FACT SHEET FOR THE FRESH FRUIT PACKING GENERAL PERMIT

SUMMARY

The Washington State Department of Ecology (Ecology) has determined to reissue the Fresh Fruit Packing General Permit. This general permit applies to the entire fresh fruit packing industry in the state of Washington except for those that have obtained individual permits from Ecology. Under this general permit, wastewater discharges from Permittees are subject to certain Treatment/Disposal Methods (TDMs) and effluent limitations. Compliance with this general permit may require Permittees to install and implement pretreatment facilities, Best Management Practices (BMPs), and/or any other tools that may be deemed necessary by Ecology in order to carry out the provisions of this general permit. The proposed terms, limitations, and conditions contained herein are tentative and may be subject to change and subsequent public hearings. Permittees covered under this general permit will not be relieved of any responsibility or liability at any time during the life of this general permit for violating or exceeding state water quality standards, or any other local, state, or federal regulations and/or standards. Facilities not accepted under this general permit must apply for an individual permit from Ecology. Any fresh fruit packing facility not covered under either this general permit or an individual permit will be considered to be operating without a discharge permit and subject to potential enforcement action.

PUBLIC COMMENT PERIOD AND INFORMATION

A Public Notice of Draft (PNOD) was published in the legal sections of the Yakima Herald-Republic and Wenatchee World on May 04, 2016.

Interested persons were invited to submit comments regarding the proposed reissuance of the Fresh Fruit Packing General Permit. Comments on the general permit may have been given at the public hearings as either written or oral testimony. Written comments may have also been submitted to Ecology until the comment period ended June 17, 2016. The testimonials and comments received during this comment period are located in **Appendix C.**

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INTRODUCTION

This fact sheet is a companion document designed to provide the basis for reissuance of the Fresh Fruit Packing National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge (SWD) General Permit. The Washington State Department of Ecology (Ecology) is proposing to reissue this general permit, which will allow the discharge of wastewater from the fresh fruit packing industry into waters of the state of Washington including groundwater, pursuant to the provisions of chapters 90.48, 90.52, and 90.54 Revised Code of Washington (RCW) and the Federal Water Pollution Control Act (FWPCA) as amended. This fact sheet explains the nature of the proposed discharges, Ecology's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for these decisions. Ecology mailed out *Application for Permit Coverage* forms to all Permittees in July of 2013. Completed forms were required to be submitted to Ecology by January 2, 2014, which is 180 days prior to expiration of the current permit.

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

Ecology decided to issue a general permit for the fruit packing industry because of the:

- Similar wastewater characteristics among facilities.
- Uniform discharge conditions to which all facilities would be subject.
- Significant reduction of resources necessary for general permit issuance and management as compared to individual permits.

However, individual permits will still be applied in those instances where a facility requires more detailed guidance or when an individual packer so desires and Ecology approves.

The regulations adopted by Ecology in regards to this general permit include the following:

- *Waste Discharge General Permit Program, chapter 173-226 Washington Administrative Code (WAC)*
- *National Pollutant Discharge Elimination System Permit Program, chapter 173-220 WAC*
- *Water Quality Standards for Surface Waters of the State of Washington, chapter 173-201A WAC*
- *Water Quality Standards for Groundwater of the State of Washington, chapter 173-200 WAC*
- *Sediment Management Practices, chapter 173-204 WAC*
- 40 CFR 131

These regulations require that an industrial facility obtain a permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for performance requirements imposed by the permit.

Under the NPDES permit program, Ecology must prepare a draft permit and accompanying fact sheet and make them available for public review before final issuance. According to chapter 173-220-050 WAC, Ecology must also publish a Public Notice of Draft (PNOD) telling people where they can read the draft permit, and where to send their comments, during a period of at least thirty days. See **Appendix A - Public Involvement** for more details about the PNOD and comment procedures.

Representatives of the industry have reviewed this fact sheet and draft permit. Ecology corrected errors and omissions identified in this review before going to public notice. After the public comment period ends, Ecology may make changes to the draft permit in response to comments submitted. In Appendix C – Comments Received and Response to Comments, Ecology will summarize the comments submitted (which includes testimonials from the public hearings), write a response for each of the comments, and summarize any permit changes that occurred due to the comments.

BACKGROUND INFORMATION

Technology-Based Effluent Limits

Sections 301, 302, 306, and 307 of the FWPCA established discharge standards, prohibitions, and limits based on pollution control technologies. These technology-based limits are "Best Practical Control Technology" (BPT), "Best Available Technology Economically Achievable" (BAT), and "Best Conventional Pollutant Control Technology Economically Achievable" (BCT). Compliance with BPT/BAT/BCT may be established using a "Best Professional Judgment" (BPJ) determination.

Washington State has similar technology-based limits which are described as; "All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment" (AKART). AKART is referred to in Washington State law under chapters 90.48.010 RCW, 90.48.520 RCW, 90.52.040 RCW, and 90.54.020 RCW. The Federal technology-based limits and AKART are similar, but not equivalent. AKART may: (1) be established for an industrial category or on a case-by-case basis; (2) be more stringent than Federal regulations; and (3) include not only treatment, but also Best Management Practices (BMPs) such as prevention and control methods (i.e., waste minimization, waste/source reduction, or reduction in total contaminant releases to the environment). Ecology and the EPA concur that historically, most discharge permits have determined AKART as equivalent to BPJ determinations.

Water Quality-Based Effluent Limits

Chapter 90.48.035 RCW authorizes establishment of water quality standards for waters of the state. Washington State has implemented groundwater quality standards in chapter 173-200 WAC. Washington State has also implemented surface water quality standards in chapter 173-201A WAC. All waste discharge permits, whether issued pursuant to NPDES or SWD regulations must prevent

damage to waters of the state and include conditions so that all authorized discharges meet Washington State water quality standards. Both surface and groundwater standards include an antidegradation policy, which requires Ecology to protect existing and designated uses.

Discharges from the fresh fruit packing industry may contain pollutants which, in excessive amounts, have a reasonable potential to cause, or contribute to, violations of Washington State water quality standards due to the presence of, but not limited to, Total Dissolved Solids (TDS), Biochemical Oxygen Demand (BOD_5), chlorine, turbidity, oxygen demand, high temperature, high or low pH, or toxic materials. Ecology has determined that if the fruit packing industry properly treats and disposes of its wastewater as required by the general permit's terms and conditions, it will: (1) prevent permit backsliding; (2) ensure compliance with Washington State water quality standards; (3) protect POTWs; (4) maintain and protect the existing characteristic beneficial uses of the waters of the state; and finally (5) protect human health. Ecology may reopen the general permit if new information collected during the term of this general permit indicates violations of water quality.

Receiving Water Identification

Activities from the fresh fruit packing industry may potentially affect both surface waters and groundwater in the state of Washington. The small percentage of fresh fruit packing Permittees that discharge directly or indirectly to surface waters must meet the state water quality standards for surface waters. In order to protect them, *chapter 173-201A WAC* ascribes all surface waters a designated use, narrative criteria and an antidegradation policy. Based on the use designations, numeric and narrative criteria are assigned to a water body to protect the existing and designated uses. Ecology must condition permits to maintain and protect existing and designated uses at all times. Permits must not allow degradation that would interfere with, or become injurious to, existing or designated uses for a water body. The designated uses in *chapter 173-201A WAC* are separated into two separate categories, fresh and marine waters. The fresh water designated uses are: aquatic life uses, recreational uses, water supply uses, and miscellaneous uses. The marine water designated uses are: aquatic life uses, shellfish harvesting, recreational uses, and miscellaneous uses.

The larger percentage of fresh fruit packing Permittees which discharge directly or indirectly to groundwater must meet at a minimum, all the state groundwater quality standards as given in *chapter 173-200 WAC*. Fresh fruit packing industry dischargers must not substantially degrade groundwater which is generally high quality. For discharges which contain complex synthetic chemicals, the groundwater standards require that no significant change is allowed above background water quality. A significant change occurs when a contaminant level increases above background water quality levels, while using the lowest quantifiable analytical method. For discharges which contain other chemicals, the groundwater standards require that no substantial change of background water quality or exceedances of any listed chemical criterion is allowed. A substantial change occurs when a chemical contaminant level increases above background water quality.

Types of Facilities or Dischargers Covered

Every new or existing fresh fruit packing facility which receives, packs, stores, and/or ships either hard or soft fresh fruit, and discharges wastewater (with the exception of discharges of only domestic wastewater or discharges only to a delegated pretreatment POTW) must apply for and obtain coverage under either this general permit or an individual NPDES/State Waste Discharge Permit. This fact sheet will primarily discuss apple, pear and cherry packers; however some information may also relate and apply to the packing of other fruits, any differences relative to the varying fruit types in packing operations and methods will be noted where appropriate.

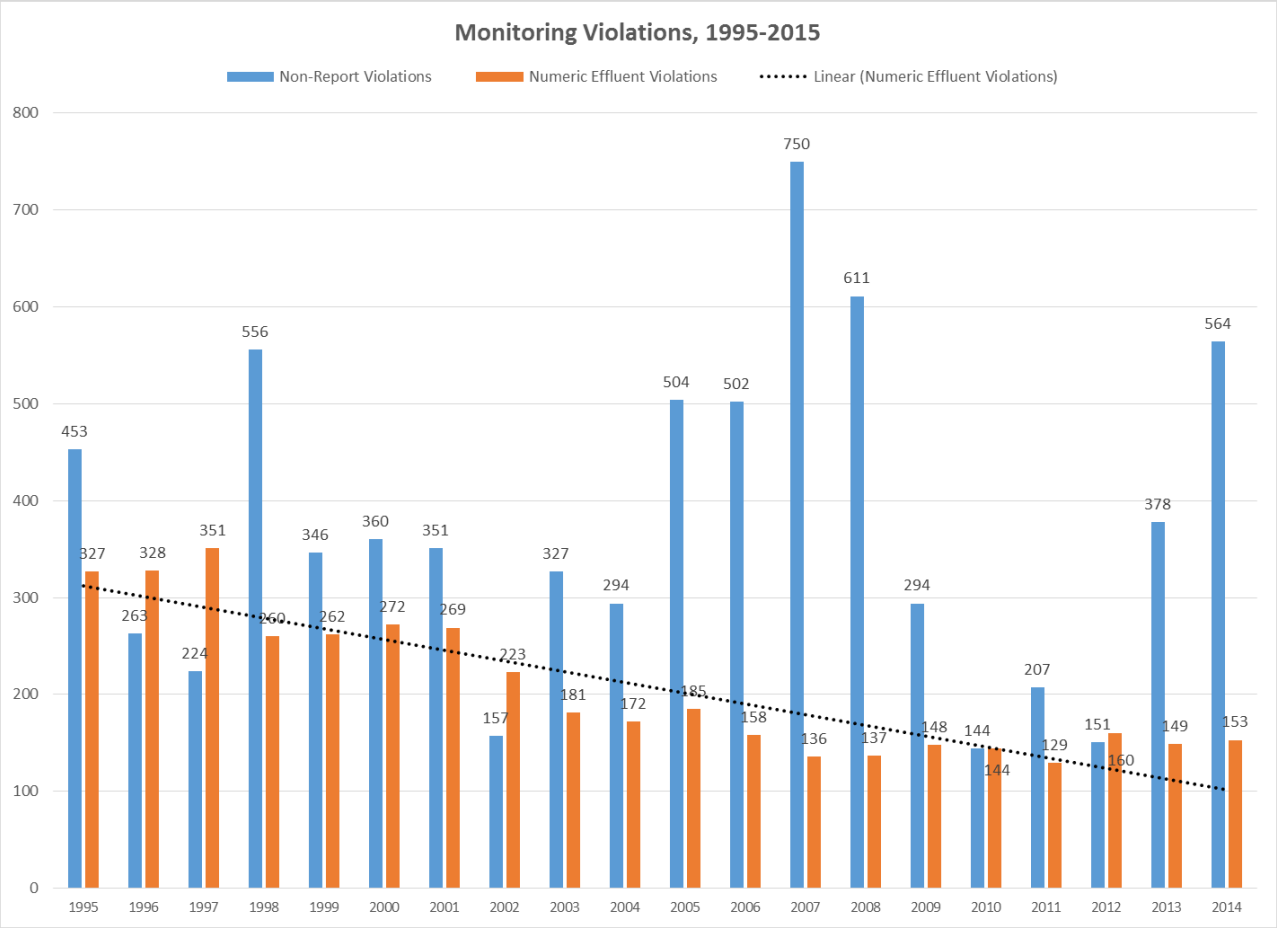
Any facility as described above, which is located on the Colville Reservation, may apply for coverage of only non-surface water discharges under this general permit. Discharges to surface water on the Colville Reservation remain under the jurisdiction of the EPA.

Geographical Area of Coverage

Although the fresh fruit packing industry is primarily located in the state's centralized fruit growing region along the Yakima, Columbia, Wenatchee, and Okanogan Rivers, this general permit covers the entire State of Washington.

Compliance with Permit

Permit compliance consists of two parts; submittal compliance (submitting required reports on time) and monitoring compliance (testing the wastewater to verify compliance within the permit effluent limits); and compliance with Best Management Practices (BMP's) and other narrative requirements of the permit. Monitoring compliance includes both non-report violations (failure to complete a required test) and effluent limit violations (actual exceedances of the permit effluent limits). The chart below summarizes monitoring violations since this general permit was issued.



Wastewater Characterization

Process wastewater discharges to surface water require a monthly DMR be submitted to Ecology. The parameters for this monthly DMR are: Biochemical Oxygen Demand (BOD5), Total Suspended Solids (TSS), pH, temperature, total chloride, total residual chlorine and flow. Table 1 below is a six and a half years (78 months) average of those parameters taken from every discharge of process wastewater to a surface water between July of 2009 and December of 2015.

TABLE 1 – 6.5 Years (78 months) Average of Process Wastewater Discharges to Surface Waters

DATA RANGE 07/01/2009 -12/31/2015							
PARAMETER	BOD	pH	TEMP	TOT CL	TRC	TSS	FLOW
UNITS	mg/L	S.U.	°C	mg/L	mg/L	mg/L	GPD
AVERAGES 04.11.2016**	17.63	7.30	14.86	46.10	0.031	16.14	34200.27

INDUSTRIAL OPERATIONS

Water Sources

The fresh water used by the fresh fruit packing industry is obtained from municipal purveyors, reservoirs, surface water and/or groundwater (i.e., private wells). The amount of water consumed during packing operations varies depending upon the facility size, operating policies, type of the cooling water system, water cost/availability, and even the condition of the harvested fruit. However, those fresh fruit packers utilizing a pre-size scheme typically use larger amounts of fresh water than those not using a pre-size scheme. This increase in water use is due primarily to the flumes, as well as some duplication of processes (washing and rinsing).

General Processes

Industrial fresh fruit packing operations vary within individual packers due to customer preferences and the types/varieties of fruit being processed. However, the wastewater discharged from these individual facilities is characteristically very similar. Fruit packing was historically seasonal, coinciding with the fruit harvest season, which generally begins in June (cherries) and ends in November (apples). However, with the advent of controlled atmosphere (CA) storage, the industry packs fruit for almost the entire year.

When fruit is freshly picked, the producer first collects them in wooden or plastic bins. These bins are subsequently stacked and trucked to warehouse facilities for final preparation, packing, and/or storage. Upon arrival at the packing warehouses, the fruit will be handled in one of three ways: (1) immediately processed; (2) put into regular cold rooms (refrigeration only) for short-term storage; or (3) placed in CA rooms for intermediate or long-term storage after generally first being treated with antioxidants and/or fungicides. The stored fruit is removed as needed from storage to be packed and shipped.

The process of storing fruit in either CA or regular cold storage requires substantial cooling capabilities. There are various cooling systems possible (i.e., Freon and ammonia phase change) with some using Non-Contact Cooling Water (NCCW) for defrosting purposes. The fresh fruit packing industry has trended toward evaporative cooling systems in which water is re-circulated through tall towers where captured heat energy is released through evaporation. Although these systems effectively reduce overall water consumption, recirculation of water can lead to "fouling" of the towers. Fouling is characterized by two principal occurrences; chemical scale formation (calcium and magnesium salts) and physical blockages (suspended solids, corrosion products, and microbial growth). These principal fouling problems are typically controlled by regular treatments with chemical products, some of which display toxic properties.

The use of both CA storage and evaporative cooling tower methods has significantly increased the marketability of fruit throughout the entire year. However, these same methods involve the use of chemical additives, some of which have a significant potential to cause degradation of surface and groundwater quality.

During storage, fruit is susceptible to several postharvest diseases and disorders. The most common ***diseases*** are: (1) Gray Mold, *Botrytis cinerea*, which generally enters through the calyx and wounds in the skin at the field site; (2) Blue Mold, *Penicillium expansum*, which often enters through wounds or bruises during storage; (3) Bull's Eye Rot, *Neofabraea perennans*, which is a rot primarily established on the fruit in the orchard; and (4) Mucor Rot, *Mucor piriformis*, which is a soil-borne fungus that grows well at cold storage temperatures. The most common ***disorders*** are: (1) Scald, which is a brown discoloration of the skin caused by oxidation; and (2) Bitter Pit, another degradation of the fruit flesh. A more detailed description of common postharvest diseases and disorders can be found in *Market Diseases of Apples, Pears, and Quinces*, Agricultural Handbook No. 376, 1976, ARS-USDA. In order to reduce the transmission of such diseases and the occurrence of disorders, the fresh fruit packing industry relies on various chemical treatments. Typically, the first application of a postharvest chemical is done at the "drencher" or presize operation immediately prior to the fruit being placed in storage.

WASTEWATER SOURCES

The fresh fruit packing industry's wastewater typically originates from the following areas, drenchers, packing processes (pear float tanks, packing line flumes, packing line dump tanks, hydrocoolers etc.), cleanup processes and NCCW. Other sources of wastewater from fresh fruit packers can include sanitary sewage and stormwater. These wastewaters (process and others) are characterized below.

Drenchers

Certain varieties of apples are drenched with a solution containing the antioxidant Diphenylamine (DPA) (which may also be combined with fungicidal chemicals) prior to storage. DPA is used to combat the apple disorder, scald; while fungicides are used to reduce postharvest decay. Calcium chloride can also be used as a post-harvest drench to prevent disorders such as bitter pit in varieties of apples susceptible to those certain disorders. Calcium chloride can be used with DPA and fungicides. Pears may be drenched with an Ethoxyquin solution, another antioxidant product used to treat scald. Other drench products include the fungicides thiabendazole (TBZ), pyrimethanil, fludioxonil, and difenoconazole which are typically used in postharvest drench solutions for apples, but can be used on pears as well. Another possible drencher additive is a food grade silicone de-foaming agent, which is not considered environmentally detrimental at the concentrations typically used by the fresh fruit packing industry.

There are two basic drenching methods, truck-drenching and bin-drenching. In **truck-drenching,** (typically used for processing more than 50,000 bins per year) the drench solution is applied to the fruit while still in bins on the truck. A typical truck-drencher has at least one 1500 to 3000 gallon storage/mix tank with overhead coarse-spray nozzles. Some drenchers also have side nozzles. Drenchers are typically used only during harvest and must be drained periodically to remove dirt, sticks, leaves, organic wastes, and to recharge the chemical agents. The predominant method for determining when to drain is based on the number of bins processed and label instructions from the chemicals used. However, some Permittees drain their drencher solutions when the chemical concentration in the solution has been determined to be “spent.” Drenching solution is recirculated: the solution cascades down through the apple bins, and is ultimately funneled by concrete berms on the floor of the drenching area and returned to the storage or mixing tanks. This collected drench

solution is then re-applied onto fresh bins of apples until a decision is made to drain out the solution and make up a new batch. In **bin-drenching**, (typically used for processing less than 50,000 bins per year) the drench solution is applied to the individual bins of fruit (which have been removed from the truck) by spraying them while on a conveyor. A bin-drencher usually has one 500 to 1000 gallon tank. The drenching solution is recirculated in bin drenching through a similar method.

Packing Processes

When market orders for fresh fruit arrive, the packer opens either a CA or regular cold storage room. Whenever a storage room is opened, the stacked bins of fruit are removed as soon as possible and brought to the beginning of the packing lines.

Apple and Cherry Dump Tanks - Dump tanks are used to remove the fruit from the bins. As each bin is completely submerged in the water solution, the fruit floats out, thereby eliminating any excessive physical contact which might reduce marketability. The water then transports the fruit to one of two distinct, packing schemes; non-presize and presize. The water solution used in dump tanks often contains no chemicals, contains chlorine-based products (or other sanitizers) or is acidified. During postharvest operations, residual concentrations are checked relatively often because these chemicals are typically adsorbed onto solids and organic sugars, which could degrade their effectiveness. Ecology has determined there is only minor, if any, chemical carry-over from storage to dump tank wastewater.

Pear Float Tanks - When packing pears, often certain chemicals are added to increase the water's specific gravity. The chemicals/products typically used for this purpose are: lignosulfonate, sodium silicate, sodium sulfate, potassium carbonate, and potassium phosphate. These products are not necessary when using a "floatless" packing system. Pear dump tanks may also contain the fungicide, sodium o-phenylphenoxide (SOPP) or a sanitizer such as chlorine. The interval at which the tank water solution is emptied varies and depends on each specific packing operation's policy. Wastewater from pear packing float tanks may contain significant carry-over concentrations from the specific gravity enhancers and fungicides mentioned above. Lignosulfonate is especially prone to this, resulting in a potential for significant BOD_5 loading and color carryover in wastewater. The dark brown color from lignosulfonate can interfere with UV disinfection systems, pass through a POTW without being treated, and may have other biological impacts to small POTWs. Therefore, any wastewater (float or rinse) containing lignosulfonate is not allowed to discharge to POTWs with UV disinfection. A number of Permittees have installed low-volume pre-rinse bars to return as much of the specific gravity enhancers to the float tank as possible.

As an alternative to chemical float enhancers, "floatless" rollover dumpers are used in some facilities. In this process, bins are placed in a cage and submerged in the tank where they are slowly rotated. A bottom chain moves non-floating fruit up to the exit flume. In addition to eliminating the need for float enhancing chemicals, rollover dumpers make it possible to apply fungicides such as SOPP in smaller in-line dip tanks, which can greatly reduce the amount of fungicide used.

Packing Lines - Packing lines vary between fruit packing facilities in the type and quantity of both chemical additives used and wastewater discharged. The fresh fruit packing industry typically uses a linear alkyl sulfonate (LAS) based detergent that washes and removes natural waxes, dirt and other

orchard residues from the fruit prior to further processing. Additional acidic or basic apple wash additives such as peracetic acid, phosphoric acid, citric acid, sodium hydroxide, tri-sodium phosphate, sodium carbonate, etc., may be used. Typically, fruit packers use two distinct, but similar, packing line schemes; non-presize and presize. The non-presize scheme uses six steps, flotation, washing and rinsing, waxing, sorting and final packaging. The presize schemes use basically the same steps, but in differing orders, and include two different presize methods corresponding to whether the presizing occurs before or after long term storage.

Non-presize schemes - Can be used with any fruit and can be used year round. For apples, the fruit is elevated or conveyed out of the dump tank. Next, the apples pass underneath a wash spray, which typically contains a detergent and/or sanitizer. The rollers in this area are usually bristle-covered (brushes) to physically aid in the effectiveness of the wash solution. The fruit are then rinsed with a spray of freshwater to flush off excess chemicals. In some cases, the rinse is followed with an additional sanitizer spray.

The fruit is finally moved across a series of brushes or sponge-covered rollers to remove excess water from the surface of the fruit. Sometimes, additional devices (i.e., fans, heaters, and dehumidifiers) are used to expedite the removal of rinse water through evaporation. From this point on, the rest of the packing process is waterless.

Once the fruit surface has been dried, the fruit may be coated by passing through a fruit coating spray on top of bristle-covered rollers (brushes). Use of brushes assures even application of the coatings, which are usually; shellac (fast-drying with high gloss), carnauba (usually for export), or a combination of the two. The coating spray may also contain a fungicide. After passing through the "waxer," the fruit continues on top of regular rollers through a forced-air dryer/dehumidifier to assure fixation of the coating. They are then physically directed into specific lanes of movement, which guide the fruit through the sorting process.

In the more modernized packing plants, the fruit next passes underneath either or both of the following opto/mechanical devices; a row of "electric eyes" which analyze the fruit for percent of color and/or a row of precise microprocessor-controlled scales for weight determinations. Each individual fruit is carried down parallel sorting lines and gently placed at a specific location, which has been calculated by the microprocessor according to various marketing categories pre-selected by the operator. This is in contrast to older facilities, where the fruit is still hand-sorted for both size and color.

At the end of the packing line, the fruit is given a final visual quality control check and placed into a variety of packaging containers including boxes, bulk bags, totes, and so on. These are then put into regular cold storage until time for shipment.

Presize schemes - Are used mainly with apples or pears and can occur either before or after long term storage. Presize schemes are more extensive and tend to use greater quantities of water than non-presize schemes. This is because fruit conveyance is done by water **flumes** rather than the mechanical devices used in non-presize schemes. Chlorine-based products are often used to control spore build-up of postharvest decay fungi. However, total residual chlorine can potentially combine chemically with other waste products to produce toxic by-products (i.e., chloramines). A typical presize fruit packer uses a number of flumes at any one time, from 6 to 18. Flume dimensions may

vary considerably. The most important factor is that all sorting is completed separate from the packing line, which itself is nearly identical to that of the non-presize scheme.

When presizing occurs before CA storage, harvested fruit is brought from the fields and drenched at this time (if drenching), before placement in short term storage. The fruit is then removed from storage, placed in dump tank, sorted, and re-binned. The full bins are placed into long term storage. When market orders arrive, the bins of properly sized apples are retrieved from storage and sent through the non-presize scheme (as described above), with exception of sorting, since that has been previously completed.

When presizing occurs after CA storage, binned fruit is taken out of storage and then is placed in dump tank, washed, rinsed, and sorted. Once the sorting has been accomplished, the apples are re-binned and placed into regular cold storage. When market orders arrive, the bins of properly sized apples are retrieved from storage and sent through the non-presize scheme (as described above), with exception of sorting, since that has been previously completed.

Non-Contact Cooling Water (NCCW)

Chemicals Used to Prevent Fouling - NCCW commonly requires some type of treatment, typically chemical-based in order to prevent biological or physical fouling. The industry uses a wide variety of these chemicals in various combinations and concentrations. These chemical additives, by their nature, have the potential to exhibit toxicity in the receiving water. Given the large number of chemicals and the potential synergistic effects of their combinations, Ecology concluded it would not be practical to regulate these additives individually in this general permit. Whole Effluent Toxicity (WET) testing will better demonstrate toxicity. Permittees that wish to discharge NCCW (with chemical additives) to surface waters must pass the WET test in order for that discharge to be covered under this general permit. WET testing is discussed in more detail under TDM 6 – Surface Water, bullet #6 of the general permit.

Currently there exists, alternative non-chemical treatment technologies for NCCW. Some examples of these technologies are as follows, Ultrasound, Pulse-Power, and Ozone. Ultrasound is used as microbiological (bacteria/algae) control treatment in cooling water systems. When applied to NCCW, ultrasound frequencies that are greater than 16 kHz result in cavitations, creating high local pressures and temperatures. This causes light and highly reactive radicals to be emitted. Pulse-Power systems can be used to control corrosion, scale, and bacteria/algae. These systems include a high frequency pulse generator (controller) and a reaction chamber. The controller introduces a high-frequency, time-varying electromagnetic field into the cooling water via a reaction chamber. This electrical field deteriorates the cell membranes, which kills bacteria and other pathogens. Ozone treatments help control scale and bacteria/algae growth in water cooling towers. Ozone treatment systems compress ambient air, then dry and ionize it to produce ozone. The ozone is then added to the circulating water in the tower (*Cooling Tower Study: Facts and Lessons Learned*, Washington State Department of Ecology [TREE], September 2007, pages 8, 9, and 10).

NCCW which contains priority pollutants, dangerous wastes, or toxics in toxic amounts, will only be permitted to discharge into lined evaporative lagoons. NCCW which does not contain priority pollutants, dangerous wastes, or toxics in toxic amounts, is permitted to be discharged to any of the six TDMs (following a passed WET test for surface water discharges).

Total Dissolved Solids (TDS) in NCCW - TDS, which affects the aesthetic value of groundwater, is a secondary groundwater criterion set at the Groundwater Quality Standard of 500 mg/L, established in chapter 173-200 WAC. The health risks associated with TDS, especially at the levels reported by most packers are low. Packers obtain water for NCCW purposes from several sources including: private wells, surface waters and municipal water systems. The TDS content of the source water sometimes exceeds the groundwater criterion of 500 mg/L. TDS is generally considered a conservative pollutant. Given the complexity of soil forms and aquifer/soil interactions, it is difficult to generalize or predict the impact TDS will have on aquifer concentrations, especially after wastewater containing high levels of TDS has been discharged via land application. Given the reported TDS concentration levels, the implementation of BMPs, and the relatively low volumes of application, Ecology has determined a TDS effluent limit for discharges of NCCW to dust abatement and land application is unnecessary however, sampling and analysis will continue.

CHEMICALS ALLOWED FOR USE

Note: References to human health refer to those risks associated with impacts of wastewater discharges into waters of the state. It does not refer to risks associated with exposure to any chemical additive or ingestion of any chemical residue on the fruit.

Chlorine-Based Chemicals

Calcium hypochlorite (CAS# 7778-54-3), sodium hypochlorite (CAS# 7681-52-9) and chlorine dioxide (CLO2) (CAS# 10049-04-4) –

Calcium hypochlorite, sodium hypochlorite, chlorine dioxide, and other chlorinated chemicals are common additives and disinfectants used during the packing of fruit. Calcium hypochlorite is highly toxic to aquatic organisms (LC50 (96hr) = 0.16 mg/L for rainbow trout & LC50 (48hr) = 0.11 mg/L for daphnia magna). In rats, calcium hypochlorite is slightly toxic with an oral rat toxicity of Lethal Dose 50 (LD50) = 850 mg/kg. Sodium hypochlorite is also highly toxic to aquatic organisms (LC50 (96hr) = 0.18 mg/L for rainbow trout & LC50 (48hr) = .033-.048 mg/L for daphnia magna. In rats, sodium hypochlorite is moderately toxic with an oral rat toxicity of LD50 = 192 mg/kg.

Chlorine dioxide is a powerful oxidizing agent used as an alternative disinfectant to chlorine. It has 2.5 times the oxidizing capability of chlorine, and generates no chloramines or tri-halomethanes and inhibits the formation of chloroform. It is a greenish-yellow gas which is typically produced on-site due to its explosive nature. At large concentrations (above 10%) in air, it can explode upon contact with any ignition source. Oral rat toxicity studies show an LD50 = 292 mg/kg, which is moderately toxic. Chlorine dioxide is however, highly toxic to aquatic organisms (LC50 (96hr) = 0.15 mg/L for bluegill & LC50 (96hr) = 0.17 mg/L for fathead minnow). Industry sources indicate use concentrations are 1.0 – 3.0 mg/L. Off-gassing of chlorine can occur with the use of chlorine dioxide, so worker health should be considered. Human health concerns with the wastewater should be low when used at normal use concentrations.

Chlorine can form highly toxic chloramines upon contact with ammonia and/or nitrogenous compounds. However, fruit packing wastewaters generally lack significant amounts of ammonia and/or nitrogenous compounds. Residual chlorine, in the absence of ammonia, may also produce

chloroform due to its reactivity with organic material. Residual chlorine has a strong adsorption to soil; therefore chlorine-based compounds are not expected to leach.

Total residual chlorine concentrations are of concern when using chlorine-based chemicals due to the fact that they are extremely toxic for aquatic organisms. In order to discourage high total residual chlorine concentrations, the fruit packing industry is encouraged to employ best management practices, waste reduction techniques and/or chemical substitution. These techniques should minimize the formation of potentially toxic or environmentally unsound wastewater and thereby protect the quality of ground and surface waters of Washington State.

Wastewater containing any type of chlorine-based chemical is allowed to be discharged to any of the six TDMs, but total residual chlorine must be sampled for if chlorine-based products are utilized. The most stringent total residual chlorine discharge limit for dust abatement and land application is 10.0 mg/L. The general permit limits discharges to POTWs to 0.50 mg/L of total residual chlorine and discharges to percolation systems to 5.0 mg/L of total residual chlorine. Discharges to surface waters are limited to 0.019 mg/L of total residual chlorine, the acute freshwater water quality criterion. If a packer uses the diethyl-p-phenylene (DPD)/colorimeter test method (40 CFR Part 136) to measure this parameter, then the enforceable limit is the established quantitation level (analytical detection limit) of 0.05 mg/L due to the lack of a reasonably priced field test kit which can detect total residual chlorine at lower levels. A packer does not violate the permit when it measures a total residual chlorine value between 0.019 mg/L and 0.05 mg/L, but it must report the value as “less than 0.05 mg/L.” If total residual chlorine concentrations exceed the above effluent limits then packers must de-chlorinate the discharge.

Fungicides

Fludioxonil (CAS# 131341-86-1), 4-(2, 2-difluoro-1, 3benzodioxal4-yl-1H–pyrrole-3-carbonitrile) –

Fludioxonil is a postharvest fungicide that helps control the pathogens that cause postharvest diseases such as blue mold, gray mold, bull’s eye rot, rhizopus rot, bitter rot, sphaeropis rot, phacidiopynis rot, and white rot to pome fruits (fleshy fruits such as apples or pears). Fludioxonil comes from the Phenylpyrrole chemical class. It can be applied in drenchers, dip tanks and packing line spray systems. It is used in concentrations of 300 mg/L and can be used in conjunction with DPA, Ethoxyquin and other fungicides. Fludioxonil is highly toxic to aquatic organisms (LC50 = 0.47 mg/l for rainbow trout and an LC50= 0.74 mg/l for bluegill). However, in rats, it is practically non-toxic (acute oral rat toxicity: LD50 rat = > 5050 mg/kg). Human health risks are low as it is a slight skin and eye irritant. It has an aerobic soil half-life of 143-220 days and in water it has a half-life of <10 days. Fludioxonil also has low mobility capabilities and therefore has a low potential to leach to groundwater.

Due to it being highly toxic to aquatic organisms, wastewater containing Fludioxonil is prohibited from discharging to any TDM other than lined lagoon, dust abatement and/or land application. The strictest maximum permit limit for both dust abatement and land application is 300 mg/L, at an application rate of 1800 gal/acre/day, every other day, to a maximum of 30 applications a year.

Difenoconazole (CAS# 119446-68-3), 1{2-[4-(chlorophonoxy)- 2chlorophenyl-(4-methyl-1,3-dioxolan-2-yl))-methyl]}-1H-1,2,4-triazole

Use of Difenoconazole is a new addition to this Fresh Fruit Packers' general permit as a postharvest dip or drench, or line spray fungicide after it was registered by EPA on March 26, 2015. The EPA Registration number is 100-1529. This product was conditionally registered in accordance with FIFRA section 3(c) (7)(B).

Difenoconazole is a postharvest dip or drench, or line spray fungicide that helps control the pathogens that cause postharvest diseases such as:

- Alternaria rot (side rot) and surface mold (*Alternaria alternata*)
- Bitter rot (*Colletotrichum gloeosporioides*)
- Blue mold (*Penicillium expansum)*
- Bull's-eye rot (*Neofabraea malacorticis; N. alba; N. perrenans; N. nova)*
- Gray mold (*Botrytis cinerea)*
- Phacidiopycnis rot (*Phacidiopycnis piri*)
- Rhizopus rot (*Rhizopus stolonifer)*
- Speck rot (*Phacidiopycnis washingtonensis*)
- Sphaeropsis rot (*Sphaeropsis pyriputrescens*)
- White rot (*Botryosphaeria dothidea*)

Considering the toxicity to aquatic organisms and data gaps of this fungicide, wastewater containing Difenoconazole is prohibited from discharging to any TDM other than lined lagoon. The allowable concentration of Difenoconazole is 300 mg/L.

Refer to APPENDIX B—REPORTS AND DOCUMENTS RELATED TO DIFENOCONAZOLE for more information concerning this post-harvest fungicide.

Pyrimethanil (CAS# 53112-28-0), (4, 6–dimethyl–n phenyl–2–pyrimidinamine) –

Pyrimethanil is a postharvest fungicide that helps control pathogens that cause postharvest diseases such as blue mold, gray mold, bull's eye rot, sphaeropsis rot, phacidiopycnis rot, and other pathogens often found in pome fruits. Pyrimethanil can be applied in drenchers, dip tanks and packing line spray systems. It is typically used in drenchers at a concentration of 500 mg/L, but can be used in concentrations of up to 2,000 mg/L and can be used in conjunction with DPA, ethoxyquin, and other fungicides. Pyrimethanil is moderately to slightly toxic to aquatic organisms (LC50 (96hr) = 10.56 mg/L for rainbow trout & an Effective Concentration 50 (EC50) (48H) = 2.9 mg/L for daphnia magna). However, in rats, its acute oral toxicity is significantly lower (oral rat toxicity LD50 (rat) = > 2000 mg/kg). Swallowing pyrimethanil is harmful to humans, but is non-irritating to the eyes and skin. It is unlikely to leach to groundwater and has a half-life of 37 days.

Wastewater containing pyrimethanil is prohibited from discharging to any TDM other than lined lagoon, dust abatement, and land application. This general permit contains two different maximum permit limits for wastewater containing pyrimethanil, the first being 500 mg/L, with an application rate of 1800 gallons/acre/day, every other day, to a maximum of 30 applications per year

and a maximum of 1000 mg/L, with an application rate of 1800 gallons/acre/day, every other day, to a maximum of 15 applications per year.

Captan® (CAS# 133-06-2), (4-cyclohexane-1,2-dicarboximide,N-((trichloromethyl)(thio))

Captan® is a fungicide usually applied on stone fruits (including cherries) and berries. It can also be applied as a postharvest dip to apples and pears. Captan® is used at concentrations up to a maximum of 1200 mg/L. It is highly toxic to aquatic organisms (LC50 (96hr) = 0.073 mg/L for rainbow trout). However, in rats, Captan® is practically non-toxic (oral rat toxicity, LD50 = 8400 to 15,000 mg/kg). Human health risk appears to be moderate due to low dermal toxicity and carcinogenic potential. It readily adsorbs and is practically immobile in soil and is also unlikely to leach. It degrades by both chemical and biological methods. Captan® used at concentrations of up to 250 mg/L, is not persistent in moist soil and has a half-life from 1 to 5 days; however, in dry soil it has a half-life of up to 2 months. Captan® also has a half-life in water from 10 minutes to 12 hours. However, due to its toxicity, it is prohibited from entering waters of the state.

Due to it being highly toxic to aquatic organisms, wastewater containing Captan® is prohibited from discharging to any TDM other than a lined evaporative lagoon, dust abatement and/or land application. The strictest maximum permit limit for dust abatement and land application discharges is based on the dangerous waste regulation calculated maximum concentration limit of 10.0 mg/L.

Thiabendazole (TBZ) (CAS# 148-79-8)

TBZ is a fungicide used to control blue and gray molds. It is typically used in drencher solutions at concentrations of up to 615 mg/L, which is the maximum label use rate. It can also be used in a line spray or added to the wax coating at rates up to 2000 mg/L for treatment of postharvest decays.

TBZ is a General Use Pesticide (GUP) and is in EPA toxicity class III (slightly toxic). It was declared eligible for registration by the EPA in 2002. It is moderately to slightly toxic to aquatic organisms, (LC50 (24hr) = 10.0 mg/L for Coho salmon, an LC50 = 24.9 mg/L for bluegill, and an LC50 = 2.4 mg/L for rainbow trout). In rats, TBZ is slightly toxic with an oral rat toxicity of LD50 = 3330 mg/kg. TBZ has demonstrated POTW toxicity at slug-loads above 50 mg/L. Human health risks appear to be low. TBZ is stable to photolysis in soil and hydrolysis. It does not metabolize significantly in soils under aerobic or anaerobic conditions. The field half-life for TBZ was reported in one study as 403 days. However, TBZ is readily adsorbed onto soil particles and is practically immobile in soil. Its affinity for soil binding increases with increasing soil acidity. EPA has concluded that due to its affinity for soil and high soil/water partitioning coefficients, the risks for leaching into groundwater and runoff into surface waters are low. TBZ photo-degrades in water with a half-life of approximately 29 hours when exposed to a xenon lamp for 96 hours. Given TBZ's low solubility, it is most likely to be bound to sediment.

Drencher wastewater (no matter what chemicals are used) is not allowed to discharge to POTWs, percolation systems, and surface waters. Discharges to POTWs (with permission) of wastewater containing TBZ (except drencher wastewater) will have a max limit of 50 mg/L and discharges (except drencher wastewater) to percolation systems will have a max limit of 10.0 mg/L (the aquatic toxicity value). Individual POTWs may deny discharge or may set more stringent limits if they feel it is necessary to protect their operations. Any wastewater containing TBZ is prohibited from

discharging to surface waters. The maximum permit limit for wastewater (drencher and packing wastewater) containing TBZ for both dust abatement and land application is 615 mg/L, at an application rate of 1800 gallons/acre/day, every other day, to a maximum 30 applications per year. Ecology requires only one annual analysis of TBZ for drencher wastewater discharges to dust abatement and land application.

SOPP (sodium ortho-phenylphenoxide) (CAS# 132-27-4)

SOPP is a fungicide commonly used in pear float tanks at concentrations from 1000 to 6000 ppm. It is used primarily with one of the following pear float enhancers: lignosulfonate, sodium sulfate, sodium silicate, and potassium carbonate. It may also be used in a separate in-line dip tank. This chemical has proven to be highly toxic to aquatic organisms (LC50 = 5.99 mg/L for fathead minnow and an LC50 = 2.8 mg/L for rainbow trout). Acute oral rat toxicity studies show an LD50 = 1160 mg/kg, making it slightly toxic to rats. Human health risk has not been determined, but is suspected to be moderate due to the toxicity data for pure phenol, which is chemically similar.

Chlorine should not be used in conjunction with SOPP because the chlorine can destroy the compounds in SOPP and possibly form polychlorobiphenyls (PCBs). The chlorine would not be able to attain a free disinfection residual that would be sufficient to destroy postharvest pathogen spores (*Investigation into Effluent Discharges from Washington Fresh Apple Packers* (EPA Contract No. 68-03-2578), September 1980, 110 pg).

At concentrations lower than 10.0 mg/L, SOPP is easily and rapidly biodegraded, with a half-life of approximately seven days under aerobic conditions in both soil and water. In experiments with activated sludge systems, SOPP has caused upsets at slug loadings of 50 mg/L. Discharges of wastewater containing SOPP to POTWs are limited to maximum permit limit of 50.0 mg/L. Individual POTWs may set more stringent limits if they feel it is necessary to protect their operations. Discharges of wastewater containing SOPP to percolation systems have a maximum permit limit of 6.0 mg/L, the LC50 toxicity value. The tiered application rate for land application and dust abatement established in the previous permit remains in effect. Application frequency is limited to once per week to reduce the risk of the SOPP inhibiting the microbial action needed for its degradation. The maximum SOPP concentration is set at the normal maximum use concentration of 6000 mg/L for the same reason. These limits are subject to change if additional research becomes available, or if any biological testing or monitoring indicates SOPP concentrations at these levels are not being adequately treated.

Antioxidants

Diphenylamine (DPA) (CAS# 122-39-4)

DPA is an antioxidant that prevents the brown "scald" discoloration of apples and may be used in combination with fungicides. It is used in drenching solutions at concentrations of up to 2200 mg/L. In 1997, DPA was approved for re-registration for post-harvest use by the EPA. The Re-registration

Eligibility Decision (RED) states that DPA appears to be very labile in the environment, with aerobic soil metabolism and aqueous photolysis being important. Under aerobic soil conditions DPA degrades rapidly (half-life < 1 day). When exposed to light in water transformation half-life is 4.39 hours. It undergoes rapid degradation in the presence of ultraviolet (UV) light and air, having a half-life of approximately 30 days in unamended soil. However, some substances enhance the degradation process, showing a half-life of approximately 10 days. It appears the ultimate fate of DPA residues is; mineralization and soil binding. Relatively little information is available about the transformation products of DPA under aerobic soil metabolism or aqueous photolytic conditions. DPA readily adsorbs onto soil, exhibiting low mobility and therefore, is not expected to leach. The mobility of DPA ranges from somewhat mobile in clay soil to mobile in other soil types (EPA Re-registration Eligibility Decision (RED), Diphenylamine EPA738-R-97-010).

The RED indicates DPA is moderately toxic to fish (LC50 (96hr) =2.2 for rainbow trout). An Ecology study conducted in 1988 determined DPA product toxicity of LC50 = 2.6 mg/L for rainbow trout. This same study also found that actual drencher wastewaters had an average LC50 = 1315 mg/L for rainbow trout. Oral rat toxicity studies of DPA have shown an LD50 = 3000 mg/kg, which makes it slightly toxic to rats. Human oral studies have shown that the lowest published lethal dose is 500 mg/kg.

DPA has been found to interfere with POTW processes at 10 mg/L and since actual discharges have significantly interfered with POTWs in the past, this TDM is prohibited for use. Wastewater containing DPA is prohibited from discharging to any TDM other than lined lagoons, dust abatement or land application. The most stringent discharge limit for land application is the maximum normal use concentration of 2200 mg/L. For dust abatement apply DPA-containing waste streams at any rate of up to a maximum annual rate of 990 lbs/acre of road surface or bin lot, which is equivalent to the discharge of 1800 gallons/acre of 2200 mg/L of DPA, 30 times per year, every other day. Ecology will not require an annual analysis of this parameter for the above TDMs, if the Permittee complies with all the terms and conditions of this general permit and applies wastewater containing DPA at a maximum rate of 1800 gallons/acre/day, every other day, to a maximum of 30 applications per year.

Ethoxyquin (CAS# 91-53-2)

Ethoxyquin is an antioxidant used to control pear scald. This chemical is typically used at a concentration of approximately 2700 mg/L and may be used in combination with fungicides. Effects on POTWs and environmental degradation processes are not known. It is slightly toxic to aquatic organisms (LC50 = 18.0 mg/L for Rainbow Trout). Oral rat studies have shown an LD50 = 800 mg/kg, making it slightly toxic to rats as well. Human health risks appear to be moderate, as cases of skin irritation upon contact have been reported. The lowest published lethal dose to humans was 500 mg/kg.

The discharge limit for wastewater (drencher and packing) containing ethoxyquin for both dust abatement and land application is the maximum normal use concentration of 2700 mg/L, at a max application rate of 1800 gallons/acre/day, every other day, to a maximum 30 applications per year. All **drencher** wastewater (no matter what chemicals are used) is not allowed to discharge to POTWs, percolation systems and surface waters. Discharges of wastewater (except drencher wastewater) containing ethoxyquin to POTWs will have a maximum permit limit of 50 mg/L and

discharges (except drencher wastewater) to percolation systems will have a maximum permit limit of 5.0 mg/L. Any wastewater containing ethoxyquin is prohibited from discharging to surface waters. Ecology will only require an annual analysis of ethoxyquin for dust abatement and land application discharges.

Pear Float Gravity Enhancers

Potassium Carbonate (CAS# 584-08-7)

Potassium carbonate is a specific gravity enhancer for pears and is usually used at a starting concentration of 27,000 ppm. It is often used with SOPP in float tank systems. Oral rat toxicity studies for potassium carbonate indicate an LD50 = 1870 mg/kg, making it slightly toxic to rats. With regards to aquatic organisms, potassium carbonate is slightly toxic (LC50 (96hr) = 68 mg/L for rainbow trout and an EC50 (48hr) = 430 mg/L for daphnia magna).

Float tank and rinse wastewater containing potassium carbonate is prohibited from discharging to surface waters. Only **rinse** wastewater containing potassium carbonate is allowed to discharge to POTWs. The strictest discharge limit is the maximum normal use concentration of 27,000 mg/L. Untreated wastewaters containing potassium carbonate will most likely be high in pH (11-12) and will therefore need to be reduced to at least a pH of 6.0 to 9.0 either before or after application.

Potassium Phosphate (CAS# 7320-34-5)

Potassium phosphate is a specific gravity enhancer for pears and is often used with chlorine in float tank systems. It is typically used at a starting concentration of about 28,800 ppm. Potassium phosphate has an oral rat toxicity of LD50 = > 500 mg/L, making it slightly toxic to rats. No aquatic toxicity information is currently available for potassium phosphate.

Float tank wastewater containing potassium phosphate is prohibited from discharging to any TDM other than lined lagoons and land application. Rinse wastewater containing potassium phosphate is allowed to discharge to dust abatement, land application and lined lagoons. The strictest discharge limit for land application and dust abatement is the maximum normal use concentration of 28,800 mg/L.

Sodium Silicate (CAS# 1344-09-8)

Sodium silicate is a specific gravity enhancer for pears and is used at a starting concentration of 30,000 ppm. It is considered mildly toxic, with an LC50 = 113 mg/L for daphnia magna. Oral rat toxicity studies indicate an LD50 = 13 mg/kg, making it highly toxic to rats. Sodium silicate has been detrimental to some POTW processes due to its abrasiveness and corrosive nature. However, this same characteristic may have significant road maintenance qualities, making it appropriate for discharges to dust abatement.

Float tank and rinse wastewater containing sodium silicate is prohibited from discharging to any TDM other than a lined lagoon, dust abatement, or land application. The strictest discharge limit for

dust abatement and land application is the maximum normal use concentration of 30,000 mg/L. Untreated wastewaters containing sodium silicate will normally be high in pH (10.0 to 11.0) and will need to be reduced to at least a pH between 6.0 - 9.0 either before or immediately after application.

Sodium Sulfate (CAS# 7757-82-6)

Sodium sulfate is a specific gravity enhancer for pears and is used at a starting concentration of 30,000 ppm. It is practically non-toxic, with an LC50 (48hr) = 1190 mg/L for daphnia magna. The FDA has classified this chemical as an indirect food additive due to being poorly absorbed into the gastrointestinal tract.

Both float tank and rinse wastewater containing sodium sulfate is allowed to discharge to lined lagoons, dust abatement, and land application. Only **rinse** wastewater containing sodium sulfate is allowed to discharge to POTWs and percolation systems. Both float tank and rinse wastewater containing sodium sulfate is prohibited from discharging into surface waters. The main concern about wastewater containing sodium sulfate is the sulfate component. Even if sodium sulfate is not used, sulfate is a required monitoring parameter for discharges to the following TDMs: POTWs (excluding NCCW), land application (excluding NCCW and drencher wastewater), and percolation systems (excluding NCCW). The only time sulfate is a required parameter for discharges to dust abatement is when sodium sulfate is used. Whenever sulfate is a required parameter, the maximum permit limit is always the same, 250 mg/L, which is the state's groundwater quality standard. Wastewaters containing sodium sulfate will normally be high in sulfate and may need pretreatment before discharge.

Lignosulfonate (CAS# 8061-51-6)

Lignosulfonate is a specific gravity enhancer used to float pears. The normal float tank concentration is 12% (120,000 mg/L) lignosulfonate, of which 50% or 60,000 mg/L are solids. The BOD_5 to solids ratio is generally 0.3 to 1 resulting in approximately 18,000 mg/L BOD_5 in the float tank solution. At these discharge concentrations, lignosulfonate is extremely toxic (LC50 = 2400 mg/L for rainbow trout). Oral rat toxicity studies indicate an LD50 = 28,500 mg/L. The high BOD_5 content would be potentially detrimental under all TDMs except for dust abatement, since lignosulfonate has a strong affinity to adsorb to soil. The maximum permit limit for dust abatement is the normal float tank use concentration of 12% or 120,000 mg/L lignosulfonate. If the Permittee complies with all the terms and conditions of this general permit, Ecology will not require analysis of this parameter for the above TDM.

Rinse wastewater containing Lignosulfonate is allowed to be discharged to lined lagoons, POTWs (which do not use UV disinfection), land application and dust abatement. Even in rinse wastewater there is a strong potential for effluent limit violations due to lignosulfonate being extremely high in BOD_5. Odor control measures may be necessary for discharges to lined lagoons due to the high BOD_5 content. In the past, quantities of lignosulfonate wastewater entered POTWs, adversely affecting the operation of the POTWs, either because of the BOD_5 exceeding the limits or because of the color interfering with the UV disinfection system and passing through the system untreated. Measures must be taken to ensure that such discharges must not exceed any limit given for any specific TDM or cause any interference or by-pass at a POTW. Such measures can include process

and source control methods such as; countercurrent washing systems, pre-rinse bars, collection and return of tank overflow and other runoff to the dump tank, recycling, dry or floatless dump systems, alternative chemicals or any other new pollutant reduction techniques that become available. This general permit prohibits the discharge of both float tank wastewater and rinse water containing lignosulfonate to POTWs that use UV disinfection. At such time that scientific evidence would indicate that different limits and/or TDMs would be possible without causing significant potential to violate any state or federal law or standard, this general permit may be modified accordingly.

Other Chemicals/Processes

Calcium Chloride (CAS# 10043-52-4)

Calcium chloride is used to help prevent disorders in fruit that are caused by low calcium levels, such as bitterpit. It may be used in postharvest drencher solutions at a concentration of approximately 2200 mg/L (equivalent chloride concentration = 1406 mg/L). It can be used with DPA or fungicides. When used in smaller concentrations, it is relatively non-toxic to aquatic organisms (LC50 = 900 mg/L for rainbow trout). Calcium chloride produces heart failure in mice at a concentration of 280 mg/L. Human health risks appear to be moderate in that it is a powerful irritant of the skin and respiratory systems. Calcium chloride is used at concentrations which pose a potential for salt build-up in the soil and eventual leaching to groundwater. This chemical does not biodegrade.

Wastewater containing calcium chloride is prohibited from discharging to any TDM other than lined lagoons, dust abatement and land application. The best way to control chlorides is through the use of BMPs, including specifying a maximum use concentration and a maximum annual application rate. The maximum use concentration is the label use rate of 2200 mg/L and the maximum annual application rate for dust abatement and land application is 1800 gal/acre/day, one (1) time a year. These rates were chosen using a biased model to determine the annual application rate of calcium chloride which could be diluted by dormant seasonal precipitation to coincide with a concentration rate that would be protective of groundwater.

One of the main concerns using calcium chloride is its chloride component. Chloride is a secondary groundwater criterion and is set at the Groundwater Quality Standard of 250 mg/L, with the main concern being the aesthetic value of the water. The criterion was set as a drinking water standard at the point where a salty taste could be detected. There is a minimal health risk associated with chloride. Chloride is considered a conservative pollutant in that the only “treatment” it can receive is dilution. For all TDMs besides lined lagoons, permittees are required to sample for chloride in all wastewater except for drencher wastewater and NCCW (even when calcium chloride is not used) at a max rate of 250 mg/L (Groundwater Quality Standard).

Ozone

The tri-atomic molecule of oxygen is a bluish gas which has been used for disinfecting drinking water since 1893. The effectiveness of ozone is not as dependent on pH and temperature as chlorine, nor does it require extensive contact time. Ozone does not react appreciably with ammonia and produces no known toxic by-products. It has a disinfection potential of at least twice that of chlorine. Experiments at the Hood River Experiment Station, Oregon yielded important and

positive data about this disinfectant concerning the fruit packing industry. These experiments found that ozone at 0.3 ppm, or chlorine at 54 ppm, in dump (float) tank water controlled *Penicillium* and *Cladosporium* to the same levels. An ozone level of 0.5 ppm killed approximately 80% of the spores in an exposure time of three (3) minutes (Spotts RA, "Use of Ozone for Decay Control", Proceedings of the 7th Annual Washington Tree Fruit Postharvest Conference, March 27 and 28, 1991).

Peroxyacetic Acid (also referred to as Peracetic Acid) (CAS# 79-21-0)

Peroxyacetic acid (PAA) is used in postharvest fruit packing process water to control microbial growth in water systems or on equipment. It is most often used in dump tanks and packing line spray systems, but can also be used in flume water. For fruit packing purposes, peroxyacetic acid is most often used in a formulation that contains hydrogen peroxide and acetic acid. This formulation is commonly just referred to as peroxyacetic acid or peracetic acid. It is typically used at a concentration between 40-100 mg/L.

Agitation or contact with organics such as apples, leaves and dirt accelerates the decomposition of peroxyacetic acid. Once decomposition occurs, it degrades rapidly into water, oxygen, and acetic acid.

Due to a lack of ecological and toxicological information, wastewater containing peroxyacetic acid is prohibited from being discharged to any TDM other than lined lagoon, dust abatement, or land application. Under certain circumstances, discharges to a POTW may be allowed, but these discharges must be approved by the POTW and Ecology. Ecology will not require analysis of this parameter for the above TDMs as long as the Permittee complies with all the terms and conditions of this general permit.

Bio-Save®

Bio-Save® consists of bacterium strains of *Psuedomonas syringae*, CAS# 68583-32-4, which is also the active ingredient. It is generally applied to apples and pears in drencher solutions or packing line spray systems in order to help control blue mold, gray mold, and mucor rot. When used on apples and pears, it can be used in conjunction with DPA. For use with cherries, it is applied via overhead drip or packing line spray systems and helps control blue mold and gray mold. This application results in minimal discharge, basically only during clean-up. Bio-Save® fungicides have an oral rat toxicity of LD50 = >5000 mg/kg. No information is currently available for aquatic toxicity. Once mixed for application, Bio-Save® fungicides have a shelf life of 24 to 48 hours. It is killed on contact with sanitation cleaners such as bleach and quaternary ammonium compounds. Ecology will not require analysis of this parameter if the Permittee complies with all the terms and conditions of this general permit.

Silicone defoaming agent (organosilicone fluid emulsion)

This product is used to de-foam process water and is typically used up to a maximum of 100 mg/L, which corresponds to the maximum FDA limit of 10.0 mg/L silicone solids. It has a pH between 4 and 5. Human health risks appear to be low as the product used is FDA food grade. The strictest discharge limit for any application is the maximum normal use concentration of 100 mg/L. Ecology

will not require analysis of this parameter if the Permittee complies with all the terms and conditions of this general permit.

Coatings (carnauba or shellac), with/without fungicide additives

Coatings are often applied to give fruit physical protection and an attractive appearance for shipment. These products are spray applied and are assumed to be a minor contributor to overall wastewater discharges and thus not detrimental to any of the TDMs. Human health risk appears to be low, as these are typically food grade additives. Apples are typically given an application of either a shellac or carnauba-based coatings, which may also contain small concentrations of a fungicide to prevent bacterial action.

Other Packing Line Chemicals

Packing lines vary between fruit packing facilities in the type and quantity of both chemical additives used and wastewater discharged. The fresh fruit packing industry typically uses linear alkyl sulfonate (LAS) based detergent washes to remove natural waxes, dirt and other orchard residues from the fruit prior to further processing. Additional acidic or basic apple wash additives such as acetic acid, phosphoric acid, citric acid, sodium hydroxide, trisodium phosphate, sodium carbonate, etc., may be used to remove hard water deposits which can result from overhead irrigation. After washing, apples are rinsed with copious amounts of clean fresh water prior to entering the dehumidifier, coating application, and dryer. Packing line and cleanup wastewaters primarily contain detergents, disinfectants, and wax removing products in concentrations that appear compatible with all the allowed TDMs.

Conditional Use of Chemicals Not Listed In the Permit

Ecology may modify this general permit to include the conditional use of products/chemicals not normally allowed if certain procedures are first followed. The products must be approved for a specific use by the EPA and/or the Washington State Department of Agriculture (WSDA). The products must also undergo a risk assessment process that must be approved by Ecology. For more information regarding the conditional use of chemicals, please refer to *Special Condition S13* in the permit.

Sample Type and Frequency

Fruit packers must collect representative composite samples with the exception of measurements for pH, total residual chlorine and temperature, which must be done on grab samples immediately after collection. Monitoring must be done in any quarter in which there is a discharge. Monitoring frequency must be quarterly for all wastewater discharges except: (1) TBZ and ethoxyquin concentrations in drencher wastewater, which must be done annually; and (2) all process wastewater discharges to surface waters, must be done monthly. Ecology may establish specific monitoring requirements in addition to those contained in this general permit by administrative order.

TREATMENT/DISPOSAL METHODS (TDMs)

Selection of TDMs

Ecology has studied the characteristics of wastewater discharges from the fresh fruit packing industry. The TDMs discussed below were designed for the protection of waters of the state, POTWs, and human health, and must not conflict with any stricter existing zoning, land use, and/or local health department regulations. This general permit requires the Permittee to identify all of the wastewater streams to be discharged by the facility. The Permittee must then select for each wastewater stream, the appropriate TDM based upon the actual type of wastewater.

A Permittee may only use one or a combination of the following six allowed TDMs, as appropriate:

TDM 1 - LINED EVAPORATIVE LAGOONS

Definition of Lined Evaporative Lagoons (Lined Lagoons)

Lined lagoons are lined, engineered structures which rely largely upon evaporation for water removal. Lined lagoons also include pre-manufactured, above-ground fiberglass or metal tanks. Lagoon geomembrane liners constructed after September 1, 2016 must meet or exceed the performance specifications of a 60 mil synthetic HDPE liner. For the purposes of this general permit, clay liners are not acceptable.

Lined Lagoon Requirements

Permit Special Condition S5.A.1 states that the construction and design of any lined lagoon must be managed by a geomembrane specialist or a licensed professional engineer (P.E.) unless this requirement is waived by Ecology in accordance with *chapter 173-240 WAC.*

Lagoon geomembrane liners constructed after September 1, 2016 must meet or exceed the performance specifications of a 60 mil synthetic HDPE liner. Ecology recommends double lined evaporative lagoons with a leak detection system, with each geomembrane liner with a minimum of a 40 mil thickness. Permittees may alternatively use above ground, pre-manufactured fiberglass tanks or fiberglass or metal lined tanks in lieu of geomembrane liners.

BMPs

Five year lagoon liner examinations/inspections - All lagoons must be completely emptied and liners must be examined at least once every five (5) years after being built. Permittees must maintain (on-site) documentation showing the results and the date of the five year examination and what actions were or will be taken. If significant deterioration and/or tears are found during the five year examination/inspection and the liner is less than 60 mil, the liner must be replaced. Ecology will strictly review documentation from any completed five year examination/inspection.

Permittees operating a double lined lagoon with a leak detection system may submit a leak detection plan, and detection results, in lieu of the requirement to completely empty the lagoon.

TABLE 2 – Effluent Limits & Monitoring of Discharges to Lined Lagoons

PARAMETER	MINIMUM	SAMPLE FREQUENCY	SAMPLE TYPE
Freeboard (reported in feet)	2 feet	Quarterly	Measurement

TABLE 3 - Minimum Setback Distances (feet) for Lined Lagoons[1]

	Surface Waters Of The State	Potable Water Wells
Lined lagoons with DPA and/or Difenoconazole	250 feet	250 feet
Lined lagoons without DPA	50 feet	100 feet

[1] No chemical testing is required for discharges to lined lagoons.

Rationale for Lined Lagoons

The general permit does not include requirements for analyzing wastewater discharged to lined evaporative lagoons. Discharge limitations are the maximum normal use concentrations and discharge volumes must not exceed the two-foot freeboard daily minimum monitoring limit.

Due to the nature of some of the products used in fresh fruit packing and their potential to contaminate groundwater, Ecology implemented the requirements above and also requires that recommended Best Management Practices (BMP's) be implemented for all lined lagoons under the Fresh Fruit Packing General Permit.

TDM 2 – DUST ABATEMENT

Definition of Dust Abatement

Dust abatement is the discharge of wastewater to unpaved bin storage lots, unpaved roads (i.e., orchard roads), or unpaved driveways/parking lots for the purpose of dust suppression. This TDM is primarily intended for the discharge of drencher wastewater and pear float tank wastewater. Permittees may discharge other wastewater sources via dust abatement; see *Permit Special Condition S5.B* in the general permit for more information. Each facility desiring to use this TDM must prepare a Road Management Plan (RMP), see *Permit Special Condition S5.B.2.c* of the general permit for more information about RMPs. Any wastewater streams containing DPA, lignosulfonate, or chlorine-based chemicals must have separate application sites and RMPs. The Permittee's RMP must not allow for potential or actual contamination of waters of the state, or violate any other federal, state, or local regulation. Batch mix records must also be maintained to ensure accurate chemical concentration within the wastewater. See *Permit Special Condition S5.B.2.b* for more info on batch mix records.

TABLE 4 – Application/Discharge Rates & Frequencies for Dust Abatement Discharges

WASTEWATER DESCRIPTION		MAXIMUM APPLICATION[1]	
		RATE	FREQUENCY
Any permitted wastewater (see Table 3) except the following: Any drencher wastewater, NCCW, pear float tank wastewater, wastewater containing fludioxonil and/or pyrimethanil		1800 gal/acre/day	180 applications / year every day
Any drencher wastewater - NOT containing calcium chloride, fludioxonil and/or pyrimethanil		1800 gal/acre/day	30 applications/year every other day
Drencher wastewater - containing calcium chloride		1800 gal/acre/day	ONE (1) application/year
Any wastewater containing fludioxonil with a concentration in mg/L of:	maximum of 300	1800 gal/acre/day	30 application/year every other day
Any wastewater containing pyrimethanil with a concentration in mg/L of:	0 to 500	1800 gal/acre/day	30 applications/year every other day
	500 to 1000	1800 gal/acre/day	15 applications/year every other day
	more than 1000	Discharge Not Allowed	
Any pear float tank wastewater[2] with an SOPP (or other fungicide) concentration in mg/L of:	0 to 1000	4840 gal/acre/day	Once per Week
	1001 to 2000	2420 gal/acre/day	Once per Week
	2001 to 3000	1613 gal/acre/day	Once per Week
	3001 to 4000	1210 gal/acre/day	Once per Week
	4001 to 5001	968 gal/acre/day	Once per Week
	5001 to 6000	807 gal/acre/day	Once per Week
	more than 6000	Discharge Not Allowed	

[1] Application rates are valid only if chemical concentrations are in compliance with the maximum use rates specified in Table 4. The discharge of wastewater containing chemicals in concentrations greater than those specified in Table 4 is not allowed.

[2] Pear float tank wastewater containing; lignosulfonate, sodium sulfate, sodium, silicate and potassium carbonate is allowed to be discharged via dust abatement. Only rinse wastewater containing potassium phosphate is allowed to be discharged via dust abatement.

TABLE 5 – Effluent Limits & Monitoring for All Discharges to Dust Abatement

PARAMETER/ POLLUTANT[2]	DAILY MAXIMUM PERMIT LIMIT[1]			SAMPLE FREQUENCY	SAMPLE TYPE
	Drencher wastewater only	NCCW only	Other allowed wastewater sources[3]		
Analysis is Required for All of the Following Parameters Except Those Marked NR (Not Required)					
Flow (gallons/day)	Record Value	Record Value	Record Value	Report The Highest Number of Total Gallons Applied During any 24 Hour Period In The Quarter	Measurement
pH (standard units)	**NR**	6.0 - 9.0	6.0 - 9.0	Quarterly	Grab
Total Chloride (mg/L)	**NR**	**NR**	250	Quarterly	Composite
Total Dissolved Solids (TDS) (mg/L)	**NR**	Record Value	500	Quarterly	Composite
Analysis is Required for All of the Following Parameters Except When: (1) Chemical is Not Used or (2) Those Marked NR					
Total Residual Chlorine[4] (mg/L)	10	10	10	Quarterly	Grab
Total Sulfate[5] (mg/L)	**NR**	**NR**	250	Quarterly	Composite
Captan® (mg/L)	10	**NR**	10	Quarterly	Composite
Ethoxyquin (mg/L)	2700	**NR**	**NR**	Annually	Composite
TBZ (mg/L)	615	**NR**	**NR**	Annually	Composite
SOPP (mg/L)	**NR**	**NR**	See Table 4	Quarterly	Composite
SOPP loading rate	**NR**	**NR**	40.4 lbs/acre/day	Quarterly	Composite
Fludioxonil (mg/L)	300	**NR**	300	Quarterly	Composite
Pyrimethanil (mg/L)	see Table 4	**NR**	See Table 4	Quarterly	Composite

[1]Effluent limits & monitoring are valid only if all chemical concentrations & app. rates are in compliance with those specified in Tables 4 and 9.
[2] The recommended analytical methods are listed in **Appendix A of the permit**.
[3] This applies to all other wastewater sources except cherry packing wastewater see Table 6 for cherry packing wastewater information.
[4] Required test only if chlorine-based products are used.
[5] Required test only if sodium sulfate is used.

TABLE 6 – Cherry Packing Wastewater Discharges to Dust Abatement – Effluent Limits & Monitoring[1]

PARAMETER/POLLUTANT[2]	DAILY MAXIMUM PERMIT LIMIT	SAMPLE FREQUENCY[3]	SAMPLE TYPE
Analysis is required for all of the following parameters			
Flow (gallons/day)	Record Value	Report The Highest Number of Total Gallons Applied During any 24 Hour Period In The Season	Measurement
pH (standard Units)	6.0 - 9.0	1 per Cherry Packing Season	Grab
Total Chloride (mg/L)	250	1 per Cherry Packing Season	Composite
TDS (mg/L)	500	1 per Cherry Packing Season	Composite
Analysis is required for all of the following parameters except when the chemical is not used			
Total Residual Chlorine[4] (mg/L)	10	1 per Cherry Packing Season	Grab
Captan®	10	1 per Cherry Packing Season	Composite
Fludioxonil (mg/L)	300	1 per Cherry Packing Season	Composite
Pyrimethanil (mg/L)	See Table 4	1 per Cherry Packing Season	Composite

[1] The application rates given in Table 4 still apply to cherry packing discharges.
[2] The recommended analytical methods are listed in **Appendix A of the permit**.
[3] The cherry packing season is the period of time when cherries are harvested and packed. Monitoring is required 1 (one) time during actual packing operations.
[4] Required test only if chlorine-based products are used.

TABLE 7 – Minimum Setback Distances (Feet) for Dust Abatement Discharge Sites

	SURFACE WATERS	POTABLE WATER SUPPLY WELLS
Lined (storage) Lagoons with DPA and/or Difenoconazole	250 feet	250 feet
Lined (storage) Lagoons without DPA and/or Difenoconazole	50 feet	100 feet
Dust Application Sites	50 feet	100 feet

TABLE 8 – Required Soil & Groundwater Monitoring For Discharges with Lignosulfonate[1]

DISCHARGE/APPLICATION FREQUENCY	REQUIRED MONITORING	TESTING FREQUENCY
Once every 30 or more days	None	N/A
Once every 14 to 29 days	Test subsoil with dipyridyl for the presence of Fe^{+2} ions at 12-inch depth within the lowest part of the application site where ponding may occur.	Quarterly
Once every 7 to 13 days	Install a down gradient monitoring well to test groundwater for BOD_5 and with dipyridyl test for the presence of Fe^{+2} ions.	Monthly

[1]The max use rate of lignosulfonate is 12% solids or 120,000 mg/L, the max application rate is 4840 gal/acre and the max application frequency is no more than once every 7 days.

Rationale for Dust Abatement Effluent Limits and Application Rate Limits

Due to the low amount of permit violations (see chart on page 6 above), Ecology has determined that requiring only quarterly sampling (excluding TBZ & Ethoxyquin, which are annual) is adequate to determine permit compliance and compliance with the State's surface water and groundwater quality standards.

Minimum Setback Distances – Due to the inclusion of such chemicals as fludioxonil and pyrimethanil, which range from moderately to highly toxic to aquatic organisms; and in order to be more protective of the quality of surface waters and groundwater, Ecology has established minimum setback distances. The minimum setback distances remain unchanged from the previous version of the permit.

BOD_5 and Lignosulfonate - The permit does not require monitoring for BOD_5 for any wastewater discharges to dust abatement. Other than those containing lignosulfonate, most discharges to dust abatement typically have BOD_5 concentrations of less than 500 mg/L. This, combined with the maximum daily application rate of 1800 gallons/acre, results in BOD_5 loadings of less than 7.5 lbs/acre/day, which should protect groundwater. Ecology determined that BOD_5 from pear float solutions containing lignosulfonate is best controlled using proper solution preparation, application rates, and BMPs. Lignosulfonate solutions must not exceed the normal use rate of 12% (120,000 mg/L), of which 50% or 60,000 mg/L are solids. With a BOD_5 to solids ratio of 0.3 to 1, this results in a maximum BOD_5 limit of 18,000 mg/L.

pH - Ecology placed the technology-based effluent limits for pH in the permit. Packers must maintain pH in the range of 6.0 to 9.0. This is less stringent than the state's groundwater quality standard of 6.5-8.5 – set in *Chapter 173-200 WAC*. pH is **not** a required parameter for drencher wastewater to dust abatement.

Total Chloride - The maximum permit limit of 250 mg/L, is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. Total chloride is **not** a required parameter for drencher and NCCW discharges to dust abatement.

Total Dissolved Solids (TDS) - TDS, which affects the aesthetic value of groundwater, has a maximum permit limit of 500 mg/L for process wastewater, which is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. NCCW discharges to dust abatement do not have a maximum permit limit for TDS, but it is still a required parameter. Permittees obtain water for NCCW from several sources including: private wells, surface waters and municipal water systems. The TDS content of the source water often exceeds the groundwater criterion of 500 mg/L. During the cooling process, evaporative losses concentrate the naturally occurring dissolved solids in the source water, resulting in TDS criterion exceedances. The health risks associated with TDS, especially at the levels reported by most Permittees are low. Given the complexity of soil forms and aquifer/soil interactions, it is difficult to generalize or predict the impact TDS will have on aquifer concentrations. Given the reported TDS concentration levels, the implementation of BMPs and the relatively low volumes of application, Ecology determined a TDS effluent limit for discharges of NCCW to dust abatement, unnecessary. However, TDS in process wastewater discharges to dust abatement have a maximum permit limit of 500 mg/L.

Total Residual Chlorine (TRC) - The maximum permit limit is equal to the dangerous waste regulations calculated maximum concentration of 10 mg/L. TRC is a required parameter for all wastewater types being discharged to dust abatement that contain chlorine-based products however, if no chlorine-based products are used, TRC does **not** need to be sampled for.

Total Sulfate - The maximum permit limit is 250 mg/L, the state's groundwater quality standard – set in *Chapter 173-200 WAC*. Sulfate is **not** a required parameter for drencher and NCCW discharges to dust abatement and is also only required if Sodium Sulfate is used with any of the other wastewater source types (i.e., packing line wastewater).

Captan® - The permit includes a maximum permit limit equal to the dangerous waste regulations calculated maximum concentration of 10 mg/L for wastewater discharges with this chemical to dust abatement. Captan® is only a required parameter if used. Captan® is not used in NCCW.

Ethoxyquin - The permit includes a maximum permit limit equal to the maximum normal use concentration of 2700 mg/L. If the Permittee complies with all the terms and conditions of this general permit, ethoxyquin is only required to be sampled for once a year within drencher wastewater discharges via dust abatement. Ethoxyquin is only a required parameter if used. Ethoxyquin is not used in NCCW.

TBZ - The maximum permit limit is the maximum normal drencher use concentration of 615 mg/L. If the Permittee complies with all the terms and conditions of this general permit, TBZ is only required to be sampled for once a year within drencher wastewater being discharged via dust abatement. TBZ is only a required parameter if used. TBZ is not used in NCCW.

SOPP - The maximum permit limit is equal to the dangerous waste regulations calculated maximum concentration of 6000 mg/L. However, depending on the SOPP concentration, maximum application rates may vary. See Table 9 of the general permit for more information regarding wastewater discharges containing SOPP to dust abatement. SOPP is only a required parameter if used. SOPP is not used in drencher water or NCCW.

SOPP Loading Rate - The loading rate equals the Maximum Application Rate multiplied by the SOPP reported concentration level then that sum is divided by 120,000.

Fludioxonil - The maximum permit limit for wastewater containing fludioxonil discharged via dust abatement is 300 mg/L. Ecology continues to require quarterly analysis of this parameter for discharges to dust abatement. Fludioxonil is only a required parameter if used. Fludioxonil is not used in NCCW.

Pyrimethanil - This general permit allows pyrimethanil to have two different maximum permit limits. When applied at a maximum concentration of 500 mg/L or less, the maximum permit limit is 500 mg/L, with an application rate limit of 1800 gallons/acre/day, every other day and not to exceed 30 applications per year to a single application site. When used at a concentration between 500 mg/L and the drencher application maximum permissible amount of 1000 mg/L, the permit limit is 1000 mg/L, with an application rate limit of 1800 gallons/acre/day, every other day, and not to exceed 15 applications per year to a single application site. Ecology continues to require quarterly analysis of this parameter for discharges to land application. Pyrimethanil is only a required parameter if used. Pyrimethanil is not used in NCCW.

DPA - The maximum permit limit is equal to the maximum normal use concentration of 2200 mg/L at a daily maximum application rate of 1800 gallons/acre, every other day, 30 applications per year to a single site. This is equivalent to an annual application rate of 990 lbs of DPA/acre.

The maximum annual and daily rates were derived using data collected by Gray & Osborne, Inc. during a soil column study in late 1993. These maximum rates and frequencies will remain in force for the life of this general permit unless scientific evidence becomes available indicating that a different limit may be allowed. This general permit may then be modified accordingly.

This general permit will not require an analysis of this parameter, if the Permittee complies with all the terms and conditions of this general permit. The Permittee must maintain records of all drencher water discharges using a **Batch Mix Record**. The permit specifies required fields of the Batch Mix Records.

Sodium Silicate - The permit includes a discharge limit equal to the maximum normal use concentration of 30,000 mg/L. Analysis of this parameter will not be required for dust abatement discharges if the Permittee complies with all the terms and conditions of this general permit. Any application rate (not concentration) that does not produce runoff or ponding will be permitted. However; this wastewater needs to be adjusted to an acceptable pH range (6.0 to 9.0) prior to application/discharge.

Potassium Carbonate - The permit includes a discharge limit equal to the maximum normal use concentration of 27,000 mg/L. Analysis of this parameter will not be required for dust abatement discharges if the Permittee complies with all the terms and conditions of this general permit. Any application rate (not concentration) which does not produce runoff or ponding will be permitted. However, this wastewater needs to be adjusted to an acceptable pH range (6.0 to 9.0) prior to application/discharge.

TDM 3 – LAND APPLICATION

Definition of Land Application

Land application is an engineered system for discharging wastewater onto a vegetated land surface. The discharged wastewater is treated by the chemical, biological, and physical processes as it flows through the plant-soil matrix. The system generally consists of an application site (i.e., piece of land) and a distribution system (i.e., sprinklers) for uniformly distributing the wastewater. A lined storage tank or lagoon for holding the wastewater during periods when it cannot be land applied (i.e., frozen or flooded ground) may be required. Such storage must comply with the general permit's lined lagoon requirements.

TABLE 9 – Application/Discharge Rates & Frequencies for Land Application Discharges

WASTEWATER DESCRIPTION	Concentration in mg/L:	MAXIMUM APPLICATION[1]	
		RATE	FREQUENCY
Any permitted wastewater (see Table 3 of the permit) with BOD_5 or TSS levels of: (Excluding any drencher wastewater, NCCW, pear float tank wastewater, wastewater containing fludioxonil and/or pyrimethanil)	0 to 200	6000 gal/acre/day	Every Other Day
	201 to 400	3000 gal/acre/day	Every Other Day
	401 to 600	2000 gal/acre/day	Every Other Day
	More than 600	Discharge Not Allowed	
Any drencher wastewater - <u>NOT</u> containing calcium chloride, fludioxonil and/or pyrimethanil	**N/A**	1800 gal/acre/day	30 applications/year
Drencher wastewater - <u>containing</u> calcium chloride	**N/A**	1800 gal/acre/day	ONE (1) application/year
Any wastewater containing fludioxonil	maximum of 300 mg/L	1800 gal/acre/day	30 apps./year every other day
Any wastewater containing pyrimethanil:	0 to 500	1800 gal/acre/day	30 apps./year every other day
	500 to 1000	1800 gal/acre/day	15 apps./year every other day
	More than 1000	Discharge Not Allowed	
Any pear float tank wastewater[2] (Excluding that with lignosulfonate)[3] **containing SOPP or TBZ:**	0 to 1000	4840 gal/acre/day	Once per week
	1001 to 2000	2420 gal/acre/day	Once per week
	2001 to 3000	1613 gal/acre/day	Once per week
	3001 to 4000	1210 gal/acre/day	Once per week
	4001 to 5000	968 gal/acre/day	Once per week
	5001 to 6000	807 gal/acre/day	Once per week
	More than 6000	Discharge Not Allowed	

[1] Application rates are valid only if chemical concentrations are in compliance with the maximum use rates specified in Table 4 of the permit. The discharge of wastewater containing chemicals in concentrations greater than those specified in Table 4 of the permit is not allowed.

[2] Pear float tank wastewater containing sodium sulfate, sodium silicate, potassium carbonate & potassium phosphate is allowed to be discharged.

[3]Only pear packing rinse wastewater containing lignosulfonate is allowed to be discharged via land application.

TABLE 10 – Effluent Limits & Monitoring for Discharges to Land Application Sites

PARAMETER/ POLLUTANT[2]	DAILY MAXIMUM PERMIT LIMIT[1]			SAMPLE FREQUENCY	SAMPLE TYPE
	Drencher wastewater only	NCCW only	Other allowed wastewater sources[3]		
Analysis is Required for All of the Following Parameters Except Those Marked NR (Not Required)					
Flow (gallons/day)	Record Value	Record Value	Record Value	Report The Highest Number of Total Gallons Applied During any 24 Hour Period In The Quarter	Measurement
BOD_5 (mg/L)	**NR**	**NR**	See Table 9	Quarterly	Composite
BOD_5 Loading Rate	**NR**	**NR**	10 lbs/acre/day	Quarterly	Composite
pH (standard units)	**NR**	6.0 - 9.0	6.0 - 9.0	Quarterly	Grab
Total Chloride (mg/L)	**NR**	**NR**	250	Quarterly	Composite
Total Sulfate (mg/L)	**NR**	**NR**	250	Quarterly	Composite
Total Dissolved Solids (TDS) (mg/L)	**NR**	Record Value	500	Quarterly	Composite
Total Suspended Solids (TSS) (mg/L)	**NR**	**NR**	See Table 9	Quarterly	Composite
TSS Loading Rate	**NR**	**NR**	10 lbs/acre/day	Quarterly	Composite
Analysis is Required for All of the Following Parameters Except When: (1) Chemical is Not Used or (2) Those Marked NR					
Total Residual Chlorine[4] (mg/L)	10	10	10	Quarterly	Grab
Captan® (mg/L)	10	**NR**	10	Quarterly	Composite
Ethoxyquin (mg/L)	2700	**NR**	**NR**	Annually	Composite
TBZ (mg/L)	615	**NR**	500	Annually	Composite
SOPP (mg/L)	NR	**NR**	See Table 9	Quarterly	Composite
SOPP loading rate	NR	**NR**	40.4 lbs/acre/day	Quarterly	Composite
Fludioxonil (mg/L)	300	**NR**	300	Quarterly	Composite
Pyrimethanil (mg/L)	See Table 14	**NR**	See Table 9	Quarterly	Composite

[1] Effluent limits & monitoring valid only if all chemical concentrations & app. rates are in compliance with those specified in Tables 9.

[2] The recommended analytical methods are listed in **Appendix A of the permit**.

[3] This table applies to all other wastewater sources except cherry packing wastewater; see Table 11 for cherry packing wastewater information.
[4] Required test only if chlorine-based products are used.

TABLE 11 – Cherry Packing Wastewater Discharges to Land Application – Effluent Limits & Monitoring[1]

PARAMETER/POLLUTANT[2]	DAILY MAXIMUM PERMIT LIMIT	SAMPLE FREQUENCY[3]	SAMPLE TYPE
Analysis is required for all of the following parameters			
Flow (gallons/day)	Record Value	Report The Highest Number of Total Gallons Applied During any 24 Hour Period In The Season	Measurement
BOD_5 (mg/L)	See Table 9	1 per Cherry Packing Season	Composite
BOD_5 Loading Rate	10 lbs/acre/day	1 per Cherry Packing Season	Composite
pH (standard units)	6.0 - 9.0	1 per Cherry Packing Season	Grab
Total Chloride (mg/L)	250	1 per Cherry Packing Season	Composite
Total Sulfate (mg/L)	250	1 per Cherry Packing Season	Composite
TDS (mg/L)	500	1 per Cherry Packing Season	Composite
TSS (mg/L)	See Table 9	1 per Cherry Packing Season	Composite
TSS Loading rate	10 lbs/acre/day	1 per Cherry Packing Season	Composite
Analysis is required for all of the following parameters except when the chemical is not used			
Total Residual Chlorine[4] (mg/L)	10	1 per Cherry Packing Season	Grab
Captan®	10	1 per Cherry Packing Season	Composite
Fludioxonil (mg/L)	300	1 per Cherry Packing Season	Composite
Pyrimethanil (mg/L)	See Table 9	1 per Cherry Packing Season	Composite

[1] The application rates given in Table 9 still apply to cherry packing discharges.
[2] The recommended analytical methods are listed in **Appendix A of the permit**.
[3] The cherry packing season is the period of time when cherries are harvested and packed. Monitoring is required 1 (one) time during actual packing operations.
[4] Required test only if chlorine-based products are used.

TABLE 13 – Minimum Setback Distances (Feet) for Land Application Discharge Sites

	SURFACE WATERS	POTABLE WATER SUPPLY WELLS
Lined (storage) Lagoons with DPA and/or Difenoconazole	250 feet	250 feet
Lined (storage) Lagoons without DPA and/or Difenoconazole	50 feet	100 feet
Land Application Sites	50 feet	100 feet

Rationale for Land Application Effluent Limits and Application Rate Limitations

Due to the low amount of permit violations, Ecology has determined that requiring only quarterly sampling (excluding TBZ & Ethoxyquin, which are annual) is adequate to determine permit compliance and compliance with the State's surface water and groundwater quality standards.

Minimum Setback Distances – Due to the inclusion of such chemicals as fludioxonil and pyrimethanil, which range from moderately to highly toxic to aquatic organisms; and in order to be more protective of the quality of surface waters and groundwater, Ecology has established minimum setback distances. The minimum setback distances remain unchanged from the previous version of the permit.

BOD_5 - The permit controls BOD5 through the use of a tiered maximum daily application rate schedule based upon the actual BOD5 concentration in the wastewater. See Table 9 above for actual maximum permit limits and application rates. BOD_5 is **not** a required parameter for drencher wastewater and NCCW discharges to land application.

BOD_5 Loading Rate - The loading rate equals the maximum Application Rate multiplied by the parameter's reported level, then that sum is divided by 120,000. The loading rate must not exceed 10 lbs/acre/day. BOD_5 loading rate is **not** a required parameter for drencher wastewater and NCCW discharges to land application.

pH - Ecology placed the technology-based effluent limits for pH in the permit. Packers must maintain pH in the range of 6.0 to 9.0. This is less stringent than the state's groundwater quality standard of 6.5 to 8.5 – set in *Chapter 173-200 WAC*. pH is **not** a required parameter for drencher wastewater discharges to land application.

Total Chloride - The maximum permit limit of 250 mg/L, is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. Total chloride is **not** a required parameter for drencher and NCCW discharges to land application.

Total Sulfate - The maximum permit limit is 250 mg/L, the state's groundwater quality standard – set in *Chapter 173-200 WAC*. Sulfate is **not** a required parameter for drencher and NCCW discharges to land application.

Total Dissolved Solids (TDS) - TDS, which affects the aesthetic value of groundwater, has a maximum permit limit of 500 mg/L for process wastewater discharges to land application, which is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. NCCW discharges to land application do not have a maximum permit limit for TDS, but it is still a required parameter.

Permittees obtain water for NCCW from several sources including: private wells, surface waters and municipal water systems. The TDS content of the source water often exceeds the groundwater criterion of 500 mg/L. During the cooling process evaporative losses concentrate the naturally occurring dissolved solids in the source water, resulting in TDS criterion exceedances. The health risks associated with TDS, especially at the levels reported by most Permittees are low. Given the complexity of soil forms and aquifer/soil interactions, it is difficult to generalize or predict the

impact TDS will have on aquifer concentrations. Given the reported TDS concentration levels, the implementation of BMPs and the relatively low volumes of application, Ecology determined a TDS effluent limit for discharges of NCCW to land application, unnecessary. However, TDS in process wastewater discharges to land application have a maximum permit limit of 500 mg/L.

Total Suspended Solids (TSS) - The permit includes limits for TSS at the same tiered application rates as for BOD_5. Ecology believes the same justification applies for TSS as for BOD_5. See the description in the BOD_5 section. TSS is **not** a required parameter for drencher and NCCW discharges to land application.

TSS Loading Rate - The loading rate equals the maximum Application Rate multiplied by the parameter's reported level, then that sum is divided by 120,000. The loading rate must not exceed 10 lbs/acre/day. TSS loading rate is **not** a required parameter for drencher wastewater and NCCW discharges to land application.

Total Residual Chlorine (TRC) - The maximum permit limit is equal to the dangerous waste regulations calculated maximum concentration of 10 mg/L. TRC is a required parameter for all wastewater types being discharged to land application that contain chlorine-based products however, if no chlorine-based products are used, TRC does **not** need to be sampled for.

Captan® - The permit includes a maximum permit limit equal to the dangerous waste regulations calculated maximum concentration of 10 mg/L for wastewater discharges with this chemical to land application. Captan® is only a required parameter if used. Captan® is not used in NCCW.

Ethoxyquin - The permit includes a maximum permit limit equal to the maximum normal use concentration of 2700 mg/L. If the Permittee complies with all the terms and conditions of this general permit, ethoxyquin is only required to be sampled for once a year within drencher wastewater discharges via land application. Ethoxyquin is only a required parameter if used with drencher water. Ethoxyquin is not used in NCCW.

TBZ - The TBZ maximum permit limit for drencher wastewater is the maximum normal drencher use concentration of 615 mg/L. For drencher wastewater discharges to land application containing TBZ, only one sample is required per year. The TBZ maximum permit limit for all other wastewater sources other than NCCW is 500 mg/L. All other wastewater sources other than NCCW discharging to land application must also sample for TBZ once a year unless it was not used. TBZ is not used in NCCW.

SOPP - The maximum permit limit is equal to the dangerous waste regulations calculated maximum concentration of 6000 mg/L. However, depending on the SOPP concentration, maximum application rates may vary. SOPP is only a required parameter is used. SOPP is not used in drencher water or NCCW.

SOPP Loading Rate - The loading rate equals the Maximum Application Rate (see Table 9 of general permit) multiplied by the SOPP reported concentration level, that sum is then divided by 120,000.

Fludioxonil - The maximum permit limit for wastewater containing fludioxonil discharged via land application is 300 mg/L. Even in packing line situations where fludioxonil is used in concentrations

up 1,200 mg/L, the maximum permit discharge limit must not exceed 300 mg/L. Ecology continues to require quarterly analysis of this parameter for discharges to land application. Fludioxonil is only a required parameter if used. Fludioxonil is not used in NCCW.

Pyrimethanil - This general permit allows pyrimethanil to have two different maximum permit limits. When applied at a maximum concentration of 500 mg/L or less, the maximum permit limit is 500 mg/L, with an application rate limit of 1800 gallons/acre/day, every other day and not to exceed 30 applications per year to a single application site. When used at a concentration between 500 mg/L and the maximum permissible amount of 1000 mg/L, the permit limit is 1000 mg/L, with an application rate limit of 1800 gallons/acre/day, every other day, and not to exceed 15 applications per year to a single application site. Ecology continues to require quarterly analysis of this parameter for discharges to land application. Pyrimethanil is only a required parameter if used. Pyrimethanil is not used in NCCW.

DPA - The maximum permit limit is equal to the maximum normal use concentration of 2200 mg/L at a daily maximum application rate of 1800 gallons/acre, every other day, 30 applications per year to a single site. This is equivalent to an annual application rate of 990 lbs of DPA/acre. The maximum annual and daily rates were derived using data collected by Gray & Osborne, Inc. during a soil column study in late 1993. These maximum rates and frequencies will remain in force for the life of this general permit unless scientific evidence becomes available indicating that a different limit may be allowed. This general permit may then be modified accordingly. This general permit will not require an analysis of this parameter, if the Permittee complies with all the terms and conditions of this general permit. The Permittee must maintain records of all drencher water discharges using a **Batch Mix Record**.

Sodium Silicate - The permit includes a discharge limit equal to the maximum normal use concentration of 30,000 mg/L. Analysis of this parameter will not be required for land application discharges if the Permittee complies with all the terms and conditions of this general permit. Any application rate (not concentration) that does not produce runoff or ponding will be permitted. However; this wastewater will need to be adjusted to an acceptable pH range (6.0 to 9.0) prior to application/discharge.

Potassium Carbonate - The permit includes a discharge limit equal to the maximum normal use concentration of 27,000 mg/L. Analysis of this parameter will not be required for land application discharges if the Permittee complies with all the terms and conditions of this general permit. Any application rate (not concentration) which does not produce runoff or ponding will be permitted. However, this wastewater may need to be adjusted to an acceptable pH range (6.0 to 9.0) prior to application/discharge.

Potassium Phosphate - The maximum permit limit is equal to the maximum normal use concentration of 28,800 mg/L. Analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of this general permit. Any application rate (not concentration) that does not produce runoff or ponding will be permitted. However, this wastewater may need to be adjusted to an acceptable pH range (6.0 to 9.0) prior to application/discharge.

TDM 4 - POTW (PUBLICLY OWNED TREATMENT WORKS)

Definition of a POTW

A POTW is a municipal or regional wastewater treatment plant (i.e., city sewer system)**.**

Compliance with More Stringent Conditions Imposed by a POTW

A POTW may impose stricter conditions as they see fit. Compliance with the terms and conditions of this general permit does not relieve the Permittee form the responsibility to comply with any local limits, contracts or agreements with the POTW, including responsibility for any contamination, pass-through, interference or upset of a POTW related to the discharge from a Permittee. The discharge of significant amounts of NCCW to a POTW is prohibited except under extraordinary circumstances (i.e., lack of an alternative TDM). Permittees must not discharge NCCW to a POTW unless the discharge has been approved by both Ecology and the POTW.

TABLE 14 – Effluent Limits & Monitoring for Discharges to POTWs

PARAMETER/ POLLUTANT[1]	DAILY MAXIMUM PERMIT LIMIT		SAMPLE FREQUENCY	SAMPLE TYPE
	NCCW only	Other allowed wastewater sources[2]		
Analysis is Required for All of the Following Parameters Except Those Marked NR (Not Required)				
Flow (gallons/day)	Record Value	Record Value	1/Discharge Event	Measurement
BOD_5 (mg/L)	NR	500	Quarterly	Composite
pH (standard units)	6.0 - 9.0	6.0 - 9.0	Quarterly	Grab
Total Chloride (mg/L)	NR	250	Quarterly	Composite
Total Sulfate (mg/L)	NR	250	Quarterly	Composite
Total Suspended Solids (TSS) (mg/L)	NR	500	Quarterly	Composite
Analysis is Required for All of the Following Parameters Except When: (1) Chemical is Not Used or (2) Those Marked NR				
Total Residual Chlorine[3] (mg/L)	0.5	0.5	Quarterly	Grab
Ethoxyquin (mg/L)	NR	50	Quarterly	Composite
SOPP (mg/L)	NR	50	Quarterly	Composite
TBZ (mg/L)	NR	50	Quarterly	Composite

[1] The recommended analytical methods are listed in **Appendix A of the permit**.
[2] This table applies to all other wastewater sources except cherry packing wastewater; see Table 15 for cherry packing wastewater information.
[3] Required test only if chlorine-based products are used.

TABLE 15 – Cherry Packing Wastewater Discharges to a POTW – Effluent Limits & Monitoring

PARAMETER/POLLUTANT[1]	DAILY MAXIMUM PERMIT LIMIT	SAMPLE FREQUENCY[2]	SAMPLE TYPE
Analysis is required for all of the following parameters			

Flow (gallons/day)	Record Value	1 per Cherry Packing Season	Measurement
BOD_5 (mg/L)	500	1 per Cherry Packing Season	Composite
pH (standard units)	6.0 - 9.0	1 per Cherry Packing Season	Grab
Total Chloride (mg/L)	250	1 per Cherry Packing Season	Composite
Total Sulfate (mg/L)	250	1 per Cherry Packing Season	Composite
TSS (mg/L)	500	1 per Cherry Packing Season	Composite
Analysis is required for all of the following parameters except when the chemical is not used			
Total Residual Chlorine[3] (mg/L)	0.5	1 per Cherry Packing Season	Grab
TBZ (mg/L)	50	1 per Cherry Packing Season	Composite

[1] The recommended analytical methods are listed in **Appendix A of the permit**.
[2] The cherry packing season is the period of time when cherries are harvested and packed. Monitoring is required 1 (one) time during actual packing operations.
[3] Required test only if chlorine-based products are used.

Rationale for POTW Effluent Limits and Application Rate Limitations

BOD_5 - The permit includes a discharge limit of 500 mg/L for dischargers to POTWs. This represents a limit approximately twice as great as typical average domestic sewage (250 mg/L BOD_5). Domestic sewage BOD_5 concentrations have reached 500 mg/L with no substantial disruption of POTW activities. This limit should adequately protect POTWs from slug load disruption. BOD_5 is **not** a required parameter for NCCW discharges to POTWs.

pH - Ecology placed the technology-based effluent limits for pH in the permit. Packers must maintain pH in the range of 6.0 to 9.0. This is less stringent than the state's surface water quality standard of 6.5 to 8.5 – set in *Chapter 173-201A WAC*.

Total Chloride - The permit limit of 250 mg/L, is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. Total chloride is **not** a required parameter for NCCW discharges to POTWs.

Total Sulfate - The maximum permit limit is 250 mg/L, the state's groundwater quality standard, set in *Chapter 173-200 WAC*. Sulfate is **not** a required parameter for NCCW discharges to POTWs.

Total Suspended Solids (TSS) - The permit includes a discharge limit of 500 mg/L. This represents a limit approximately twice the typical average domestic sewage (250 mg/L of TSS). Domestic sewage TSS concentrations have reached this quantity with no substantial disruption of POTW activities. This limit should adequately protect POTWs from slug load disruption. TSS is **not** a required parameter for NCCW discharges to POTWs.

Total Residual Chlorine (TRC) - The maximum permit limit is 0.5 mg/L, which takes into specific consideration the toxicity of chlorine. TRC is only a required parameter if used.

Ethoxyquin - The maximum permit limit is 50 mg/L, which takes into consideration the toxicity of ethoxyquin. Ethoxyquin is only a required parameter if used. Ethoxyquin is not used in NCCW.

SOPP - The maximum permit limit is 50 mg/L, which takes into consideration the toxicity of SOPP. SOPP is only a required parameter if used. SOPP is not used in NCCW.

TBZ - The maximum permit limit is 50 mg/L, which takes into specific consideration the toxicity of TBZ. TBZ is only a required parameter if used. TBZ is not used in NCCW.

Potassium Carbonate - The permit allows Permittees to discharge rinse wastewater containing potassium carbonate to POTWs. Rinse wastewater containing potassium carbonate may need to be neutralized to an acceptable pH range (6.0 to 9.0) prior to discharge.

TDM 5 – PERCOLATION SYSTEMS

Definition of a Percolation System

A percolation system is an engineered system for the aerobic treatment of wastewater as it percolates through the soil matrix. The system is designed to account for hydraulic and nutrient loading rates, wet and dry cycles, uniform wastewater distribution and other relevant design parameters. Ecology will review design plans of percolation systems before permitting. Reference for the design of percolation systems is the rapid infiltration land treatment process in the *EPA Process Design Manual and Supplement for the Land Treatment of Municipal Wastewater* (EPA 625/1-81- 013 and –013a).

TABLE 16 – Effluent Limits & Monitoring for Discharges to Percolation Systems

PARAMETER/ POLLUTANT[1]	DAILY MAXIMUM PERMIT LIMIT		SAMPLE FREQUENCY	SAMPLE TYPE
	NCCW only	Other allowed wastewater sources[2]		
Analysis is Required for All of the Following Parameters Except Those Marked NR (Not Required)				
Flow (gallons/day)	Record Value	Record Value	1/Discharge Event	Measurement
BOD_5 (mg/L)	NR	100	Quarterly	Composite
pH (standard units)	6.0 - 9.0	6.0 - 9.0	Quarterly	Grab
Total Chloride (mg/L)	NR	250	Quarterly	Composite
Total Sulfate (mg/L)	NR	250	Quarterly	Composite
Total Dissolved Solids (TDS) (mg/L)	Record Value	500	Quarterly	Composite
Total Suspended Solids (TSS) (mg/L)	NR	100	Quarterly	Composite

Analysis is Required for All of the Following Parameters Except When: (1) Chemical is Not Used or (2) Those Marked NR				
Total Residual Chlorine[3] (mg/L)	5	5	Quarterly	Grab
Ethoxyquin (mg/L)	NR	5	Quarterly	Composite
SOPP (mg/L)	NR	6	Quarterly	Composite
TBZ (mg/L)	NR	10	Quarterly	Composite

[1] The recommended analytical methods are listed in **Appendix A of the permit**.
[2] This table applies to all other wastewater sources except cherry packing wastewater; see Table 17 for cherry packing wastewater information.
[3] Required test only if chlorine or any chlorine-based products are used.

TABLE 17 – Cherry Packing Wastewater Discharges to a Percolation System – Effluent Limits & Monitoring

PARAMETER/POLLUTANT[1]	DAILY MAXIMUM PERMIT LIMIT	SAMPLE FREQUENCY[2]	SAMPLE TYPE
Analysis is required for all of the following parameters			
Flow (gallons/day)	Record Value	1 per Cherry Packing Season	Measurement
BOD_5 (mg/L)	100	1 per Cherry Packing Season	Composite
pH (standard units)	6.0 - 9.0	1 per Cherry Packing Season	Grab
Total Chloride (mg/L)	250	1 per Cherry Packing Season	Composite
Total Sulfate (mg/L)	250	1 per Cherry Packing Season	Composite
TDS (mg/L)	500	1 per Cherry Packing Season	Composite
TSS (mg/L)	100	1 per Cherry Packing Season	Composite

Analysis is required for all of the following parameters except when the chemical is not used			
Total Residual Chlorine[3] (mg/L)	5	1 per Cherry Packing Season	Grab
TBZ (mg/L)	10	1 per Cherry Packing Season	Composite

[1] The recommended analytical methods are listed in **Appendix A of the permit**.

[2] The cherry packing season is the period of time when cherries are harvested and packed. Monitoring is required 1 (one) time during actual packing operations.

[3] Required test only if chlorine-based products are used.

TABLE 18 - Minimum Setback Distances (Feet) for Percolation Systems

	SURFACE WATERS OF THE STATE	POTABLE WATER SUPPLY WELL
Percolation Systems	50 feet	100 feet

Rationale for Percolation Systems Effluent Limits and Application Rate Limitations

Minimum Setback Distances – In order to be more protective of the quality of surface waters, groundwater and human health, Ecology has established minimum setback distances. The minimum setback distances remain unchanged from the previous version of the permit.

BOD_5 - The maximum permit is 100 mg/L. This represents a 50% reduction (safety margin) of the most conservative limit as indicated in *Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems,* Department of Ecology Publication #93-36). BOD_5 is **not** a required parameter for NCCW discharges to percolation systems.

pH - Ecology placed the technology-based effluent limits for pH in the permit. Packers must maintain pH in the range of 6.0 to 9.0.

Total Chloride - The maximum permit limit of 250 mg/L, is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. Total chloride is **not** a required parameter for NCCW discharges to percolation systems.

Total Sulfate - The maximum permit limit is 250 mg/L, the state's groundwater quality standard - set in *Chapter 173-200 WAC*. Sulfate is **not** a required parameter for NCCW discharges to percolation systems.

Total Dissolved Solids (TDS) - TDS, which affects the aesthetic value of groundwater, has a maximum permit limit of 500 mg/L for process wastewater, which is the state's groundwater quality standard – set in *Chapter 173-200 WAC*. NCCW discharges to percolation systems do not have a maximum permit limit for TDS, but it is still a required parameter. Permittees obtain water for NCCW from several sources including: private wells, surface waters and municipal water systems.

The TDS content of the source water often exceeds the groundwater criterion of 500 mg/L. During the cooling process evaporative losses concentrate the naturally occurring dissolved solids in the source water, resulting in TDS criterion exceedances. The health risks associated with TDS, especially at the levels reported by most Permittees are low. Given the complexity of soil forms and aquifer/soil interactions, it is difficult to generalize or predict the impact TDS will have on aquifer concentrations. Given the reported TDS concentration levels, the implementation of BMPs and the relatively low volumes of application, Ecology determined a TDS effluent limit for discharges of NCCW to percolation systems, unnecessary. However, TDS in process wastewater discharges to percolation systems have a maximum permit limit of 500 mg/L.

Total Suspended Solids (TSS) - The maximum permit limit is 100 mg/L. This represents a 50% reduction (safety margin) of the most conservative limit as indicated in *Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems,* Department of Ecology Publication #93-36). This is intended to compensate for the higher probability of leaching and thus groundwater contamination, than from land application. TSS is not a required parameter for NCCW discharges to percolation systems.

Total Residual Chlorine (TRC) - The maximum permit limit is 5 mg/L, which takes into specific consideration both the protection of the waters of the state and groundwater and its degradation characteristics.

Ethoxyquin - The maximum permit limit is 5 mg/L, which takes into specific consideration both the toxicity of ethoxyquin and the protection of the waters of the state and groundwater.

SOPP - The maximum permit limit is 6 mg/L, which takes into special consideration both the toxicity of SOPP and the protection of the waters of the state and groundwater.

TBZ - The maximum permit limit is 10 mg/L, which takes into specific consideration both the toxicity of TBZ and the protection of the waters of the state and groundwater.

Potassium Carbonate - The maximum permit limit is equal to the maximum normal use concentration of 27,000 mg/L. Analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of this general permit. Any application rate (not concentration) which does not produce runoff or ponding will be permitted. However, this wastewater may need to be adjusted to an acceptable pH range (6.0 to 9.0) prior to application.

TDM 6 - SURFACE WATERS

Definition of Surface Waters

The surface water TDM is a discharge to any of the surface waters of the state. Surface waters of the state include, but are not limited to, lakes, rivers, creeks, ponds, streams, inland waters, irrigation canals and return drains, wetlands, stormwater collection systems that discharge to a surface water, and all other surface waters and watercourses within the jurisdiction of the State of Washington. The Permittee's discharge must not cause or contribute to an excursion of the state's water quality standards in *chapter 173-201A WAC,* and human health-based criteria in the National Toxics Rule [40 CFR, part 131.36].

Allowed Discharges to Surface Waters

The discharge of fruit packing wastewaters directly into surface waters is only authorized for the following waste streams: (1) Wastewater containing no chemical additives at all or only chlorine-based chemicals (i.e., chlorine dioxide and sodium hypochlorite), (2) Secondary treated wastewater containing linear alkyl sulfonate (LAS) based soaps, acidic or basic washes, food grade waxes, or chlorine-based chemicals, (3) NCCW wastewater containing no priority pollutants, dangerous wastes, or toxics in toxic amounts.

303-D Listed Surface Waters

The permit does not allow packers to discharge to surface waters if the effluent exceeds a water quality criterion and/or if the receiving water is on the current 303-(d) list for that criterion unless the facility either selects an alternative TDM or participates in the Total Maximum Daily Load (TMDL) process for that water body. If the facility is unable to meet the WLA under this general permit, the facility must apply for coverage under an individual NPDES permit.

TABLE 19 – Effluent Limits & Monitoring for Discharges to Surface Waters[1]

PARAMETER/ POLLUTANT[2]		DAILY MAXIMUM LIMIT	SAMPLE FREQUENCY		SAMPLE TYPE
			NCCW only	All other allowed wastewater sources	
Analysis is Required for All of the Following Parameters					
Flow (gallons/day)		Record Value	1/discharge event	1/discharge event	Measurement
BOD_5 (mg/L)		30	Quarterly	Monthly	Composite
pH (standard units)		6.0 – 9.0	Quarterly	Monthly	Grab
Temperature (Celsius)		record value	Quarterly	Monthly	Grab
Total Chloride (mg/L)		250	Quarterly	Monthly	Composite
Total Suspended Solids (mg/L)		30	Quarterly	Monthly	Composite
Analysis is Required Only if Chlorine or Chlorine-Based Products are Used					
Total Residual Chlorine (mg/L)	Permit Limit	0.019	Quarterly	Monthly	Grab
	Enforcement Limit[3]	0.050			

[1] If a Permittee has been assigned a WLA due to the passage of a TMDL there will be additional parameter(s) not listed in the table. **Appendix B of the permit** lists the Permittees and the additional parameters.

[2] The recommended analytical methods are listed in **Appendix A of the permit**.
[3] The established QL (Quantitation Level) will serve as the enforceable limit for this parameter when using the required Spectrophotometric, DPD method (SM 4500-CI G). A measured value between 0.019 and 0.050 mg/L is not a violation due to the uncertainty of the accuracy of test results at this low concentration. Results less than 0.050 mg/L will be reported as "< 0.05 mg/L"

Whole Effluent Toxicity (WET) Testing

All **New Permittees** with a surface water discharge of NCCW containing chemical additives must, within one year of receiving coverage under this general permit. **Existing Permittees** must, within 3 months of any changes in chemical additives, submit to Ecology the results of a WET test for acute toxicity, as specified in Table 25.

Any Permittee that fails a WET test must select a different TDM in order to continue to discharge NCCW containing chemical additives. IF a Permittee fails a WET test, but still wishes to discharge NCCW with additives to a surface water, one of the following options must be completed:

a. Select and implement an alternate chemical treatment regime and then repeat and pass the WET test.

b. Apply for coverage under an individual NPDES permit. If a facility with an individual permit meets the requirements of *chapter 173-205 WAC* for attainment of the WET performance standard it may reapply for general permit coverage.

TABLE 20 – WET Test Requirements

	WET TEST FOR ACUTE TOXICITY
Test Name	Daphnid 48-hour survival static test
Test Method	EPA-821-R-02-012
Test Species	Ceriodaphnia dubia, Daphnia pulex or Daphnia magna
Pass	65% or above survival in 100% effluent
Fail	Below 65% survival in 100% effluent

Rationale for Surface Water Effluent Limits and Application Rate Limitations

BOD_5 - Ecology used secondary treatment standards for municipal wastewater as the basis to limit this parameter to the maximum permit limit of 30 mg/L. Municipal permits must meet this limit on a monthly average basis and generally Ecology determines that this limit protects the dissolved oxygen levels in surface waters.

pH - Ecology placed the technology-based effluent limits for pH in the permit. Packers must maintain pH in the range of 6.0 to 9.0. This is less stringent than the state's surface water quality standard of 6.5 to 8.5, set in *Chapter 173-201A WAC*.

Temperature - Ecology did not specify a temperature effluent limit due to the site specific nature of such a limit. Ecology has determined that the current discharges protect background water quality

for temperature given that correct BMPs are implemented. Any facility which has a surface water discharge to a water body that is on the most recent approved 303(d) list for temperature must participate in the TMDL process for that water body. If the implementation of the TMDL & WLA cannot be completed under this general permit's requirements, the facility must select an alternative TDM or apply for coverage under an individual NPDES permit.

Total Chloride - The maximum permit limit is 250 mg/L for surface water discharges, which is the state's surface water quality standard – set in *Chapter 173-201A WAC*. If a packer meets this limit they will meet the freshwater quality criterion given in *Chapter 173-201A WAC*.

Total Suspended Solids (TSS) - Ecology used secondary treatment standards for municipal wastewater as the basis to limit this parameter to a maximum permit limit of 30 mg/L. Given that the particle size of the TSS associated with fresh fruit packing wastewater is generally large in size, Ecology believes that typical fruit packing wastewater with a TSS of 30 mg/l would not exceed the water quality standard of no more than 5 NTU. This meets the water quality standards for turbidity.

Total Residual Chlorine (TRC) - The permit restricts TRC to a maximum permit limit of 0.019 mg/L, for surface water discharges, which the state's surface water quality standard – set in *Chapter 173-201A WAC*. Due to the lack of a reasonably priced field test kit which can detect total residual chlorine to this level, the established quantitation level of 0.05 mg/L (analytical detection limit), when using the required DPD/colorimeter test method, 40 CFR Part 136, will serve as the enforceable limit for this parameter. A measured value between 0.019 and 0.05 mg/L may not be a violation due to the uncertainty of the test results at this concentration, and must be reported as "less than 0.05 mg/L". This limit should be protective of background water quality.

STORMWATER

1. The following applies to all facilities (new and current) that receive coverage under the General Permit for the Fresh Fruit Packing Industry:

    a. Permittee's are required to determine if stormwaters at their facility are co-mingled with any facility discharges, including non-contact cooling water discharges, to surface waters of the state, or to any other TDM available to the facility.

    b. Stormwater, when it is combined with fruit packing process discharges, including non-contact cooling waters; is considered wastewater and remains covered under the General Permit for the Fresh Fruit Packing Industry, and additional coverage under the Washington State Industrial Stormwater General Permit may not be required.

    c. Additional monitoring and/or reporting may be required for facilities discharging combined stormwater and process discharge waters, on a case-by-case basis.

2. All facilities (new and current) that receive coverage under the General Permit for the Fresh Fruit Packing Industry that have stormwaters that discharge directly to surface waters or direct discharge to a storm sewer system, are subject to coverage under the Washington State Industrial Stormwater General Permit and shall apply for coverage under that permit. For more

information, please refer to:
http://www.ecy.wa.gov/programs/wq/stormwater/industrial/index.html

3. Permittees that plan to expand and/or build on their facility property may need to obtain the WA State Department of Ecology Construction Stormwater General Permit. If a construction activity will disturb one or more acres of land and will also discharge stormwater off site into waters of the state, the facility may need to obtain this permit. For more information, please refer to: http://www.ecy.wa.gov/programs/stormwater/construction/index.html.

ENVIRONMENTAL COMPLIANCE PLAN (ECP)

In accordance with state and federal regulations, each facility receiving coverage under this general permit must develop and retain on-site, an Environmental Compliance Plan (ECP) with the following four sections:

Treatment/Disposal Method Operating Plan

In accordance with state and federal regulations, the Permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e) and chapter 173-226-080 WAC).

Solid Waste Management Plan (SWMP)

Ecology has determined that the Permittee has a potential to pollute waters of the state through inappropriate disposal of solid waste or through the release of leachate of solid waste. This general permit requires, under the authority of chapter 90.48.080 RCW that the Permittee develop and implement a SWMP designed to prevent solid waste from polluting waters of the state.

Spill Prevention Plan (SPP)

Ecology has determined that the fruit packing industry stores a quantity of chemicals that have the potential to pollute waters of the state if accidentally released. Ecology can require the Permittee to develop BMPs to prevent this accidental release [section 402(a) (1) of the Federal Water Pollution Control Act (FWPCA) and chapter 90.48.080 RCW]. This general permit requires Permittees to develop or update and implement the SPP for preventing the accidental release of pollutants into waters of the state and for minimizing damages if such a spill occurs.

Stormwater

All facilities (new and current) that receive coverage under the General Permit for the Fresh Fruit Packing Industry that have stormwaters that discharge directly to surface waters or direct discharge to a storm sewer system, may be subject to coverage under the Washington State Industrial

Stormwater General Permit and shall apply for coverage under that permit. For more information, please refer to: http://www.ecy.wa.gov/programs/wq/stormwater/industrial/index.html

ECONOMIC IMPACT ANALYSIS STATEMENT

An Economic Impact Analysis Statement was conducted and is available at: https://fortress.wa.gov/ecy/publications/UIPages/Home.asp.

PESTICIDES

Ecology has established and will enforce limits and conditions expressed in this general permit for the discharge of waste streams containing various pesticides registered for use by the EPA and the Washington State Department of Agriculture. These agencies will enforce the use, storage, and disposal requirements expressed on pesticide labels. The Permittee must comply with both the pesticide label requirements and this general permit's conditions. This general permit does not supersede or preempt federal or state label requirements or any other applicable laws and regulations. General permit Condition G24 reminds the Permittee of this fact.

RECOMMENDATION FOR PERMIT ISSUANCE

This general 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 general permit be issued for five years.

REFERENCES AND DATABASES USED

A Guide for Fruit Packing Warehouses: How to Properly Manage and Reduce Your Pesticide Hazardous Wastes, (Washington State Department of Ecology, revised March 1993, 90-42).

Agricultural Chemical Usage, Postharvest Applications, Apples and Pears, (USDA, National Agricultural Statistics Service, March 2003, Ag Ch1.).

Cooling Tower Study: Facts and Lessons Learned, (Washington State Department of Ecology, Technical Resources for Engineering Efficiency [TREE], September 2007).

EPA Re-registration Eligibility Decision (RED) for Captan, (United State Environmental Protection Agency-738-F99-015, September 1999).

EPA Re-registration Eligibility Decision (RED) for Diphenylamine, (United States Environmental Protection Agency-738-R97-010, April 1998).

EPA Re-registration Eligibility Decision (RED) for Thiabendazole, (United States Environmental Protection Agency-738-R-02-xxx, October 2002).

EPA Memorandum. Ecological Risk Assessment for the Proposed New Uses of Difenoconazole. (United States Environmental Protection Agency – PC Code: 128847, February 2011)

EPA Memorandum. Difenoconazole. Summary of Analytical Chemistry and Residue Data (United States Environmental Protection Agency – PC Code: 128847, October 2014)
Federal Register Vol. 80, No. 63. Thursday, April 2, 2015. Rules and Regulations. EPA (EPA-HQ-OPP-2014-0149; FRL-9923-82) Difenoconazole-Pesticide Tolerances-Final Rule.

*Federal Insecticide, Fungicide, and Rodenticide Act (*United States Environmental Protection Agency, September 2012).

Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, (Washington State Department of Ecology, Publication #93-36, May 1993).

Non-citrus Fruits and Nuts 2007 Summary, (United States Department of Agriculture, National Agricultural Statistics Service, 2008).

Permit Writer's Manual, (Washington State Department of Ecology, Publication #92-109, 2011).

Safety Data Sheet. Difenoconazole (CAS #119446-68-3), and Fludioxonil (CAS #131341-86-1). (Syngenta, Product Identifier- Academy, October 2014)

Statement of Basis for the NPDES General Permit to Discharge Non-contact Cooling Water Into the Waters of the State of New Jersey, (State of New Jersey, Department of Environmental Protection and Energy, NPDES Permit No. NJ0070203).

DATABASES

EXTOXNET (Extension Toxicology Network)

Pesticide Information Profiles

Toxnet Literature Review, Toxicology Data Network.

Aquatic Toxicity Information Retrieval Database

PAN (Pesticide Action Network) Pesticide Database

Environmental Fate Data Base

PICOL (Pesticide Information Center OnLine) Database

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue the Fresh Fruit Packing Industry general permit. The general permit includes wastewater discharge limits and other conditions. This fact sheet describes Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice of Draft on May 4, 2016 in the Yakima Herald Republic and the Wenatchee World to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

PUBLIC NOTICE OF DRAFT GENERAL NPDES PERMIT FOR THE FRESH FRUIT PACKING INDUSTRY

Introduction: In 1994, the Washington State Department of Ecology (Ecology) developed a National Pollutant Discharge Elimination System (NPDES) general permit to regulate the discharge of wastewater from fresh fruit packing facilities.

This permit was developed to meet the requirements of Chapters 90.48, 90.52, and 90.54 Revised Code of Washington (RCW) as amended, and the Federal Water Pollution Control Act (FWPCA) (Title 33 United States Code, Section 1251 et seq.) as amended. All requirements of 40 Code of Federal Regulations (CFR) 122.41 and 122.42 are incorporated in this general permit by reference.

The fruit packing industry is eligible for coverage under a general permit due to: (1) the similar wastewater characteristics among facilities; (2) the uniform discharge conditions to which all facilities would be subject; and (3) the significant reduction of resources necessary for permit handling. However, individual NPDES/State Waste Discharge permits will still be applied in those instances where Ecology determines the general permit is not appropriate for a facility or an individual facility does not wish to be covered by the general permit.

This general permit establishes Treatment/Disposal Methods, effluent limits, and Best Management Practices for discharges from the fresh fruit packing industry. Compliance with this general permit is anticipated to protect human health and waters of the state.

Types of Facilities or Dischargers and Geographic Area Covered: Every new or existing fresh fruit packing facility within the entire State of Washington which receives, packs, stores, and/or ships either hard or soft fruit is required to apply for coverage under either this general permit or an individual NPDES/State Waste Discharge Permit.

Documents Available for Review: You may download a copy of the draft permit and fact sheet at http://www.ecy.wa.gov/programs/wq/permits/fruit_packers/index.html; or you may request a copy from Cynthia Huwe, (509)457-7105 or email cynthia.huwe@ecy.wa.gov.

Public Workshops: Public workshops concerning this draft general permit shall be held on May 18, 2016 in Union Gap and May 19, 2016 in Leavenworth. WebDMR training will also take place on these dates. Please see below for location and exact times.

DATE	Wednesday, May 18, 2016	Thursday, May 19, 2016
WORKSHOP BEGINS	9:00 am to Noon	1:30 to 4:00 pm
WebDMR TRAINING BEGINS	1:30 to 3:30 pm	10:00 am to Noon
LOCATION	Washington State Department of Ecology - CRO	Chelan County Fire District #3 Community Fire Hall
ADDRESS	1250 West Alder Street	228 Chumstick Highway
CITY	Union Gap, WA 98903	Leavenworth, WA 98826
ROOM	102 B	

Additional WebDMR training: An additional WQWebDMR system training (training only, no workshop) will be offered on Thursday, August 18, 2016 from 10 AM to Noon at the Central Regional Office, 1250 W. Alder Street, Union Gap, WA, in Conference Room 102B.

When and How to Submit Comments: Comments on the proposed general permit may be given at the public hearings. Interested persons are also invited to submit written comments regarding the proposed general permit. All written comments should be submitted by 5:00 pm on June 17, 2016 to: Department of Ecology, 1250 West Alder Street, Union Gap, WA 98903, Attn: Cynthia Huwe, cynthia.huwe@ecy.wa.gov.

This notice will be published in the legal section of the Yakima Herald-Republic and the Wenatchee Daily World on May 4, 2016. A mailing containing this notice will be sent to all current permittees and other interested parties.

Final Determination: All comments received at the public hearings or at Ecology's Central Regional Office by 5:00 pm on June 17, 2016 will be considered before final permit terms, limitations, and conditions are established. A responsive summary of comments received during the comment period will be prepared and available for public review. If the final content of the general permit remains substantially unchanged from the draft permit, a copy of the final determination in the form of a Public Notice of Issuance shall be forwarded to all persons who submitted written comment or gave public testimony regarding the permit. However, if the final determination is substantially changed, another Public Notice of Draft Permit shall be published.

Economic Impact Analysis: Ecology completed a new economic impact analysis that will be available May 2016 on Department of Ecology's Publications & Forms Website located here: https://fortress.wa.gov/ecy/publications/UIPages/Home.asp.

Tentative Determination to Issue: After Ecology receives and considers all public comments, it will issue the final permit. Ecology expects to issue the general permit in August 2016, with an effective date of September 1, 2016.

Further Information: Contact Sanjay Barik at sanjay.barik@ecy.wa.gov or (509) 454-4247; or Marcia Porter at marcia.porter@ecy.wa.gov or (509) 454-7864 or at 1250 W. Alder Street, Union Gap, WA.

Ecology is an equal opportunity agency and does not discriminate on the basis of race, creed, color, disability, age, religion, national origin, sex, marital status, disabled veteran's status, Vietnam Era veteran's status or sexual orientation. If you have special accommodation needs or require this document in alternative format, please contact Cynthia Huwe at (509) 457-7105.

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

You may obtain further information from Ecology by telephone, 509/457-7105 or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
1250 West Alder Street
Union Gap, WA 98903

The primary author of this permit and fact sheet is Sanjay Barik.

APPENDIX B--REPORTS AND DOCUMENTS RELATED TO DIFENOCONAZOLE (NEW POST-HARVEST FUNGICIDE)

Difenoconazole is a broad spectrum fungicide belonging to the triazole group of fungicides. The mode of action of difenoconazole is as a demethylation inhibitor of sterol biosynthesis which disrupts membrane synthesis by blocking demethylation. It is used in concentrations of 300 mg/L and can be used in conjunction with Fludioxonil.

In soil, difenoconazole is persistent and slightly mobile. Difenoconazole has low potential to reach groundwater, except in soils of high sand and low organic matter content. During a runoff event, difenoconazole will potentially enter adjacent bodies of surface water. In an aquatic environment, difenoconazoles main route of dissipation is partitioning into the bottom sediment as shown in an aerobic aquatic metabolism study (MRID 42245134), in which the distribution ratio of sediment and water phases was 8:1 at 1 day post-treatment and 40:1 at 30 days post- treatment. Difenoconazole has the potential to undergo slow to relatively fast aqueous photolysis in clear water. **Table 2** summarizes the environmental fate data of difenoconazole.

Table 1. Physical and Chemical Properties of Difenoconazole

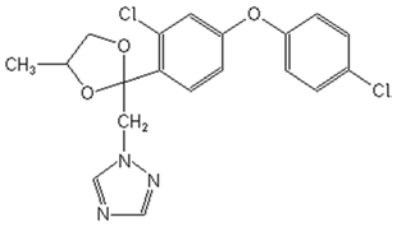
Property	Value	Source
Common Name	Difenoconazole	MRID 469501-04
CAS Registry No.	119446-68-3	
PC Code	128847	
Structure		MRID 469501-04
Chemical Name (CAS)	1-{2-[4-(chlorophenoxy)-2- chlorophenyl-(4-methyl -1,3- dioxolan-2-yl)-methyl]} -1H-1,2,4- triazole	MRID 469501-04
SMILES notation	O1CC(C)OC1(Cn2ncnc2)c3c(Cl)cc(O c4ccc(Cl)cc4)cc3	EPI Suite, v3.12 SMILES
Molecular Formula	$C_{19}H_{17}Cl_2N_3O_3$	MRID 469501-04
Molecular Weight	406.27	MRID 469501-04
Physical State	Red Liquid	
Vapor pressure	2.5×10^{-10} mm Hg (25 ^oC)	MRID 465159-01
Henry's Law constant	8.9×10^{-12} atm x m^3/mol	MRID 465159-01
Specific Gravity/ Density	1.14g/cm^3 @ 25 ^oC	MRID 469501-04
Solubility in water	15.0 mg/L @ 25 ^oC	MRID 469501-04
log K_{ow}	4.4 (25 ^oC)	MRID 469501-05

Table 2. Summary of the Environmental Fate Properties of Difenoconazole

Property	Value	Source
Name	Difenoconazole	
Henry's Law constant	8.9×10^{-12} atm x m^3/mol	MRID 465159-01
Soil adsorption coefficient K_{oc} (L/kg)	3867, 3518, 3471, and 7734 3870, 4587, 4799, and 11202	MRID 422451-35 [A] MRID 469501-21
Hydrolysis half-life pH = 5 pH = 7 pH = 9	 Stable Stable Stable	 MRID 422451-27
Photolysis half-life in water	6 days – ca. 1 ppm in sterile buffer solution (30-day study) ca. 9.2 days – 1mg ai/L in natural water 228 days – 1.52 ml ai/L in sterile buffer solution (15-day study)	MRID 422451-28 MRID 469501-04 MRID 469501-05 [B]
Photolysis half-life in soil	349 - 823 days	MRID 469501-06 [C]
Aerobic soil metabolism half-life	84.5 days – at 0.1 ppm concentration 1600 days – at 10 ppm in loam 1059 days – at 10 ppm in sandy loam 120 days – at 0.13 ppm; Swiss loam 104 days – at 0.13 ppm; Swiss loam 165 (158) days – at 0.23 ppm; Swiss sandy loam 204 (187) days – at 0.23 ppm; Swiss sandy loam/loamy sand 204 (198) days – at 0.23 ppm; French silty clay loam 433 (408) days – at ca. 0.1 ppm in CA loamy sand at 25 °C 533 days – at ca. 0.1 ppm in CA loamy sand at 25 °C	MRID 422451-31 MRID 422451-32 [D] MRID 422451-33 [D] MRID 469501-09 MRID 469501-10 MRID 469501-11 MRID 469501-12 MRID 469501-14
Anaerobic soil metabolism half-life	947 days – at 10 ppm in loam	MRID 422451-32
Aerobic aquatic metabolism half-life	860 days (10 mg ai/L) 315 (330) days (nominal 0.1 kg ai/ha =0.17 mg ai/L); Swiss pond water-silty clay loam sediment) 335 (301) days (0.17 mg ai/L; Swiss river water-sandy loam sediment) 565 days (0.04 mg ai/L)	MRID 422451-34 [E] MRID 469501-16 MRID 469501-17
Anaerobic aquatic metabolism half-life	1245 days (10mg ai/L) 370 days (433) (0.04 mg ai/L)	MRID 422451-34 [E] MRID 469501-19
Terrestrial field dissipation half-life	252 days - determined in the 0- to 3-inch depth – CA bare loamy sand 231 days – GA bare loamy sand (four applications of 0.13 lb ai/A) 139 days – CA bare plot of loam soil (four applications of 0.13 lb ai/A) 462 days – ND bare sandy clay loam	MRID 422451-40 MRID 469501-26 MRID 469501-27 MRID 469501-29

Property	Value	Source
Laboratory accumulation in fish bioaccumulation factor (*Lepomis macrochirus*) a depuration half-life	170x in edible tissues 570x nonedible tissues 330x for whole body 1 day	MRID 422451-42

[A] There was another adsorption/desorption study (MRID 422451-36) reviewed in which the test soils were autoclaved prior to conducting the study which could distort the mobility characteristic of difenoconazole, thus, the study results were not used for calculation of modeling input parameters.

[B] For modeling purposes, the longest half-life was used as it represents the most conservative scenario. However, there is considerable uncertainty in the photolysis half-lives because the duration of the studies was considerably shorter than the extrapolated half-life (MRIDs 469501-05 and 469501-06).

[C] The soil photolysis half-life under xenon light condition was recalculated to represent the conditions under natural sunlight intensity during 30-day periods between June and September (104.7-246.9 W·min/cm^2), as a result, a range of half-lives was obtained.

[D] In those aerobic soil metabolism studies (MRID 422451-32 and MRID 422451-33) the test application rate was significantly higher than expected under registrant-proposed use condition for difenoconazole.

[E] In those aquatic metabolism studies, the test application rates were significantly higher than expected under registrant-proposed use condition for difenoconazole.

Table 3. Potential Effects to Listed Species Associated with the Proposed New Use of Difenoconazole

Listed Taxa	Direct Effects[1]	Indirect Effects
Terrestrial and semi-aquatic plants – monocots and dicots	Yes (listed dicots)	Yes
Birds	No – Acute Yes – Chronic	Yes
Terrestrial-phase amphibians	No – Acute Yes – Chronic	Yes
Reptiles	No – Acute Yes – Chronic	Yes
Mammals	No – Acute Yes – Chronic	Yes
Aquatic plants	No[2]	Yes
Freshwater fish	No – Acute Yes – Chronic	Yes
Aquatic-phase amphibians	No – Acute Yes – Chronic	Yes
Freshwater invertebrates	No – Acute No – Chronic	Yes
Estuarine/marine fish	No – Acute Yes – Chronic	Yes
Estuarine/marine invertebrates	No – Acute Yes – Chronic	Yes
Terrestrial invertebrates	No	Yes[3]

[1] RQs for aquatic plants and chronic risk to fish and aquatic invertebrates were based on total toxic residues (TTR) due to a lack of guideline toxicity data for 1,2,4-triazole and triazole acetic acid. Degradate toxicity was assumed equal to that of difenoconazole for those endpoints.

[2] There is some uncertainty for non-vascular plants because an acceptable study with cyanobacteria is not available; however, there are not currently any listed non-vascular plant species.

[3] Only for obligate relationships with listed terrestrial plant species (dicots).

Table 4. Summary of Most Sensitive Aquatic Toxicity Endpoints for Difenoconazole

Type of Study	Species	Toxicity Value (µg ai/L)	MRID
Acute – Freshwater Fish	Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 810	42245107
Chronic – Freshwater Fish	Fathead minnow (*Pimephales promelas*)	NOAEC = 1.9 LOAEC = 3.7 based on reduced male length of F0-generation 12 weeks post-hatch	48453205
	Rainbow trout (*Oncorhynchus mykiss*)	NOAEC = 0.86 Value used for risk assessment. Based on acute-to-chronic ratio of fathead minnow data to rainbow trout data (the most acutely sensitive species).[1]	-
Acute – Freshwater Invertebrate	Water flea (*Daphnia magna*)	48-hr EC_{50} = 770	42245110
Chronic – Freshwater Invertebrate	Water flea (*Daphnia magna*)	NOAEC = 5.6 LOAEC = 13.0 based on reduced number of young/adult/reproductive day and adult length	42245114
Chronic – Freshwater Invertebrate (Sediment)	Midge (*Chironomus riparius*)	EC_{50} >50 mg ai/kg-sediment (nominal) NOAEC = 5 mg ai/kg-sediment (nominal) based on emergence rate & development rate	47648601
Acute – Estuarine/Marine Fish	Sheepshead minnow (*Cyprinodon variegates*)	96-hr LC_{50} = 819	42245112
Chronic – Estuarine/Marine Fish	Sheepshead minnow (*Cyprinodon variegates*)	NOAEC = 0.86 Based on acute-to-chronic ratio of fathead minnow data to sheepshead minnow data.[1]	-
Acute – Estuarine/Marine Mollusk	Eastern oyster (*Crassostrea virginica*)	96-hr EC_{50} = 424	42906701
Acute – Estuarine/Marine Invertebrate	Mysid shrimp (*Americamysis bahia*)	96-hr LC_{50} = 150	42245111
Chronic – Estuarine/Marine Invertebrate	Mysid shrimp (*Americamysis bahia*)	NOAEC < 0.115 LOAEC = 0.115 based on reduced number of young/adult/reproductive day	46950133
Vascular Plant – Freshwater	Duckweed (*Lemna gibba*)	EC_{50} = 1900 EC_{25} = 110 NOAEC ≤ 110 LOAEC ≤ 100 based on reduced frond number	46920504
Non-vascular Plant – Freshwater	Diatom (*Navicula pelliculosa*)	EC_{50} = 98 NOAEC = 53 LOAEC = 150 based on reduced cell density	46920508

Table 5. Summary of Most Sensitive Aquatic Toxicity Endpoints for 1,2,4-Triazole

Type of Study	Species	Toxicity Value (µg ai/L)	MRID
Acute – Freshwater Fish	Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} = 498,000	48474301
Acute – Freshwater Invertebrate	Water flea (*Daphnia magna*)	48-hr EC_{50} > 98,100	48453206

Table 6. Summary of Most Sensitive Aquatic Toxicity Endpoints for Triazole Acetic Acid

Type of Study	Species	Toxicity Value (µg ai/L)	MRID
Acute – Freshwater Fish	Rainbow trout (*Oncorhynchus mykiss*)	96-hr LC_{50} > 101,000	48453209
Acute – Freshwater	Water flea (*Daphnia magna*)	48-hr EC_{50} > 108,000	48453208

Reference Documents concerning difenoconazole are located at:

http://www.ecy.wa.gov/programs/wq/permits/fruit_packers/index.html

Difenoconazole Summary of Analytical Chemistry and Residue Data.pdf
https://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2014-0149-0009

Ecological Risk Assessment for Difenoconazole_Part1.pdf
http://www.ecy.wa.gov/programs/wq/permits/fruit_packers/EcologicalRiskAssessmentPart1.pdf

Ecological Risk Assessment for Difenoconazole_Part2.pdf
http://www.ecy.wa.gov/programs/wq/permits/fruit_packers/EcologicalRiskAssessmentPart2.pdf

Federal Insecticide, fungicide, and Rodenticide Act.pdf
https://www.epa.gov/laws-regulations/summary-federal-insecticide-fungicide-and-rodenticide-act and http://www.agriculture.senate.gov/imo/media/doc/FIFRA.pdf

Federal Register- Difenoconazole-April 2015.pdf
https://www.gpo.gov/fdsys/pkg/FR-2015-04-02/pdf/2015-07354.pdf

SDS for Difenoconazole and Fludioxonil.pdf
http://www.syngentacropprotection.com/sds-label/academy

APPENDIX C--RESPONSE TO COMMENTS

NORTHWEST HORTICULTURAL COUNCIL
105 So. 18th Street, Suite 105
YAKIMA, WASHINGTON 98901 USA
(509) 453-3193 FAX (509) 457-7615
www.nwhort.org

June 17, 2016

Mr. Sanjay Barik
Technical Unit Manager
Washington State Department of Ecology
Yakima, WA 98902

Re: 2016 Fresh Fruit Packing General Permit and Fact Sheet

Dear Mr. Barik:

The Northwest Horticultural Council represents the growers, packers, and shippers of tree-fruit in the Pacific Northwest. On average, regional growers produce over 75% of the U.S. fresh apple market, 75% of the U.S. fresh pear market, and 80% of the U.S. fresh cherry market. Approximately 30% of these crops are exported. The USDA Non-citrus Fruits and Nuts 2014 Summary reports an estimated $3.25 billion dollar value for apples, pears and cherry crops for the region. We offer this letter in support of the 2016 Fresh Fruit Packing General Permit and Fact Sheet. Specific comments are included on the following page.

Since the permit's inception, the tree fruit industry has worked closely with the Department of Ecology to fashion a document that not only addresses environmental concerns but is also effective and feasible for the fruit packers of Washington state. We believe this permit is consistent with these goals.

The Washington state apple, pear, and cherry industry supports the adoption of this permit and looks forward to continuing our collaborative working relationship.

Sincerely,
NORTHWEST HORTICULTURAL COUNCIL

Laura Grunenfelder
Technical Issues Manager

Cc: Washington State Tree Fruit Association
NHC Wastewater Committee

Northwest Horticultural Council
LG

Specific Comments on the Draft Permit and Fact Sheet:

Fact Sheet

Comment: Page 11- Wastewater Sources- Drenchers. Add difenoconazole to the list of permitted fungicides.

Response: As suggested, difenoconazole is added to the list of fungicides.

Comment: Page 12- Packing Processes. Adjust description of dump tanks and float tanks to incorporate cherry and stonefruit.

Response: As suggested, the change has been made.

Comment: Pages 12, 13- Packing Processes. Replace the term "wax" with coating, as this will incorporate use of other permitted coatings.

Response: As suggested, the change has been made.

Comment: Page 16- Chlorine-based Chemicals- Calcium Hypochlorite. Modify the following sentence to incorporate language consistent with permit requirements. "Wastewater containing any type of chlorine-based chemical is allowed to be discharged to any of the six TDMs, but total residual chlorine must be sampled for." Suggested addition, "*if any chlorine-based chemicals are used*."

Response: As suggested, the change has been made.

Comment: Pages 16-22- Fungicides- Difenoconazole. Incorporate the extensive tables into an "addendum" for reference, rather than inclusion in this section to maintain consistency with descriptions for other fungicide products.

Response: As suggested, the change has been made.

Comment: Pages 28-30- Other Chemicals/Processes. Request addition of Ozone (as was in previous versions of Fact Sheet) to the list of chemicals.

Response: Ozone is added to the list.

Comment: Page 32- TDM 1- BMPs. Modify the following sentence to incorporate language consistent with permit. "All lagoons must be completely emptied and liners must be examined at least once every five (5) years after being built." Suggest clarification that this is not required for double-lined lagoons with leak detection.

Response: The suggested language is added for clarity and consistency.

Comment: Page 32- TDM 1- Rationale for Lined Lagoons. Request modification for the following sentence for clarity: " Due to the unknown nature of the products used in fresh fruit packing and their potential to contaminate groundwater…" Suggested language: "Due to the nature of some products used in fresh fruit packing…"

Response: As suggested, the change has been made.

Comment: Tables 13, 18- Request that each value has a parameter given (i.e. "feet") to clarify the required setbacks.

Response: As suggested, "feet" is added for clarity and consistency.

Comment: Table 15- Request modification to language for clarity under wastewater description " Any permitted wastewater (see Table 3) with BOD5 or TSS levels of: (Any are NOT ALLOWED." Suggested change: "Any permitted wastewater (not including drencher wastewater, NCCW, pear float tank wastewater, wastewater containing fludioxonil and/or pyrimethanil, see Table ???) with BOD5 or TSS levels of:".

Response: The change has been made for clarity and consistency.

Draft Permit

Comment: Tables 6, 8, 13- Request that each listed value has a parameter (i.e. "feet") to clarify the required setbacks.

Response: As suggested, "feet" is added for clarity and consistency.

Comment: Table 14- Request modification to language for clarity under wastewater description " Any permitted wastewater (see Table 3) with BOD5 or TSS levels of: (Any are NOT ALLOWED." Suggested change: "Any permitted wastewater (not including drencher wastewater, NCCW, pear float tank wastewater, wastewater containing fludioxonil and/or pyrimethanil, see Table ???) with BOD5 or TSS levels of:".

Response: The change has been made for clarity and consistency.

Comment: Page 46- Batch Records: Request change in language for consistency with rest of permit: "Permittees must keep Batch Mix Records for all discharges of packing line, pear float tank, and drencher wastewater. Each batch made, mixed and discharged throughout the year requires a Batch Mix Record." Suggested language "Each batch discharged throughout the year requires a Batch Mix Record."

Response: As suggested, the change has been made.