinfectant by this industry can chemically combine with other chemicals in the water and form trihalomethanes. The trihalomethanes; chloroform, dichlorobromomethane, and chlorodibromomethane are listed as potential carcinogens by EPA and were evaluated for the potential to cause a human health concern. The data indicates that these substances occur but at low concentrations. See discussion below.

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 these facilities is not expected to contain any pollutants of concern besides those that have been identified and discussed below. However, the 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 is required to correct the problem and may be required to apply for an individual permit.

Antidegradation

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The discharge from water treatment plants is typically of high quality. The primary pollutants are suspended solids and chlorine. Chlorine dissipates rapidly and would not be expected to degrade the receiving water outside of the area of initial discharge. The 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 will typically indicate low levels of suspended solids. The permit sets a discharge limit for settleable solids. Discharges that comply with the settleable solids permit limit are not expected to include suspended solids at levels that would degrade the receiving water.

Impaired Waters

The permit must consider any discharges to impaired waters. 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 waterbody that was listed (segment or grid). For other listings, a Water Clean Up Plan or Total Maximum Daily Load (TMDL) has been completed identifying the actions that must be taken to restore the waters. TMDLs are typically applied to a watershed and set conditions that apply to identified contributors to the impairment. Permits must be conditioned as necessary to comply with federal and state regulations for the protection of impaired waters.

Facilities with coverage under a general permit must be compliant with the terms and conditions of completed TMDLs and the detailed implementation plan. No TMDLs have been identified that include requirements applicable to facilities currently under the water treatment plant general permit.

General permit coverage cannot be issued to new facilities that will cause or contribute to the impairment of listed waterbodies. Existing facilities that have potential to cause or contribute to impairment of listed waterbodies 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. The water treatment plant general permit does not include any specific monitoring schedule or reporting requirements for discharges to impaired waters. When applicable, such requirements will be set by Administrative Order or the facility may be required to apply for an individual permit. One facility currently under permit coverage has been identified with a discharge to a water segment impaired for temperature. Monitoring will be required for this facility and an individual permit may be required if monitoring reveals discharges may be causing or contributing to excursions of temperature criteria for the listed waterbody.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses. Because this is a general permit, critical conditions are based on assumptions that consider differences in facilities and describe generalized critical conditions for the industry as a group.

MIXING ZONES

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 this industrial category was discussed above and expressed by technology-based limits. Facilities were required under the previous permit to implement any treatment facilities necessary to achieve AKART. Therefore all the facilities under this permit are expected to be at AKART and to meet this test of eligibility for a mixing zone.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

This group of facilities typically discharge relatively small intermittent discharges into a significantly larger receiving water. However sidebank discharges do not promote rapid mixing. Most mixing will occur as a result of the initial energy of the discharge entering the waterbody and then mixing is slow as the plume moves along. In the case of streams, the plume typically follows the bank of the waterbody. 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. The typical mixing zone authorized under this permit will be no more than 30 feet downstream and not to exceed 2.5 percent of the receiving water volume for acute determinations and no more than 300 feet downstream and not to exceed 25 percent of the receiving water volume for chronic determinations.

DESCRIPTION OF THE RECEIVING WATER

The typical receiving water is a Class A waterbody. Characteristic uses 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 class shall meet or exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

chlorine	acute: 0.019 mg/L chronic: 0.011 mg/L
pH	6.5 to 8.5 standard units
Turbidity	not to exceed 5 NTU above background or 10% of background when background exceeds 50 NTU

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Chlorine concentrations in the discharge from water treatment plants may exceed water quality criteria after technology-based controls which Ecology has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of representative mixing scenarios. For the purposes of analysis, discharges of 1 cfs (maximum discharge rate) into a waterbody with 100 cfs (flow at critical conditions, 7Q10), 10 cfs into a waterbody with 1000 cfs and 12 cfs into a waterbody with 60,000 cfs were evaluated. Consideration of dilution for acute mixing zone was evaluated at the maximum of 30 feet from point of discharge and at the maximum of 2.5 percent of the receiving water volume. Consideration of dilution for the chronic mixing zone was evaluated at the maximum of 300 feet from point of discharge and at 25 percent of the receiving water volume. In both cases the percent of volume was the more restrictive. The dilution factors have been determined to be:

	Acute	Chronic
Aquatic Life	4	26
Human Health, Carcinogen		26

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

The derivation of surface water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The impacts of chlorine, dissolved oxygen deficiency, pH, temperature, trihalomethanes (chloroform, dichlorobromomethane, chlorodibromomethane), and turbidity were evaluated to determine if ongoing monitioring and a permit limit is required:

<u>Chlorine</u>—Chlorine can result in acute toxicity in a very short exposure period. Data on chlorine concentration in the discharge from water treatment plants often exceeded water quality standards and sometimes exceeded 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. Chronic toxicity is not considered an issue because of the intermittent nature of these discharges and the dilution available in the chronic mixing zone. Monitoring for chlorine will continue and the permit sets a water quality-based limit.

<u>Dissolved Oxygen</u>—During the last permit cycle, Permittees reported the dissolved oxygen concentration in their discharge. Data on biochemical oxygen demand (BOD) was not collected. BOD was not expected to be a significant concern because settling should remove most substances that will consume oxygen and they would not end up in the discharge. Dissolved oxygen values largely exceeded (were better than) standards for Class A waterbodies.

The few exceptions are not expected to violate standards after consideration of available dilution. There was one facility that reported a significant number of dissolved oxygen values below 8.0 mg/L and they will be investigated separately to determine if there is an error in sampling or if there is a potential water quality-based problem that needs to be addressed. The proposed permit revision does not include monitoring for dissolved oxygen.

<u>pH</u>—The data for this set of facilities show pH consistently in the range of 6.5 to 8.5 with a few values below 6.5. The technology based requirement for this group of facilities is within the range of 6.0 to 9.0 standard units. The technology-based requirement is more restrictive after considering available dilution. Monitoring for pH will continue with a technology-based permit limit.

<u>Temperature</u>—The data collected for temperature was consistently below 18°C with only a few exceptions. The few exceptions would not violate standards after consideration of available dilution. No additional monitoring for temperature will be required.

<u>Trihalomethanes</u>—The data for trihalomethanes demonstrated that they are present but at very low levels. A more complete discussion of the data and what it means in relation to human health criteria is provided below. Since the concentrations are low and after consideration of available dilution limits are not required, monitoring for trihalomethanes will not be required.

<u>Turbidity</u>—The available data for turbidity suggests that for this group of facilities, turbidity is not likely to be a concern. These facilities have implemented settling to remove solids before discharge and that should also reduce turbidity. After even a small amount of dilution, the remaining turbidity should not violate standards. However, there is a concern that when the source water for a drinking water facility is very turbid (e.g. during flood water conditions) and frequent backwash is required, turbidity could be an issue. A permit limit for turbidity is not be included in the permit but monitoring for turbidity will continue.

Toxic Pollutants--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.

Chlorine is typically present in the discharge from water treatment plants. A reasonable potential analysis was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

A water quality-based limit for chlorine is set as follows:

	Average Monthly	Maximum Daily
Chlorine:	.07 mg/L	.15 mg/L

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no WET testing is required by the proposed general permit.

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

Ecology has determined that the applicant's discharge will typically contain small amounts of the trihalomethanes: dichlorobromomethane, trichloromethane (chloroform), and chlorodibromomethane. 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. The data collected found low levels of these chemicals, but typically at levels of no significant concern. Dichlorobromomethane levels had the greatest concern, but with modest dilution, the concentration would be reduced to acceptable levels. It is also difficult to apply the basis for deriving reasonable potential to this category of dischargers. They are intermittent discharges that don't readily fit the long term exposure assumptions of the criteria as there will typically be longer periods of no discharge than discharge. The intermittent nature of the discharges combined with the relatively low level of these toxicants in the discharge support a determination that there is no reasonable potential to violate water quality standards for these toxicants.

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 the discharge to cause a violation of applicable standards (WAC 173-204-400).

Ecology has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY LIMITATIONS

Ecology has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by Ecology shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100). This permit regulates discharges to surface water. Incidental discharge to ground is not considered a risk to the state's ground waters.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT

	Existing Limits	Proposed Limits
Settleable Solids	0.1 ml/L (avg) 0.2 ml/L (max)	0.1 ml/L (avg) 0.2 ml/L (max)
pH	In the range of 6 – 9 standard units	In the range of 6 – 9 standard units
Chlorine	0.3 mg/L (avg) 0.5 mg/L (max)	0.07 mg/L (avg) 0.15 mg/L (max)

avg = average monthly – max = maximum daily

The water quality-based chlorine limit is more stringent than the technology-based limit and will therefore be incorporated into the new permit. However, implementing dechlorination will likely be necessary for most facilities in order to comply with this new limit. Therefore a compliance schedule (below) will be authorized upon written request by existing facilities. During the compliance schedule, the technology-based limits (current permit limits) will apply.

COMPLIANCE SCHEDULE

The proposed permit sets a limit for chlorine that is significantly below the previous permit. It is likely that facilities that cannot currently comply with the new limit will have to implement a treatment option, e.g. dechlorination, to come into compliance. The permit will authorize a two-year compliance schedule for facilities that request it. The Permittee must request the compliance schedule by notifying Ecology in writing within the first three months after the effective date of the reissued permit. During compliance schedule, the technology-based limits for chlorine will apply. At the end of the first year, the Permittee must submit a report to Ecology identifying the action to be taken to reduce chlorine levels. In the second year the Permittee must implement that plan and submit a report to Ecology documenting completion of the project. At the beginning of the third year, the facility must comply with the water quality-based permit limit for chlorine.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The permit requires monitoring of **settleable solids**, **pH**, and **chlorine** for compliance with permit limits. Monitoring for **turbidity** is included to further characterize the effluent. Monitoring for **dissolved oxygen, temperature, and trihalomethanes** has been dropped.

The previous permit included monitoring of the discharge rate (peak flow) and volume (total flow). However the previous permit and the revised permit do not set a limit for the amount of discharge or the rate of discharge. The data gathered was used to consider potential critical discharge conditions for consideration of mixing zones and available dilution. However, the rate of discharge and the amount of discharge can be reasonably estimated based on the facility design and backwash frequency. Since there is no discharge limit for volume and rate, monitoring and reporting for these two parameters will be dropped.

The monitoring schedule is detailed in the proposed general permit under Condition S4. Specified 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 discharge for small facilities is significantly less than for large facilities, but the cost of monitoring for the small facility, in terms of cost per residential connection, is much greater than for larger facilities. Typical characteristics and treatment of ground water result in less variability in the wastewater discharge than for surface water. Therefore, the monitoring schedule will be divided into two tiers based on the capacity of a facility to produce finished water (facility size) and the source of raw water (ground water versus surface water). Group 1 facilities are those that have a maximum production capacity of less than 4 million gallons a day or only use ground water for their source water. Group 2 facilities are those with a maximum production capacity of 4 million gallons a day, or more, and are treating surface water.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* Facilities that conduct their own analysis for the required monitoring and reporting must be accredited. Analysis of chlorine requires lab accreditation and that triggers accreditation for pH and turbidity.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The terms of Condition S6 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 273-220-210). Monitoring reports will be submitted every month using the discharge monitoring report form provided by Ecology.

BEST MANAGEMENT PRACTICES

Ecology has determined that WTPs typically store a quantity of chemicals that have the potential to cause water pollution if accidentally released. It is also typical for water treatment plants to 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 Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080 to require the Permittee to develop best management plans to prevent the accidental release of chemicals and require appropriate handling of the release of hyper-chlorinated water.

The proposed permit requires the Permittee to develop, maintain, and implement a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. This plan shall be available on-site to Ecology. Disposal of hyper-chlorinated water to surface water is prohibited. The proposed general permit will require the Permittee to develop, maintain, and implement a plan for the safe release of hyper-chlorinated water either through dechlorination or through containment followed by discharge to land.

SOLID WASTE PLAN

Lagoon/settling tank treatment to reduce the amount of solids in the wastewater discharge results in 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 from leachate of solid waste. Improper disposal can result in the entry of these 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, material from this discharge may solubilize and be carried to ground water. Therefore, periodic removal and beneficial use or disposal of the residuals is necessary.

Ecology encourages the application of residual solids to a beneficial use rather than to a landfill. In most cases, WTP residuals will be classified as nonhazardous solid waste, but a toxicity characteristics leaching procedure (TCLP) test will likely be necessary to assure that the residuals will not qualify as hazardous under Federal and State hazardous waste regulations. Beneficial use can include incorporation in the production of a product such as concrete, direct application to soil at an approved agronomic rate[3], or as a component of a soil mix. Any beneficial use, however, 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 proposed general permit requires, under authority of RCW 90.48.080, that the Permittee have a solid waste plan to prevent solid waste from causing pollution of waters of the state. The plan must be submitted to the local permitting agency for approval and available on-site to Ecology.

STORMWATER POLLUTION PREVENTION PLAN

Facilities that discharge stormwater from their site to a surface waterbody or to a stormwater conveyance system that discharges to a surface waterbody must complete a stormwater pollution prevention plan. The purpose of this plan is to identify the potential contaminates and to prevent the contamination of stormwater to the maximum extent practical. This is a new requirement for this permit. Most facilities should be able to complete the stormwater pollution prevention plan (SWPPP) by following the listed requirements in the permit.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual industrial NPDES permits issued by Ecology.

Condition G1 requires responsible officials or their designated representatives to sign submittals to Ecology. Condition G2 requires the Permittee to allow Ecology to access the treatment system, production facility, and records related to the proposed permit. Condition G3 specifies conditions that may result in revoking a specific coverage under the general permit. Condition G4 allows the Permittee to request their general permit coverage be replaced by an individual permit. Condition G5 specifies conditions for modifying, suspending or terminating the permit. Condition G6 requires the Permittee to notify Ecology when facility changes may require modification or revocation of permit coverage. Condition G7 requires Ecology approval of plans for construction of wastewater control facilities. Condition G8 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G9 and G10 relate to permit renewal and transfer. Condition G11 requires the Permittee to control its production in order to maintain compliance with its permit. Condition G12 prohibits the reintroduction of removed substances back into the effluent. Condition G13 requires the

[3] land application of alum residuals can cause a reduction in available phosphorus, however, application rates of up to 7.34 tons/acre-year should not cause environmental degradation

Permittee to provide permit relevant information to Ecology when requested. Condition G14 incorporates by reference all other requirements of 40 CFR 122.41 and 122.42. Condition G15 notifies the Permittee that additional monitoring requirements may be established by Ecology. Condition G16 requires the payment of permit fees. Condition G17 describes the penalties for violating permit conditions. Condition G18 defines the term "upset" and the affirmative defense using upset. Condition G19 states that the permit does not convey property rights. Condition G20 requires the Permittee to comply with the terms and conditions of the proposed permit. Condition G21 requires the Permittee to comply with more stringent toxic effluent standards or prohibitions established under Section 307(a) of the Clean Water Act. Condition G22 identifies the penalty for falsifying or tampering with monitoring required by the permit. Condition G23 requires reporting of any planned changes that would result in noncompliance with the permit. Condition G24 requires the Permittee to notify Ecology if they identify errors or omissions in reporting. Condition G25 requires the Permittee to submit reports associated with a compliance schedule within 14 days of scheduled completion date. Condition G26 defines appeal options for the terms and conditions of the general permit and of coverage under the proposed permit by an individual discharger. Condition 27 invokes severability of permit provisions.

ECONOMIC IMPACT ANALYSIS

SMALL BUSINESS ECONOMIC IMPACT

An economic impact analysis was conducted to evaluate the impact that the water treatment plant general permit on small business when it was first issued. The permit included measures to reduce that impact where legal and feasible pursuant to WAC 173-226-120. The cost of implementing and operating typical technology-based treatment was evaluated based on a 20-year lifespan of operation and cost recovery. The annual cost per connection varied dramatically from about 10 cents a year for a very large facility (400,000 residential connections) to about $20.00 a 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, attempts have been made to mitigate the disparity of economic impact.

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

2. Discharges to land and to POTWs will not typically require a permit. Currently a larger percentage of small facilities discharge to land or POTW 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 will be reduced from weekly to monthly for facilities with a maximum production capacity of less than 4,000,000 gallons a day.

The proposed permit revisions include a chlorine limit that will require many facilities to implement dechlorination in order to remain in compliance. Dechlorination technology is readily available and relatively inexpensive to implement. It was estimated that the initial cost of buying equipment and setting up dechlorination would cost large facilities about $5,000 and ongoing maintenance and purchase of chemicals would be about $1,000 per year. It would likely cost small facilities $800 to $1000 initially and no more than $500 per year for ongoing maintenance and chemicals. The projected impact of this permit condition is considered nominal. However, a compliance schedule is provided to allow the Permittee sufficient time to implement dechlorination with minimum economic impact.

Monitoring requirements were revised to eliminate different schedules for sampling. Large facilities must monitor for all parameters weekly and small facilities must monitor for all parameters monthly. The additional monitoring is offset by a reduction in the total number of parameters for monitoring. No significant increase in cost is expected from this permit revision.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes that this proposed permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1996. Management of Water Treatment Plant Residuals. Technology Transfer Handbook, EPA/625/R-95/008.

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Fort, Douglas J., and Stover, Enos L.

1995. Impact of Toxicities and Potential Interactions of flocculants and Coagulant Aids on Whole Effluent Toxicity Testing. Water Environment Research, Vol 67, #6, pp 921-925.

George, D.B., Berk, S.G., Adams, V.D., Ting, R.S., Roberts, R.O., Parks, L.H., and Lott R.C.

1995. Toxicity of Alum Sludge Extracts to a Freshwater Alga, Protozoan, Fish, and Marine Bacterium. Archives of Environmental Contamination and Toxicology, Vol 29, pp 149-158.

Montgomery, James M., Consulting Engineers, Inc.

1985. Water Treatment Principles and Design. John Wiley & Sons Inc.

Science Applications International Corporation (SAIC)

1987. Model Permit Package Water Supply Industry. EPA Contract # 68-01-7043, Work Assignment # Pl-18, SAIC Project # 2-835-03-516-03.

Snoeyink, V.L., C.K. Jongeward, A.G. Myers, and S.K. Ritcher

1989. Characteristics and handling of wastes from groundwater treatment systems. In: Sludge: Handling and Disposal, Denver, CO; American Water Works Association

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Wright, R.M., and A.J. McDonnell.

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

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology has tentatively determined to reissue the general permit for certain categories of water treatment plants. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet. Ecology announced its intent to rewrite and reissue the water treatment plant general permit in State Register, July 16, 2003, in a letter to Permittees and interested parties dated August 6, 2003, and on Ecology's water treatment plant webpage.

Ecology will publish a Public Notice of Draft (PNOD) on April 21, 2004, in the State Register, the Vancouver Columbian, the Seattle Daily Journal of Commerce, the Tri-City Herald, the Spokesman Review, and the Bellingham Herald 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 a.m. and 5:00 p.m. 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:

Carey Cholski,
Dept of Ecology Southwest Region Office
PO Box 47775
Olympia, WA 98504-7775

Keith Johnson
Dept of Ecology
PO Box 47600
Olympia, WA 98504-7600

The public workshop and hearing on the proposed general permit will be held on May 24, 2004. 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 2:30 p.m. and conclude as soon as public testimony is completed but no later than 5:00 p.m.

Any interested party may comment on the draft permit or request an additional public hearing on this draft permit within the 30-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 must be postmarked by midnight, **May 27, 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 is available upon request and will be mailed directly to people expressing an interest in the proposed general permit.

Further information may be obtained from Ecology by telephone, (360) 407-6442 or (360) 407-6279, TTY (only) – 711 or 1-800-833-6388, by E-Mail at kjoh461@ecy.wa.gov or cgru461@ecy.wa.gov, or by writing to Keith Johnson or Carey Cholski at the address listed above.

This permit and fact sheet were written by Keith Johnson and Carey Cholski.

APPENDIX B--GLOSSARY

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

AKART-- An acronym for “all known, available, and reasonable methods of treatment”.

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

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

Average Monthly Discharge Limitation --The average of the measured values obtained over a calendar month's time.

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

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

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

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

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

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

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

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

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

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

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

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

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

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

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

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

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

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

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

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

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

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

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

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

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

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

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

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

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

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

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

Water Quality-based Effluent Limit--A limit 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.

APPENDIX C - TECHNOLOGY-BASED TREATMENT

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

1. using the criteria for setting case-by-case limitations 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 waterbody 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 waterbody, 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 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 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 (90) 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 limitations 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 D - 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 (arsenite, 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 can not 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 (NaCl) 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 freshwater resources. RO technology is also advancing providing 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 (% 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 would not be eligible for coverage under the WTP general permit and should be disposed of with the same considerations as RO wastewater. It 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, has a maximum production capacity of 50,000 gallons a day or more, and discharges backwash effluent to surface water, then an application for coverage under the WTP general permit needs to be submitted. If the process is removing dissolved solids and discharging wastewater to surface water, then an application for an individual permit needs to be submitted.

Discharge of RO and IX wastewater may be to ground, to 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's ground water criteria have been set for regulated contaminant substances including chlorides (250 mg/L), total dissolved solids (500 mg/L), arsenic (0.05 mg/L), nitrate (10 mg/L), nitrite (1 mg/L), and total nitrogen (10 mg/L). Corresponding surface water criteria 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 throughout the state in scattered locations at concentrations high enough to a public health concern. The source of this arsenic is arsenopyrite and other arsenic rich minerals. These minerals dissolve into ground water to form inorganic arsenic ions, arsenate (AsO_4^-) and arsenite (AsO_2^-). Both arsenate and arsenite can occur in ground water. Arsenite must be oxidized to arsenate for some forms of arsenic treatment to be effective. When the concentration of arsenic exceeds the State Drinking Water Standards, treatment is required. 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 and reverse osmosis are two other forms of arsenic treatment that can be used. However, these two treatment processes generate a concentrated liquid waste stream with high concentration of arsenic that may make disposal problematic.

Nitrate Removal

Nitrate contamination of ground water has become an increasing concern in this state. Pregnant women and infants are considered 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 can blend their sources of water thereby achieving 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 this 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. *The Ground Water Quality Standards* (Chapter 173-200 WAC) establish a 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 has not developed a threshold for reasonable potential to violate ground water standards for these discharges. Reasonable potential varies from site to site based on volume of discharge, soil characteristics, depth to aquifer and exceptionally sensitivity 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 of 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.

Compounds	**Threshold Concentration of Concern As Measured at Headworks of the POTW**
NaCl (Sodium Chloride)	2,500 mg/l (Kincannon, PhD theses OK State U., 1965) & (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 freshwater will likely violate the State's surface water quality standards as stipulated in Chapter 173-201A WAC. The discharge of high levels of dissolved solids to freshwater 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.

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 (see charts above) 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 soils, 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's Underground Injection Control Act, Chapter 173-218 WAC. Discharge to a drain field, infiltration pond or trench although not prohibited, should only be utilized 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 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 5000 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 shall be submitted to Ecology.

APPENDIX E - WTP DISCHARGE TO LAND/POTW

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, 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 water treatment plant 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 the state, 10 WTPs with more than 100 residential connections were identified as discharging 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 filtrate accumulates and must be cleaned to avoid breakthrough and unacceptable headloss. Filter cleaning is accomplished by reversing the flow of water and backflushing the filter, producing wastewater composed of the filtrate and backflush water. The filtrate includes 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.

Chlorine can combine with organic material in water and produce toxic and carcinogenic byproducts, trihalomethanes, which are regulated under the State’s water quality standards as well as by the Washington State Department of Health (Health). The State’s 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. Because the product is drinking water, it is highly unlikely that the source water would contain significant concentrations of toxics or high levels of TDS.

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. Because 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.

Health, however, has implemented a risk reduction/ pollution prevention wellhead protection policy which would prohibit 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 one-year time-of-travel wellhead protection areas.

Ground Water as Source Water

Ground water frequently contains dissolved iron and manganese at concentrations that require removal to meet drinking water standards. Iron and manganese are precipitated as relatively stable oxides that are considered nonmobile under typical aerobic conditions and soil will act as a filter, preventing the wastewater discharge from carrying the oxides to ground water. However, nonmobility is not as certain when quantities of these precipitates build up in the soil, are exposed to anoxic conditions and thereby become soluble and likely to migrate to ground water. Appropriate removal and disposal of the residuals is necessary to assure that the iron and manganese do not become mobile and pollute waters of the state.

Surface Water as Source Water

Surface water is typically treated by filtration to remove silt, clay, organics, and pathogens and when the filtrate 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.

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 highly 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.

Five WTPs that currently discharge to four POTWs were interviewed as were the POTWs receiving the discharge. Two of the POTWs are activated sludge facilities and two utilize nonmechanical lagoon treatment. None of the POTWs have experienced any plant upsets or other difficulties resulting from the WTP discharges. Only one of the WTPs discharges backwash directly to a sewer line; all the others discharge to a tank or pond and then use a pump or gravity flow to drain the effluent into the sewer line. A tank or pond allows some control over the discharge rate into the sewer line which in two cases was necessary to avoid overloading the sewage delivery system. One WTP also timed their discharges to avoid peak flows in a delivery system that was approaching design capacity.

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 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 all 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.

APPENDIX F--RESPONSE TO COMMENTS

One person provided testimony at the public hearing and three people provided written testimony. The comments and testimony with Ecology's response follows:

Public Testimony by Ricardo R. Saavedra:

My name is Rick Saavedra. I'm the Superintendent for the City of Longview Water Treatment Facility. Our comments today, city-wise, is we don't have any general problems with the permit at all. We're quite happy with the way things function. We just want that on public record. We do have a comment though on the de-chlorination side. One aspect that we think should be looked at and probably next cycle, if not sooner, is chemicals that are being added for that. There's a few choices out on the market, but at this point in time aren't regulated in any form. So certainly something that should have some look at. At times, these processes aren't monitored very well on the other end. You know, it's easy to get sample with zero chlorine, but what actually are you putting in that can be, in some instances, a great as a concern as the chlorine is presently being monitored. So that's something that we'd like the state to take a look at. And you know hopefully not just say look at it, but have some choices and have some background information so that cities can be able, be more prepared to react to something like that.

Ecology Response:

Ecology concurs that using appropriate chemicals and correctly applying them to achieve dechlorination or any other chemical treatment (e.g. pH adjustment), is an issue of concern. The permit will not include a list of acceptable procedures but the following language has been added to direct permittees to manage any chemical treatment appropriately.

> Any addition of chemicals to treat the wastewater (discharge) must comply with manufacturers' recommendations and administered only at a rate appropriate for treatment. The addition of excessive quantities of treatment chemicals to the wastewater is prohibited. The use of treatment chemicals that will result in a water quality violation in the receiving water is prohibited.

Comment from Jess Greenough III, Water Treatment Manager, City of Pasco

After reviewing the proposed changes to the Water Treatment Plant General Permit (WTP-GP) the City of Pasco found an issue of concern. The city feels that the lab accreditation requirement for (total) residual chlorine (Section - E. Laboratory Accreditation) presents an undue burden and provides no measurable benefit relative to quality assurance or quality control. The current DPD colorimetric method is reliable, accurate and cost effective. Furthermore, the City feels that this additional regulatory requirement will simply increase the cost of doing business and provide no bonafide/tangible benefit to anyone. In fact the current residual chlorine test method that the Water Treatment Plant performs now is accepted by the Department of Health. This testing method is acceptable for the human health and safety, therefore, it should be acceptable for WTP-GP requirements. See attached letter for additional information on the City of Pasco's testing history for (total) residual chlorine.

Ecology Response:

There are two issues in this comment. One is the lab accreditation requirement and the other is the use of the colorimetric test method.

Lab Accreditation Requirement: Certification of laboratories is authorized under RCW 43.21A.230 and WAC 173-226-090 requires accreditation for monitoring data.

(4) Except as provided in subsection (5) of this section, all monitoring data required as a condition of a general permit, or required as part of an application for coverage under a general permit shall be prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC within one year of first being covered under a general permit or by July 1, 1995, whichever is later.

(5) The following parameters need not be accredited or registered:

- (a) Flow;
- (b) Temperature;
- (c) Settleable solids;
- (d) Conductivity, except that conductivity shall be accredited if the laboratory must otherwise be registered or accredited;
- (e) pH, except that pH shall be accredited if the laboratory must otherwise be registered or accredited;
- (f) Turbidity, except that turbidity shall be accredited if the laboratory must otherwise be registered or accredited; and
- (g) Parameters which are used solely for internal process control.

There is no other option at this time but to require lab accreditation. However, should this rule come up for revision, we are hopeful that Pasco will again make their position known to Ecology.

Use of Colorimeter Test Method: Ecology concurs that the colorimeter test method can be an acceptable and authorized test method, although lab accreditation for conducting the test is required. The permit authorizes the following under Special Condition S4 Monitoring Requirements: Low range (0.01 mg/L) digital colorimetric meter or equivalent method. Equivalent in this case means that the test method will be sufficiently precise and accurate to detect total residual chlorine levels as low as the permit limit of .07 mg/L.

Comment from Samuel A. L. Perry, Department of Health, Office of Drinking Water:

General Permit

Page 12: *There are a couple types of Hach® Pocket Colorimeters™, so it would be more appropriate to list the requirement more generically as digital colorimetric meter. In addition, the required accuracy of the instrumentation should be noted, especially since the discharge standard is proposed for downward revision. The smallest increment on low range digital colorimetric meter is 0.01 mg/L as* Cl_2 *should be considered as an accuracy requirement to discourage the use of handheld colorwheels for low range measurements.*

Page 12: *Most bench top water treatment plant turbidimeters are accurate to nearest 0.01 NTU. Requiring reporting and measurement accuracy to the nearest 0.1 NTU is well within the capability of water treatment plant operators.*

Page 13: *The comments on page 12 apply to page 13 as well.*

Page 13: *Currently, there only a few water treatment plant laboratories in Washington State that are accredited for the analysis of chlorine residual. To require small water treatment plant laboratories to go through the lab accreditation process to use a pocket digital colorimeter is an onerous requirement with little apparent environmental health benefit. At water treatment plants, regulatory analysis must be conducted by a certified operator. It is recommended that this* *requirement be used as the means of sampling quality assurance rather than lab accreditation, especially if the only thing that the lab will be accredited for is the use of a digital colorimeter.*

Page 14: *Please provide the names and phone numbers of individuals to contact at each regional and field office. Going through the main switchboard can be a cumbersome, bureaucratic process.*

Fact Sheet

Page 34: *It appears that s a simple mistake was made in listing the ground water criterion for arsenic as 0.05 μg/L. It should be listed as 0.05 mg/L or 50 μg/L.*

Page 35: *The section on arsenic removal contains a number of inaccuracies and should probably be rewritten in its entirety.*

Page 36: *Please be more clear that water treatment plants that use oxidation and filtration to remove iron, manganese, and arsenic and discharge to land are exempt from the permitting process. The focus of this document is appropriately on discharge to surface waters. Clearly stating that groundwater treatment plants that land apply the wastewater discharge via an infiltration pond, drainfield, or similar disposal method, are exempt from the NPDES permitting process would avoid potential misinterpretation and misuse of this permitting process.*

Page 36: *The comments above do not apply to groundwater treatment system that use ion exchange, reverse osmosis, or treat for nitrate. I agree that these situations should be evaluated on a case-by-case basis. However, some additional guidance on the subject would be helpful so that the regulated and regulatory communities can reach a common understanding more easily.*

Ecology Response:

Ecology concurs that the meter requirement for chlorine should be expressed in a more generic fashion with emphasis on low level capability. The language has been changed to:

Low range (0.01 mg/L) digital colorimetric meter or equivalent method

The permit specifies an accuracy of 1 NTU because that is sufficient for the purpose of the required monitoring. It is good that the operators can do much better than that but it is not necessary to require greater NTU accuracy in the permit just because it is achievable. No change will be made.

As noted above in the response to the City of Pasco's comment, the lab accreditation requirement is based on rule and the permit can not conflict with the rule. No change can be made unless there is a rule revision.

Ecology's experience with listing names and phone numbers of specific contact people suggests that listing a more generic number that will remain constant is a better approach. This is a five year permit and in that time it can be expected that staff will change. Ecology reception staff are skilled in forwarding calls to the appropriate person and the more generic numbers will remain.

The fact sheet has been corrected to list the correct arsenic groundwater standard of .05 mg/L.

The arsenic removal language in the fact has been changed based on additional information provided by Samuel Perry.

The following language was added to the beginning of APPENDIX E - WTP Discharge to Land/POTW to clarify that this permit does not apply to land application of filter backwash.

> 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 water treatment plant general permit.

Comment from Arnold Peterschmidt:

It is my opinion that there are some very small public water systems treating ground water for removal of iron and manganese that meet the conditions of section S1 as Group 1 Facilities under Section S4 of the draft Water Treatment Plant Industry National Pollutant Discharge Elimination System Waste Discharge General Permit that should be exempt from the permit. Imposing the permit requirements for treatment and monitoring waste effluent will not provide the environmental benefits intended by the permit while increasing the costs of water supply to the community and adding to Ecology's work load.

I am currently working with a community water system that is a good example. The system employs a manganese green sand pressure filter system for removal of excess iron and manganese from the water produced by the two source wells. The treatment system has the capacity to produce up to approximately 100,000 gallons per day, double the permit threshold. The average daily water consumption is approximately 30,000 gallons per day for 115 residential water service connections. Backwash water is discharged to the drainage ditch along the County road in front of the water system facilities. Average discharge volume is approximately 2000 gallons per day which contains approximately 0.5 lb iron and 0.1 lb manganese and free chlorine at concentrations near 0.2 mg/l. The discharge site is approximately 3000 feet from the eastern shoreline of Admiralty Inlet. The condition of the ditch indicates that storm water runoff is seldom enough to flow from the backwash discharge site to the outfall at the shoreline. As roadside drainage ditches are included in the definition of "waters of the State" regardless of the nature of the receiving waters or the lack of hydraulic connection between a particular ditch and the potential receiving waters, the filter backwash must meet the effluent limitations set in the permit and discharged effluent must be monitored and reported at least monthly.

The requirements of the current draft permit seem unnecessary for water treatment systems such as that described above. The precipitated iron and manganese released with the backwash are not toxic and the quantities are small. As the hydraulic link between the discharge point and the surface water is long and weak and is not expected to occur at all except during significant storm water runoff events, the free chlorine residual will dissipate long before reaching the receiving water. The receiving body of water is very large with swift currents and the shoreline is normally turbid due to constant wave action. It is hard to imagine that this filter backwash could ever have any environmental impact on receiving water such as Admiralty Inlet.

It is the costs associated with monitoring that are my greatest concern. I estimate that it will require at least a half day per month labor by the contract water system operator to collect effluent samples, send them to an accredited lab and maintain the necessary records. With laboratory fees, the annual cost is expected to be around $3000 for the system described above. There is substantial economy of scale in water systems. Small public water systems can not deliver water as economically as larger municipal water systems. Three thousand dollars per year, year after year is a significant expense for a very small system. It is an additional cost that will have an impact on water rates and funds available for maintenance, operations and *replacement of water system facilities. I see no discernable benefit to the environment, the community served by the water treatment plant or the public at large from this permit process and the associated costs.*

My suggestions are:

> *Increase the maximum water treatment plant capacity under part S1, A, 3 to 250,000 gallons per day for systems discharging filter backwash consistent with that described above.*
>
> *Allow water treatment plants that discharge to a location with limited hydraulic continuity to a surface water body to install biofiltration swales and ponds such as those used in storm water treatment in lieu of continuous monitoring and reporting.*

Ecology Response:

There are two issues here. One is the facility size threshold that is applied by this permit and the other concerns infiltration versus discharge to surface water. A discharge of wastewater (filter backwash) to surface water requires a permit. The size threshold was set to make this permit available to as many facilities as possible that have a surface water discharge and can reasonably be expected to meet the testing and reporting requirements of the permit. The current threshold is still applicable and no change will be made.

A discharge to a roadside ditch is typically considered a discharge to surface water, particularly when there is a connection between the ditch and a more traditional surface water body. There is a suggestion in the comment that this facility might be able to totally infiltrate the backwash and not discharge to the ditch. If that can be accomplished than no permit would be necessary.