National Pollutant Discharge Elimination System
Permit Fact Sheet

Oregon Department of Environmental Quality
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Proposed Action: Issuance of 2000J NPDES pesticide general permit for irrigation systems.

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Permit Category: General Permit

Source Location: Statewide

Activities Covered Under This Permit: A pesticide application to an irrigation system for pest control that results in a point source discharge to surface waters of the state from the use of a (i) biological pesticide or (ii) a chemical pesticide that leaves a residue.

The decision in *National Cotton Council, et al.* v. *EPA,* 553 F.3d 927 (6th Cir. 2009) and EPA regulations found that point source discharges of biological pesticides and chemical pesticides that leave a residue to waters of the U.S. are pollutants under the Clean Water Act and therefore require NPDES permits.

This permit is for pesticide applications to control weeds and algae within irrigation system boundaries. An irrigation system is defined here and in the permit as a controlled system consisting primarily of manmade canals, ditches and ponds designed and operated for the delivery and management of water for irrigation purposes. It includes main canals, lateral canals, pipes, ponds for holding water or buffering flow, and drainage ditches. It also includes all the gates, valves, overflow structures and other system components used for transporting water or directing its flow.

Weed and algae control is the application, by any means, of contact or systemic herbicides to control vegetation and algae in the water and at the water's edge. This permit covers pesticide applications in an irrigation system or at the water's edge for weed and algae control, invasive or other nuisance weeds, and algae and pathogens such as fungi and bacteria, including terrestrial plants that are close to the water's edge. Water's edge means pesticide applications made within three feet of surface waters of the state and conveyances at the time of pesticide application. The three-foot distance is measured horizontally from the ordinary high water mark of the waterbody.

Entities that require coverage under this permit:
The following entities that apply pesticides that result in a point source discharge to waters of the state must register to obtain permit coverage.

- Irrigation systems organized as districts under ORS Chapter 545, water improvement works organized as districts under ORS Chapter 552 and water control works organized as water control districts under ORS Chapter 553
- Irrigation districts or companies previously covered under an individual permit for the application of aquatic pesticides within irrigation system boundaries. A list of these entities is provided in Table 1 – List of Irrigation Systems with NPDES Permit Coverage
- Irrigation districts registered under a 2300A Pesticide General Permit. A list of these entities is provided in Table 1 – List of Irrigation Systems with NPDES Permit Coverage

Operators of irrigation systems currently covered under an individual permit and operators of irrigation systems organized under ORS Chapter 545, ORS Chapters 552 and 553 are required to register in order to obtain permit coverage for any amount of pesticide application. DEQ identified 107 systems[1] that may require registration under this permit, which include irrigation systems organized as districts under ORS Chapter 545, two water improvement

works organized as districts under ORS Chapter 552 and 30 water control works organized as water control districts under ORS Chapter 553. A list of these irrigation systems is provded in Appendix A.

The term *works*, which is used to describe these operations, includes irrigation systems. These districts have authority to provide irrigation water. An average size irrigation district in Oregon operates about 300 miles of canals and laterals that deliver water from the river to approximately 2400 delivery points covering 27,000 acres.[2]

A current list of irrigation systems and districts registered under an individual permit, 2300A pesticide general permit or both are provided below in Table 1- List of Irrigation Systems with NPDES Permit Coverage.

Table 1- List of Irrigation Systems with NPDES Permit Coverage

WQFile #	Common Name	Permit #	EPA Class	PermitType
38215	Hermiston Irrigation District	102565	Minor	NPDES-IW-B15
84410	Stanfield Irrigation District	102566	Minor	NPDES-IW-B15
84410	Stanfield Irrigation District	28048	Minor	GEN23
111807	Klamath Irrigation District	102541	Minor	NPDES-IW-B15
111807	Klamath Irrigation District	28046	Minor	GEN23
111835	West Extension Irrigation District	102567	Minor	NPDES-IW-B15
123674	West Extension Irrigation District	30104	Minor	GEN23
111836	Westland Irrigation District	102568	Minor	NPDES-IW-B15
111836	Westland Irrigation District	28047	Minor	GEN23
111848	Vale Oregon Irrigation District	102605	Minor	NPDES-IW-B15
111848	Vale Oregon Irrigation District	28049	Minor	GEN23
111849	Owyhee Irrigation District	102606	Minor	NPDES-IW-B15
121982	Owyhee Irrigation District	28177	Minor	GEN23
111875	Ochoco Irrigation District	102627	Minor	NPDES-IW-B15
111875	Ochoco Irrigation District	28050	Minor	GEN23
111876	North Unit Irrigation District	102628	Minor	NPDES-IW-B15
111876	North Unit Irrigation District	28051	Minor	GEN23
111877	Owyhee Ditch Company	102607	Minor	NPDES-IW-B15
122125	Warmsprings Irrigation District	28400	Minor	GEN23
122758	Grants Pass Irrigation District	29103	Minor	GEN23
122030	Santiam Water Control District	28219	Minor	GEN23

Entities that do not require coverage under this general permit:
Other pesticide applications that do not require registration under this general permit include:

- Other irrigation systems such as, cooperatives, companies and other off-farm irrigation water suppliers controlling weed and algae that result in point-source discharges of pesticides to surface waters of the state that have permit coverage under an individual permit or may have an option for coverage under the 2300A pesticide general permit, when renewed.
- Irrigation systems where pesticide application does not result in a point source discharge to surface waters of the state.

Entities with overlapping treatment areas:
DEQ understands that treatment areas can overlap between irrigation systems; however, each irrigation system must comply with permit conditions within its boundary. As defined in the permit, an operator includes any owner or entity with operational control over the decision to perform a pesticide application that is covered under this permit or has

the day-to-day operational control of activities that are necessary to ensure compliance with the permit. The following example provides an illustration of responsibility when treatment overlaps system boundaries.

"Irrigation district A" applies a pesticide to treat their irrigation system as well as an overlapping section in"irrigation district B." Irrigation district A starts a treatment that covers four linear miles. One of these four linear miles is within the boundary of irrigation district B. In this example, irrigaton district A is the operator of irrigation system A and serves as a contracted applicator that provides pesticide treatment for irrigation district B. Irrigation district B is the operator that accepted a pesticide application that resulted in one mile of treatment within its irrigation system boundary.

1.0 Coverage for Pesticide Applications

The permit authorizes the discharge of biological pesticides and chemical pesticide residuals, applied from a point source to waters of the state. The permit assumes that all chemical pesticide applications leave a residue[1] once the product has performed its intended purpose and therefore constitute the discharge of a pollutant.

1.1 Background

In 2001, the Ninth Circuit U.S. Court of Appeals determined that compliance with Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) registration and labeling requirements did not eliminate the need for a NPDES permit. [Headwaters, Inc. v. Talent Irrigation District, 243 F3d 526 (9th Cir Mar. 12, 2001)]. Accordingly, as early as 2001, DEQ regulated the discharge of chemical pesticide residue by issuing individual NPDES permits to ten irrigation systems. These individual permits authorized a discharge of chemical pesticide residue from the application of specified aquatic herbicides.

In 2006, EPA issued a regulation that interpreted the Clean Water Act as not requiring NPDES permits for pesticide applications. In 2009, the Sixth Circuit U.S. Court of Appeals vacated EPA's 2006 NPDES Pesticides Rule under a plain language reading of the Clean Water Act (National Cotton Council v. EPA, 553 F3d 297 (6th Cir, 2009)). The Sixth Circuit Court held that NPDES permits are required for all biological pesticide applications made in, over and near waters of the U.S., and chemical pesticide applications that leave a residue or excess pesticide in water when such applications are made in, over and near waters of the U.S. The Court of Appeals stayed the decision invalidating EPA's regulation until April 9, 2011. Subsequently, EPA requested and received an extension of the stay until Oct. 31, 2011. EPA and most states, including Oregon issued NPDES pesticide general permits in October 2011 for pest control activities that result in a pesticide discharge to water from a point source. Detailed information relating to this matter can be found at 75 Federal Register 31775 (Jun. 4, 2010) and 76 Federal Register 68750 (Nov. 7, 2011).

1.2 Current Action

OAR 340-045-0033(2) allows DEQ to develop and issue general permits for certain categories of minor discharge sources or minor activities that involve similar or substantially similar types of operations, similar types of wastes, similar monitoring conditions and the category of sources are more appropriately controlled under a general permit.

This general permit meets the requirements of OAR 340-045-0033(2) and is appropriate for the pest control categories covered under this permit for the following reasons:

- Pesticide applications covered under this permit involve the same or substantially similar types of operations. The operations are required to minimize pesticide discharge by using pest management measures. These pest management measures are operational requirements commonly used in pest control and generally known as integrated pest management. Pest management measures include proper identification of the pest problem, alternative control methods and proper pesticide use that apply to each type of pest control under this permit.

- Pesticide applications have the potential to discharge or dispose of the same or similar types of wastes. The types of waste discharged are from pesticide use. The definition for pesticides is the same for all pest control under the permit.

- The same or similar monitoring requirements, effluent limitations and operating conditions are required in this permit. For all pesticide applications there are visual monitoring and pest management measure requirements. Additional monitoring and effluent limits are required for irrigation systems that use acrolein-, copper-, or xylene-based aquatic pesticides.

A NPDES general permit is an appropriate tool for regulating pesticide applications within irrigation system boundaries. General permit conditions include the same monitoring compliance points as the individual permits for chemical pesticide

[1] Residue: In chemistry, residue is whatever remains or acts as a contaminant after a given class of events. Wikipedia article: Residue (chemistry). https://en.wikipedia.org/wiki/Residue_(chemistry). Accessed: 2018.08.20.

residue. Permit conditions have similar pest management measures for pesticide use. There are similar effluent limits appropriate for acrolein, copper and xylene.

DEQ uses a general permit to establish statewide conditions to protect water quality standards. This broad coverage of commonly applicable requirements allows DEQ to administer timely, quality permits more efficiently.

This general permit includes pest management practices and effluent limits for acrolein-, copper- and xylene- based aquatic pesticides consistent with the permit conditions in individual irrigation district permits issued in 2005 and 2006. Irrigation systems that use pesticides have to meet the same general requirements and specific requirements for acrolein-, copper- and xylene- based aquatic pesticides statewide.

DEQ is issuing this proposed NPDES general permit by department order for similar operations and activities that can be controlled with a standard set of requirements.[3] DEQ anticipates that the operators of ten irrigation systems currently covered under individual permits and operators of other irrigation districts will seek coverage under this general permit. The existing ten permittees currently operate under individual NPDES permits which were issued in 2001 and expired in 2007. These ten permittees currently operate under an administrative extension of their individual permits. When issued, the 2000J irrigation system general permit can replace these ten administratively extended individual permits with a current NPDES permit at a lower cost for permit coverage. This 2000J general permit will also provide permit coverage for irrigation systems that registered for coverage under the 2300A pesticide permit which expired on Sept. 30, 2016.

2.0 Discharges Not Authorized by this Permit

This permit does not authorize pesticide pollutant discharges under the following situations.

2.1 Point Source Discharge to Water Quality Limited Waters

The general permit does not authorize a point source discharge to a waterbody or segment that is identified as water quality limited for a relevant standard. A discharge to a water quality limited water body may be covered in some circumstances under an individual permit with more detailed site-specific evaluation that results in additional technology-based and/or water quality-based effluent limitations.

This eligibility requirement is based on a list of water quality limited waterbodies established pursuant to OAR 340-041-0046 and includes waters on the 303(d) list for a specific pesticide and its chemical residual or degradates when a waste load allocation for the relevant pollutant parameter does not exist. This eligibility requirement is for current and future 303(d) lists approved or established by EPA and currently includes waterbodies listed in Categories 4 and 5 of DEQ's Water Quality Assessment section of Oregon's 2012 Integrated Report Database.

The 303(d) list that is in effect each year on January 1 will be used to determine eligibility under this permit. DEQ is using the most current 303(d) list in effect as of Jan. 1 of each year. Using a set date to determine that this permit authorizes coverage allows an operator to plan for purchases or services associated with pesticide use. Using the most current 303(d) list that is in effect as of Jan. 1 of each year, is more protective than waiting for permit renewal. Operator should use the most current 303(d) list in effect as of Jan. 1 of each year to decide whether their discharge will meet the eligibility requirements regarding waterbodies impaired for specific pesticides. An operator's up-to date pesticide management plan will include a list of water-quality limited streams. The list is used to determine whether alterantives, such as, integrated pest management, mechanical means or a different pesticide should are needed to maintain coverage under this permit.

Future listings are available on DEQ's Water Quality Assessment web page at:
http://www.oregon.gov/deq/wq/Pages/WQ-Assessment.aspx.

2.2 Discharge Not Authorized Due to Exemption

There are regulations in place that exempt certain discharges from a NPDES permit requirement. These exemptions include discharges composed entirely of return flows from irrigated agriculture or agricultural stormwater runoff. [Clean Water Act section §502(14); 40 CFR §122.2 and 40 CFR §122.3(f)]. However, discharges from the application of

pesticides into irrigation ditches and canals – that are themselves surface waters of the state – are not exempt as irrigation return flows or agricultural stormwater.

3.0 Coverage and Eligibility

This section of the permit contains the requirements in OAR 340-045-0033 applicable to general permits.

Section A. explains procedures for obtaining and maintaining permit coverage. All operators identified on page 1 of the permit are required to obtain permit coverage by submitting a complete application and associated fees to DEQ.

The NPDES application form requires specific information to be filled out before permit coverage may be assigned by DEQ. Fees and a land use compatibility statement form are required to be submitted with an application before it is processed. If a land use compatibility statement form is on file, then DEQ can use that land use compatibility statement. A new registration fee for the 2000J will not be applied to a transfer of permit coverage from a 2300A general permit. A prepaid annual fee for a 2300A pesticide general permit will be applied to the 2000J annual fee. Individual annual fee payment will be pro-rated based on the date of individual permit coverage termination. A pesticide discharge management plan is not submitted with an application.

Section A. provides time frames for registration which is dependent upon a planned pesticide application or prior permit coverage.

This section includes requirements that anticipate electronic registration will be available in the future during the permit term.

Section B. Summarizes circumstances contained in OAR 340-045-0033 to explain when coverage under this general permit is not authorized and an individual permit will be required OAR 340-045-0033(10)(c) includes a complete list of reasons for requiring an individual permit.

Under OAR 340-045-0033(8), any permittee covered by an individual NPDES permit may request that the individual permit be cancelled, if its discharge or activity may be covered by an existing general permit. This type of permit action would apply to permittees currently covered under individual permits for use of acrolein-based, copper-based, and xylene-based aquatic pesticides within irrigation system boundaries that seek coverage under this general permit. A list of irrigation systems are currently operating under an individual permit is provided in Table 1 above.

In OAR 340-045-0033(6), one circumstance precluding permit coverage under this permit is when pesticide applications are approved and regulated under a separate NPDES permit. Coverage for a point source discharge of a pesticide not authorized under this permit may be obtained under an individual NPDES permit or, when renewed, under NPDES 2300A pesticide general permit.

Section C. This section provides basic information on general permit expiration and renewal.

4.0 Permit Limits

There are two categories of effluent limits for NPDES permits: 1) Technology-based effluent limits and 2) Water quality-based effluent limits.

TBELs define a minimum level of control using available technology. EPA establishes TBELS through effluent limitation guidelines specific to industrial categories. If there are no applicable effluent limitation guidelines, best professional judgment may be used.

This approach is used in this NPDES general permit for pesticides;[4] as EPA explains in its fact sheet for the 2016 pesticide general permit on page 81:

> "Permit writers are to assess whether the TBELs are protective of water quality standards, and if not, permit writers must also include WQBELs as necessary to ensure that the discharge will not cause an

excursion above any state water quality standard, including state narrative criteria for water quality (see 40 CFR 122.44(d)). In developing WQBELs, permit writers must consider the potential impact of every proposed surface water discharge on the quality of the receiving water. Unlike individual permits that include requirements tailored to site-specific considerations, general permits, while tailored to specific industrial processes or types of discharges (*e.g.*, from the application of pesticides), often do not contain site-specific WQBELs. Instead, in general, EPA includes a narrative statement that addresses WQBELs."

When renewing a permit, a permit writer typically evaluates the existing limits in the permit against changes to technology based standards and water quality standards that may have occurred during the permit term. With few exceptions, the anti-backsliding provisions (described in CWA Section 402(o) and CFR 122.44(l)) do not allow relaxation of effluent limits in renewed permits. The most stringent of the existing or new limits must be included in the new permit.

Similar to EPA's 2016 pesticide general permit, this permit contains technology based effluent limits and narrative water quality-based effluent limits that apply to most pest control categories. There are also technology based effluent limits for pesticide application within an irrigation system.

The non-numeric technology-based effluent limitations and narrative water quality-based effluent limits in this general permit will protect water quality and existing beneficial uses in the receiving surface waters of the state. In general these beneficial uses are for fish and other aquatic life, recreation, drinking, agriculture, industry and other uses.

This permit includes requirements for irrigation systems use of acrolein-, copper- and xylene-based aquatic pesticides. In this general permit, numeric water quality-based effluent limits and management practices for acrolein-, copper- and xylene-based pesticides are also included.

DEQ issued individual permits for irrigation systems beginning in 2001. A review of these individual permit conditions and evaluation reports shows that regulation of these aquatic herbicide applications in irrigation systems are substantially similar in each individual permit and to the requirements in this pesticide general permit. Management practices for acrolein-, copper- and xylene-based pesticides are consistent with the permit conditions that are in individual irrigation district permits issued in 2005 and 2006. These individual permits have numeric effluent limits for acrolein, copper and xylene. As explained below, these numeric effluent limits have changed.

The effluent limits for acrolein, copper and xylene are lower in this general permit than the effluent limits in the individual permits. The effluent limit for acrolein is lower because this permit contains current human health water quality criteria for acrolein. The effluent limit for xylene is lower to be protective of water quality narrative criteria in OAR 340-041-0007 (10), no toxics in toxic amounts. This xylene effluent limit is based on information from EPA's Office of Pesticide Programs in a Sept. 26, 2005 document, Reregistration Eligibility Decision for xylene. This proposed general permit includes new copper limits using DEQ's revised aquatic life water quality criteria for copper which are based on a EPA Office of Water approved biotic ligand model. DEQ revised its copper criteria to address EPA's disapproval of Oregon's freshwater hardness based copper criteria. EPA approved DEQ's biotic ligand model copper criteria in January 2017. In keeping with DEQ's antidegradation requirements these statewide permit limits will protect the more sensitive existing beneficial uses.

4.1 Narrative Water Quality-Based Effluent Limits and Technology-Based Effluent Limits

Similar to EPA's 2016 pesticide general permit, this permit retains technology-based effluent limits and narrative water quality-based effluent limits for pesticide application. DEQ agrees with EPA's approach to regulate most pesticide applications using technology-based effluent limits and narrative water quality-based effluent limits to protect water quality.

4.1.1 Narrative Water Quality-Based Effluent Limits

This permit has narrative water quality based effluent limits to protect water quality and beneficial uses. This approach is consistent with EPA's and other states general permits.

EPA noted in its 2016 pesticide general permit fact sheet that national scale monitoring data is not well suited to identify whether a point source discharge of a specific pesticide may adversely affect water quality.

National scale monitoring data such as USGS's studies contained in *The Quality of Our Nation's Water – Pesticides in the Nation's Streams and Ground Water, 1992-2001 :USGS Circular* (Gilliom et al. 2006) are earlier studies that did not focus on point source discharge. These studies:

- capture the transport of pesticides to surface water from runoff;
- capture more diffuse non-point transport of pesticides in watersheds,
- do not focus on the practices in place during pesticide use; and
- may not have captured pesticide residues with the timing and location of sample collection.

Similarly, the results of many studies with water quality toxic monitoring data in Oregon are not coincident with a point source discharge of biological pesticide or chemical pesticide excess or residual. The possible sources of the pesticides detected in ambient water are associated with the common pesticide use and other known land uses in that area.

In 2000, the U.S. Geological Survey began sampling for pesticides in the Clackamas River basin as part of a cooperative study with the Clackamas Watershed Management Group. While the study did not focus on point sources, the study did associate the pesticides found in surface water with various pesticide uses:

> *Of the 51 current-use pesticides detected in the basin, 47 have uses associated with nursery and floriculture crops (29 herbicides, 12 insecticides, and 6 fungicides). About one-half of the pesticides detected in the Clackamas River basin also are commonly used on lawns and landscaping in urban areas (57 percent), on golf courses (49 percent), applied along fences, roads, and other rights-of-way (45 percent). Although not specifically examined in this study, 14 percent of the pesticides may be used on forestland, and considering the large amount of forest acreage in the basin, applications to state or private forestland also may be important. Pesticide use on federal land in the basin is rare, although applications have been done in the past.*[5]

Most of the sampling events occur during storm events. The sampling events target stormwater runoff and seasonal fluctuations. The study results are compared to pesticide benchmarks, which are helpful in interpreting monitoring data, but not for establishing numeric effluent limits for a point source discharge. As DEQ notes in the December 2009 Willamette Basin and Streams Assessment summary report, water quality criteria do not exist for the vast majority of pesticides. The report states:

> *Herbicides were the most frequently detected class of pesticides measured in water samples from the Willamette River Basin. Diuron and atrazine were the most commonly detected herbicides in surface water sampled at 20 sites in September and December 2008. At least half of the surface water samples collected during September and December contained detectable concentrations of the herbicide diuron and at least a quarter of the samples contained detectible concentrations of atrazine, another widely used herbicide. No pesticides were detected in water at concentrations that exceeded federal or Oregon water quality criteria although few criteria exist for current-use pesticides.*

A discharge from most pesticide applications is not typical of a point source discharge that can easily be characterized to establish a numeric effluent limitation. Chemical pesticide products applied directly to water are not considered pollutants until sometime after the pesticide has performed its intended function for pest control under Federal Insecticide Fungicide Rodenticide Act (FIFRA); therefore, the point in time for which a numeric effluent limitation would apply is not easily determined. The discharges are intermittent. The pesticide product will have varying rates of degradation, the compounds of degradation vary and the discharge will have combined with other discharges in the water, so that it is not easily distinguishable from the pesticide application of the product. For most pesticide applications, the approach on how and when to measure for a numeric limit is not clear.

NPDES permits are usually written for continuous discharges that have a discrete discharge location and a characterized discharge. Most discharges from the application of pesticides are different. Pesticides applications often occur over a short duration. Because the discharges are highly variable and occur over many different locations, an approach to setting numerical limits at each location would be difficult. Pesticide use is dependent upon formulation changes and practices that keep ahead of pest resistance. Active ingredients are known and regulated under FIFRA. The inerts and adjuvants are

not known. While numeric WQBEL are not part of this permit for most pesticide use, the non-numerical technology-based control limits are an effective regulatory requirement that takes into account the variability in location and pesticide use.

Studies focusing on pesticide use over time may demonstrate a trend in pesticide use. On the USGS web site, http://toxics.usgs.gov/highlights/herbicide_decline.html, USGS noted that after monitoring 50 Midwestern streams in 1989, 1990, 1994, 1995, and 1998:

- Certain herbicides declined because they were not being used: alachlor showed a downward trend because of the decrease in the total application amount; and
- A pesticide showed a downward trend suggesting that changes in farming and best management practices, or other factors, are affecting the concentration.

Studies have shown that pesticides in water decrease when management practices that focus on improving water quality are adopted. As part of the Pesticide Stewardship Partnership Program at DEQ, projects in the Columbia Gorge, Hood River and The Dalles have shown substantial improvements in water quality associated with measurable changes in pesticide management practices. See DEQ's Pesticide Stewardship Partnerships website at http://www.oregon.gov/deq/wq/programs/Pages/Pesticide.aspx.

In Schedule A, Condition Nos. 1, 4 and 5, operators are required to meet water quality standards, practice pest management measures and take corrective action if water quality standards are not met. In Schedule A, Condition 1.d., meeting water quality standards includes ensuring compliance with a total maximum daily load implementation plan for temperature. A pesticide application cannot be inconsistent with a temperature TMDL. A pesticide application that may have a negative effect on establishing desired vegetation or site potential established in a temperature TMDL is not allowed. A pesticide application that has an effect on riparian vegetation that reduces shade and increases the amount of solar radiation could have a negative effect. Therefore this permit condition would not allow, for example, a blanket pesticide application that results in a widespread killing or retardation in development of desired vegetation that is not part of a riparian restoration strategy.

DEQ has narrative criteria that prohibits the creation of conditions harmful to aquatic life and a discharge that is toxic. This permit contains aquatic life protections for salmon that are not a part of a label but are contained in court ordered streamside no-spray buffers effective in Oregon. In Condition 1.e.*i.* and *ii.* a point source discharge of a pesticide must be consistent with court-ordered determinations in addition to labelling to be protective of water quality and beneficial uses of Oregon's water.

4.1.2 Technology-Based Effluent Limits

Effluent limit guidelines are not established for pesticide applications into, over or near the water's edge. For point sources not covered by an effluent limit guideline, permit writers develop technology-based effluent limits using best professional judgment (40 CFR Part 125.3). Permits must contain technology-based effluent limits (40 CFR Part 122.44(a)(1) and 125.3) and any additional limits needed to ensure the permitted activity does not cause or contribute to a violation of water quality standards. For most pesticide applications, information needed to develop numeric effluent limits is not available at this time. For pesticide applications other than acrolein-, copper- and xylene-based aquatic pesticides used to control weeds and algae within irrigation system boundaries, this permit commonly uses EPA's and other states' technology-based effluent limits.

Non-numerical, technology-based effluent limits reduce pollutants by using appropriate pest management measures, also known as best management practices. It is important to note that EPA generally expects that compliance with the technology-based effluent limits in their pesticide general permit will meet the applicable water quality-based effluent limitations and DEQ's permit is in keeping with this assumption. However, the extent of the reduction cannot be determined, so the permit contains additional narrative effluent limits (Schedule A, Condition 1, a. through e.) that prohibits any discharge that violates water quality standards and protects beneficial uses.

Like the 2300A pesticide general permit, this permit requires the use of pest management measures to minimize impacts of pesticide use. These pest management measures control the discharge of pesticide pollutants.

Requiring all operators to minimize their discharge through use of a proper amount of pesticide, use of proper equipment, maintenance, spill prevention, corrective action and pest management measures goes beyond the current practice of following the FIFRA label. (Schedule A, Condition Nos. 4. through 6.) Reduction of a discharge protects water quality and beneficial uses.

The permit requires more than the conventional "follow the FIFRA label" pest control and management practices for pesticides. Not all FIFRA labels contain management practices to protect water quality. Conventional pest control is typically reactive, intended to kill the target pest, but ignoring the reasons why the pests are present. Conventional pest control may be used to ward off the onset of the pest before it is even detected or does damage. Conventional pest control is a short-term solution that can become dependent upon repeated pesticide use that may cause water quality problems. Federal or state label requirements may not include local considerations. Inherent in the pest management measures in this permit is an understanding of the species involved, an evaluation of the threat at that site and a combination of control methods that results in minimizing the use of pesticides. The evaluation is not static. Continued evaluations and improvements are expected as part of the practice. Integrated Pest Management was an encouraged practice for some entities, but now IPM type procedures or Pest Management Measures are a requirement under the permit.

The general pest management measures required in Schedule A, Condition Nos. 4 through 6 are an effective and environmentally sensitive approach that relies on a combination of common-sense practices. The pest management measures rely on current, comprehensive information on the life cycles of pests and their interactions with the environment. This information in combination with available pest control methods will be used to manage pest damage with the least possible hazard to people, property, and the environment while taking into consideration the most economical means. Pest management in Schedule A, Condition 6 requires a more detailed structural approach toward minimizing the discharge of pesticides.

Similarly, this permit includes best management practices for acrolein-, copper- and xylene-based aquatic pesticide use within irrigation system boundaries and best management practices assigned to specific irrigations system operators. These best management practices, contained in Condition Nos. 7 through 11, are required practices in individual permits set to be protective of beneficial uses and water quality. For example, gate maintenance may be implied as a label requirement, but is not a requirement of a label. This permit requires gate inspection and maintenance.

Condition 12 contains an exception from following pest management measures for research and development purposes. This condition is in place because pest management measures may be inconsistent with the research and development activities and its applicable plan. DEQ can check with an ODA Pesticide User Certification and Licensing Specialist to determine if a pesticide is being used for research and development.

4.2 Water Quality-Based Effluent Limits for Acrolein-, Copper-, Xylene-based Aquatic Pesticides Within Irrigation Systems Boundaries

Irrigation systems provide farmers and ranchers with water for irrigation of their crops and pastures. However, irrigation systems are sometimes interconnected with natural waters and valid concerns about off-site effects can arise over the application of pesticides into these irrigation systems. This permit has effluent limits and management practices to prevent residues from pesticide-treated irrigation waters from affecting natural waterways.

Residues are the aquatic herbicide itself, an excess or off-target application or by-product resulting from the application of the aquatic herbicide. Residues are found outside of the treatment area during application or persist after the specified treatment period. The permit assumes that all pesticides leave a residue.

For chemical pesticide residues in Schedule A., DEQ requires compliance with water quality standards within the irrigation system outside of the treatment area during the treatment period, and within the irrigation system and treatment area after the treatment period has elapsed. Compliance with water quality standards is required within the irrigation system for biological pesticides.

In keeping with prior individual permits, numeric-effluent limits are at set with no allowance for dilution. Also in keeping with prior individual permits, compliance is monitored at a discernible compliance point closest to natural water. Acrolein-, copper- and xylene-based pesticide residues will continue to be sampled at a location that is closest to natural water. A definition of natural water, to describe this sampling point, is provided in the definition section of the permit.

Surface waters of the state includes canals, creeks, impounding reservoirs, natural or artificial, public or private surface water. An exception to surface waters of the state is private water that does not combine or connect with a natural surface or underground water. An irrigation ditch or canal can be a surface water of the state with applicable beneficial uses that are listed by basin in Oregon Administrative Rule OAR 340-041 Tables 101A to 340A. With a few exceptions for hydro-power, industrial water supply and commercial navigation and transport, most basins have the following beneficial uses shown in Table 2 below:

Table 2- Beneficial Uses in Oregon Administrative Rule OAR 340-041 Tables 101A to 340A

Beneficial Uses	
Public and Private Domestic Water Supply[1]	Aesthetic Quality
Salmonid Fish Rearing	Livestock Water
Boating[1]	Wildlife and Hunting
Industrial Water Supply	Hydro Power
Salmonid Fish Spawning	Anadromous Fish Passage
Water Contact Recreation	Fishing[2]
Irrigation	Commercial Navigation & Transportation[1]
Fish and Aquatic life[2]	

[1] Beneficial uses in Umatilla Basin applicable to West Division Main Canal constructed channel and over flow channels do not include public or private domestic water supply, boating or commercial navigation & transportation.
[2] Beneficial uses in Umatilla Basin applicable to West Division Main Canal overflow channels do not include fish and aquatic life or fishing.

Water quality standards applicable to West Division Main Canal constructed channel and over flow channels that are part of West Extension Irrigation District are contained in OAR 340-041-0315.

An irrigation system's primary beneficial use is to supply water for irrigation. This permit will protect beneficial uses, in addition to irrigation, in natural waterways. Human health and aquatic life criteria are appropriate criteria to apply to each basin in the state. A use attainability analysis is required to change a beneficial use established in DEQ's water quality standards for a surface water of the state. The section on Schedule A below has further explanation of water quality-based effluent limits.

5.0 Antidegradation

The narrative water quality-based effluent limits and technology based pest management measures in this permit will be protective of water quality standards and existing beneficial uses for most pesticide applications.

The pest control covered under this permit and the discharges from pesticide applications existed prior to DEQ's issuance of individual permits for irrigation systems in 2002 and coverage granted under the 2300A pesticide permit in October 2011. The proposed level of aquatic pesticide application is consistent with past usage in that it will follow FIFRA label requirements and fluctuate with the severity of aquatic weed infestation, weather conditions and irrigation flows. As such, the existing discharges do not constitute new or increased "point source" discharges that would foreseeably degrade water quality.

This permit with similar discharge loadings contained in individual permits and 2300A pesticide general permit is not considered to lower water quality from the existing condition. This general permit for irrigation systems will continue to protect water quality as operators responsible for the pest control carry out the permit's technology-based requirements for minimization and follow pest management measures.

Chemical pesticides are applied as a product and are intended to be toxic to the target species. The discharges covered under this permit are for the chemical pesticide residues after the pesticide has performed its intended purpose. Therefore, the residue will be no higher than, and in many instances, lower than, the concentration of the pesticide as applied.

Biological pesticides are certain microorganisms including bacteria, fungi, viruses, and protozoa that are effective in controlling target pests. Biological pesticides do not by regulatory definition work through a toxic mode of action.[6]

This general permit must contain limits and other conditions necessary to implement water quality standards that are developed to protect the most sensitive existing beneficial uses. As such, this permit includes pesticide use requirements that may not currently be on a pesticide label or bulletin, but are in effect due to a court order. In keeping with antidegradation requirements, the effluent limits in this permit are designed to protect the most sensitive beneficial uses of Oregon waters. Therefore, in waters where existing uses are more sensitive than the uses specifically designated for the waterbody, the permit limits and requirements will protect the more sensitive existing beneficial use. This permit includes pesticide use requirements in Schedule A,1.e.that are protective of existing beneficial uses, specifically endangered species, as set by a court-ordered decision that is in effect in Oregon. Reference to the most recent court-ordered decision in place is available on Oregon Department of Agriculture's web page on buffers at http://www.oregon.gov/ODA/programs/Pesticides/Water/Pages/Buffers.aspx.

Conditions in this permit implement the antidegradation rules consistent with DEQ's antidegradation approach for permits. This approach can be found online at https://www.oregon.gov/deq/wq/Pages/WQ-Standards-Antidegradation.aspx.

Regional copper limits are derived using copper criteria based on EPA's Office of Water national biotic ligand model. The BLM model derives copper criteria based on water quality characteristics and requires the input of 11 different water quality parameters that affect the bioavailability and toxicity of copper in freshwaters. This model provides a more accurate prediction of copper toxicity than DEQ's previous criteria which was based on water hardness correction alone. DEQ recently revised its copper standards to protect aquatic life based on EPA's 2007 national recommendation to use BLM copper. Environmental Quality Commission adopted these rules in November 2016. DEQ received EPA's approval of its copper BLM standard in January 2017.

Permit limits for xylene were established in individual permits issued to five irrigation system operators in 2002. This permit includes xylene limits based on more recent information from EPA's Office of Pesticide Programs. The Sept. 26, 2005 Reregistration Eligibility Decision for xylene established a "safe" concentration of 0.04 ppm in receiving water to be protective of endangered species.[7] DEQ's statewide narrative criteria contained in OAR 340-041-0007 does not allow the creation of tastes, odors, toxics or other conditions that are deleterious to fish or other aquatic life, that affect the potability of drinking water or the palatability of fish or shellfish. This permit contains xylene limits that are protective of this narrative water quality criteria. This limit can be achieved by following holding requirements as directed by a label.

This general permit contains limits based on the most recent water quality criteria for acrolein. The limits are set to protect the most sensitive beneficial use, human health.

The effluent limits for acrolein, copper and xylene are lower in this general permit than the effluent limits in the individual permits and as such do not result in backsliding or an increased discharge of a pollutant or degradation of water quality.

The permit requires the protection of existing uses and places restrictions on when new or increased pollutants may be allowed. This permit contains water quality-based limits to prevent degrading water quality and prohibits an increased discharge of the limited water quality parameter (or parameter related to the limited parameter) in a water quality limited water.

A point source discharge of pesticides must also be consistent with applicable reasonable prudent alternatives set out in Biological Opinions published by National Marine Fisheries Service or U.S. Fish and Wildlife for FIFRA registration actions as they pertain to preventing jeopardy of adverse modification of critical habitat for species present in Oregon waters. Operators are required to review and comply with EPA issued Endangered Species Protection Bulletins.

The general permit does not authorize a discharge to a waterbody identified as water quality limited on the 303(d) list for a pesticide, its chemical residual or degradates when a waste load allocation for the relevant pollutant parameter does not exist. For example, application of the pesticide copper sulfate to a waterbody impaired for either copper or sulfates would not be eligible for coverage under this permit. This is because copper sulfate can degrade into these two substances. An operator will have to choose between using mechanical means, a different pesticide product or an individual permit. A

discharge of impairment pollutants to water quality limited waterbody would require an individual permit which may include a more detailed site specific evaluation that results in additional technology-based or water quality-based effluent limitations. DEQ has tools to identify categories 4 and 5, 303(d) listed waterbody segments as an additional permit resource. There are waterbodies that are on DEQ's 2012 303(d) list for copper. There are no water bodies on DEQ's 2012 list of impaired waters for acrolein or xylene.

DEQ will be using water bodies listed as water quality limited for copper based DEQ's 2012 303(d) list for copper. If a new assessment results in a listing based on BLM copper, DEQ may require an operator to obtain an individual NPDES permit on the basis of this Permit's eligibility requirements and OAR 340-045-0033(10). Most irrigation systems are located in the eastern region. Owyhee and Vale irrigation systems in Oregon and Idaho were studied in 1990-1991. Results of dissolved copper in surface water samples taken in these project areas are in a Geological Survey Water-Resources Investigations Report 93-4156. A majority of the samples results for dissolve copper are below 8 µg/L. Of the 22 samples taken in these project areas in Oregon, three results were above 8 µg/L and half of the results are 2 µg/L.[8] Appendix B contains an excerpt from this report. Appendix B contains a figure with sampling locations and an excerpt from a table with concentrations of dissolved elements. Information on FIFRA labels have changed over the years and NPDES discharge permits were not in place at the time. In this permit, copper limits are set to meet the current BLM copper criteria, does not allow a mixing zone, and pest management practices are required, so that, existing irrigation systems newly assigned to this permit are not expected to cause or contribute to a lessening of DEQ's BLM water quality criteria.

Water quality standards applicable to Oregon's Outstanding Resource Water are contained in OAR 340-041-0305(4). Irrigation systems have not been identied as a potential source in this newly designated Outstanding Resource Water in North Fork Fork Smith River, its tributaries and wetlands. No new discharges from an irrigation system are expected to be established in these waters.

6.0 Schedule A- Discharge limitations

6.1 Minimization

For many pesticide applications, minimization of the discharge can be achieved without using highly engineered, complex treatment systems. The specific limits included in Schedule A emphasize effective "low-tech" approaches, including following mandatory label requirements, using the optimal amount of pesticide product, performing regular equipment maintenance and calibration, accurately identifying the pest problem, efficiently and effectively managing the pest problem, and properly using pesticides.

These effluent limits are generally preventative in nature, and are designed to minimize the discharge of pollutants from pesticide use. Operators are ultimately responsible for ensuring that all required effluent limits are met.

6.2 Narrative Effluent Limits (Conditions Nos. 1.)

Operators of irrigation systems must meet narrative water quality-based effluent limits, as well as, water quality based limits and technology-based effluent limits. Condition 1.a. and b. contains a general requirement that all operators must manage their discharge so that it does not cause or contribute to a violation of water quality standards. In Condition 1.c. and 5, operators must take corrective action in response to a discharge that does not meet this requirement.

Condition 1.d. requires a discharge to be consistent with an EPA approved total maximum daily load implementation plan for temperature. For example, the December 2008 Molalla-Pudding SubbasinTMDL[9] Water Quality Management Plan, Chapter 7, Table 7-2, contains an example management strategy to increase effective shade through riparian restoration to address temperature as a pollutant. This permit condition does not allow a pesticide application inconsistent with a temperature implementation plan that includes this management strategy for addressing temperature as a pollutant. In general, most pesticide applications are conducted to control invasive or unwanted vegetation so that riparian restoration is achieved. This permit condition would not allow, for example, a blanket pesticide application that results in a widespread killing or retardation in development of desired vegetation that is not part of a riparian restoration strategy.

There are court-ordered buffer requirements (i.e. specific set-back distances from water) for some pesticides approved for use in Oregon. These court-ordered buffers are not currently included on a label or enforceable by Oregon Department of Agriculture. Condition 1.e. includes court-ordered buffer requirements in effect for specific pesticides. Reference to the

most recent court-ordered decision in place is available on Oregon Department of Agriculture's web page on buffers at http://www.oregon.gov/ODA/programs/Pesticides/Water/Pages/Buffers.aspx.

6.3 Schedule A - Pest Management Measures (Condition Nos. 4 through 7)

Operators are required to use pest management measures to minimize the discharge of pesticides.

To meet these limits the permit requires operators to implement site-specific pest management measures to minimize the discharge of pollutants from the application of pesticides. Pest management measures can be actions, such as processes, procedures, schedules of activities, prohibitions on practices and other management practices, or structural, or installed devices to prevent or reduce water pollution. The term minimize, as defined in the permit, means to reduce or eliminate pesticide discharges to surface waters of the state using achievable pest management measures to the extent technologically available and economically practicable and achievable. Pest management measures provide for variability in the best way to achieve these pest management measures. In general, pest management measures need to be adapted for each site.

Generally a pesticide product label contains both mandatory actions and advisory statements related to practices that can prevent pesticide residues from reaching surface waters. In Condition 4.a., DEQ requires operators to follow mandatory Federal Insecticide Fungicide Rodenticide Act label requirement (e.g. directions) that can protect water quality. This information can be found in several sections of a label, including sections with the following headings: Directions for Use, Environmental Hazards, Spray Drift Management, Endangered Species Protection, and Buffers (Vegetative and "No Spray" Buffers). The mandatory requirements are typically identifiable by language that includes the words "must" or "must not." Examples of mandatory requirement language in the label that can protect water quality include:

- *"This product must not be mixed or loaded within ___feet of intermittent streams or rivers"*
- *"The following drift management requirements must be followed to avoid off-target drift movement from aerial applications….."*
- *"Any use of this product in an area where use is prohibited is a violation of federal law."*
- *"Do not exceed ___ pounds per acre per calendar year."*

Using the pesticide product as intended and following the label will result in the efficient use of the pesticide and minimize or prevent a pesticide or pesticide residue from discharging to water. Using the optimal amount of pesticide, as required in Condition 4.b, reduces the amount of pesticide that is not performing a specific pest-control function. Using only the amount and frequency of applications necessary will save the user time and money.[10]

In Condition 4.c., operators are required by DEQ to minimize discharge through equipment maintenance, proper mixing and loading activities. Common sense and good housekeeping practices enable pesticide users to save time and money and reduce the potential for unintended discharges. Some basic practices to consider to make sure equipment is in proper operating condition and how to avoid improper pesticide mixing and equipment loading are provided below:

- Inspect pesticide containers at purchase to ensure proper containment;
- Maintain and clean storage facilities for pesticides;
- Regularly monitor containers for leaks;
- Make sure gaskets are tight and connections are secure to prevent spills and leaks;
- Ensure the proper handling and storage of the equipment at the treatment site;
- Use leak proof containers for storage and use leak proof containers for mixing on site;
- Avoid storage and mixing in areas that will drain or leach any accidental spillage into water; and
- Promptly deal with spills following the manufacturer's recommendations.

For example, when water is taken from a stream for mixing pesticides or to clean equipment, there are ways to prevent the pesticide from getting into the stream. A backflow-preventer or an air gap on the device used for siphoning or a clean reservoir between the water source and the mixing container will prevent the pesticide from getting into the water.

In Condition 4.d, DEQ expects operators to maintain the application equipment and calibrate it to have the necessary control: otherwise too little or too much will be applied. Apply too little, the frequency of application increases, apply too much and excess pesticide may lead to water quality problems and could be a violation of pesticide laws (FIFRA and

ORS 634). When done properly, equipment calibration can assure uniform application to the desired target and result in higher efficiency in terms of pest control and cost.[11]

Spray application equipment must be equipped to deliver at the correct pressure, with the right orifice size or tip to dispense the proper amount of product. Any pumps for spraying need maintenance to deliver the pesticide at sufficient pressure to apply a uniform and adequate rate of pesticide. Pesticide application efficiency and precision can be adversely affected by a variety of mechanical problems and can be addressed through regular calibration. Sound calibration practices to consider are:

- Choosing the right spray equipment for the application;
- Ensuring the proper regulation of pressure and choice of nozzle to ensure the desired application rate;
- Calibrating spray equipment prior to use to ensure the rate applied is that required for effective control of the target pest;
- Cleaning all equipment after each use and prior to using another pesticide;
- Checking all equipment regularly (e.g., sprayers, hoses, nozzles, etc.) for signs of uneven wear (e.g. metal fatigue/shavings, cracked hoses, etc.) to prevent equipment failure that may result in inadvertent discharge into the environment; and
- Replacing all worn components of pesticide application equipment prior to application.

Pesticide application equipment is generally sold with manufacturer's instructions so that the manufacturer's conditions can be followed on how to use the equipment properly. If the equipment is not new, operators should access the manufacturer's information to make sure the instructions are followed, the equipment is used properly to maximize efficiency and accuracy of delivery and pesticide use is minimized.

Condition 4.e contains a requirement to assess environmental conditions in the treatment area. DEQ expects, for example, that weather conditions will be assessed to determine that the conditions are appropriate for an effective application in instances when the label dictates certain requirements. Documentation of environmental conditions is also a requirement.

The efficacy of the pesticide may be dependent upon the waterbody conditions such as temperature or water movement for proper mixing and the least impact on non-target species.

Using site-specific pest management measures will minimize the discharge of pesticides to surface water. If site-specific pest management measures are not being met or water quality standards are not being met, then corrective action is required.

Conditions 6 and 7 requires an operator to accurately identify the pest problem, efficiently and effectively manage the pest problem, and follow pesticide use practices. There are several specific management practices for the use of acrolein-, copper- and xylene-based pesticides. Recordkeeping is required on surveillance methods, action thresholds, and pest management methods used for each treatment area.

In Condition 6, permit registrants are required to identify the pest problem, identify the target pest, and establish an action threshold. Understanding the pest biology and ecology will provide insight into selecting the most effective and efficient pest management strategies and in developing an action threshold. An action threshold is established at the beginning because it is a point at which pest populations or environmental conditions indicate that pest control action must be taken. Through proper pest identification, informed pesticide management decisions can be made based on the development biology of the pest (susceptible development stage), pest mobility (potential rate of spread), timing to act on the selected pest management measures, applicable control techniques, and most effective chemical pesticides for the target species. Failure to identify pests can lead to unwarranted control activities or the need for chemical application with potential for discharge of pesticides into water, or both.

Operators are required to identify the pest problem in their pest management area prior to the first application covered under this permit. Re-evaluation of the pest problem is also important to ensure pest management strategies are still applicable. Permit registrants must identify the pest problem at least once each calendar year prior to the first application for that calendar year. Implementing efficient and effective means of pest management over the long term will minimize pesticide discharges to waters of the state resulting from the application of pesticides.

Nuisance plant growth within irrigation canals consists primarily of submerged and floating aquatic vegetation, algae/moss and pondweed. As the vegetation accumulates, it causes partial blockage of the irrigation canals, delivery points, screens, trash racks and check gates. This blockage can restrict water flow, thereby causing backwater areas. These backwater areas can cause the water to crest the banks of the canals and reduce water supply to irrigators. The vegetation also clogs pumping station intakes, causing the pumps to switch off, and thereby eliminating the supply of water for agricultural purposes.

Alternatives to pesticide use must be considered but can be considered in combination with other pest management options. Combinations of various management methods are frequently the most effective control strategies over the long term. The goal should be to emphasize long-term control rather than a temporary fix. The management strategy chosen must take into consideration the impacts to water quality, minimizing impacts to non-target organisms, pest resistance, feasibility and cost effectiveness. The strategies to be evaluated include: no action, prevention, mechanical or physical methods, cultural methods, biological control agents and pesticides. Using a combination of the management strategies used over the long term is usually an effective way to prevent resistance.

There are alternative means to pesticide control application, including[12]:

- Physical (hand-pulling, backhoe excavations, mechanical harvesting),
- Biological (stocking with grass carp),
- Mechanical/ (sediment amendment/removal, canal lining, piping, etc.)
- Cultural (dewater, drawdown)

However, as with pesticide applications, these alternatives have their pros and cons. For example, mechanical cleaning usually requires access on both sides of the ditch in order to have tractors drag a chain across the ditch bottom. In many cases, such access is not available system-wide. In addition, mechanical cleaning can stir up sediment and debris, which will clog irrigation drip and sprinkler systems. This makes it difficult to conduct mechanical cleaning during the irrigation season. Piping is another effective method for reducing plant growth; however, it can be very expensive and may be difficult for systems that receive stormwater runoff. Biological methods, such as stocking with grass carp, are considered impractical and risks introducing nonnative species.

Operators need to evaluate these options carefully, and are likely to choose a combination of activities to control nuisance plant growth. Operators must reevaluate every year prior to the first pesticide application for that calendar year. Recordkeeping is required on the pest management measures taken prior to the first pesticide application.

Pest management measures take into consideration the pest management area and the pest management strategy for that area. By using pest management measures, consideration is given to other treatment alternatives or the combination of treatment alternatives (mechanical, cultural, biological). Choosing a pesticide that is more selective for the target species is part of that consideration. Partial site treatments over time may be considered in order to minimize risk to non-target organisms. Pesticide application must be limited to the appropriate amount required to control the target pests. Methods used in applying pesticides must minimize the impact to non-target species.

If pesticides are used, they must only be used as needed as determined by an action threshold. Pesticide use must follow the appropriate pest management measures including use of the minimum effective application rate.

Permit registrants are required to conduct pest surveillance prior to the application of pesticides to determine when the action threshold is met. Pest surveillance is necessary for pest control in order to reduce the impact on the environment. Pest surveillance is important to properly time the need for pest control, taking into account such things as local environmental conditions, the possible spreading of the pest, due to environmental conditions and conditions that limit the choice or effectiveness of the control activity. An example of effectiveness of the control can include the effectiveness of a pesticide on the life stage of a pest. The action threshold was established when the problem was identified. Surveillance confirms that the action threshold has been achieved and the conditions for pesticide application in the treatment area are appropriate.

The density of the pest population that can be tolerated may differ for non-native species and overgrown native plant species. Management goals for nuisance native plants emphasize reduction of problem growth, not elimination of the species from the system, which is different from what may be required for non-native weed control. Surveillance needs to be conducted to determine when the conditions are right for the application of the pesticide. In selecting the right pesticide, there are considerations for submersed and emergent applications and contact versus systemic herbicides, to name a few. The efficacy of the pesticide may be dependent upon the waterbody conditions such as temperature, water movement for proper mixing and the least impact on non-target species or the stage of the plant growth.[13]

Aquatic pesticide applications are typically made in sections of irrigation systems. An entire system can rarely be treated with one application and many districts only use pesticides in specific problem areas because chemicals can be expensive. Pesticide is usually added at a specific point and flows through the irrigation canal for a certain distance before it is no longer present at effective concentrations due to dilution or degradation. Often pesticide applications must be repeated during the irrigation season because weed growth can be excessive and continuous. Pesticide applicators are required to follow FIFRA label requirements during applications.

The permit contains several specific management practices in keeping with the individual permits for the use of acrolein-, copper- and xylene-based pesticides in Condition 7, which include:

- Plant growth action levels;
- Efforts to control fish entry through fish screens, structures or other management techniques as practicable;
- Gate management for irrigation systems with gates;
- Water users delivery restrictions;
- Flow management;
- Inspection requirements; and
- Requirement to use a licensed applicator

Some but not all individual permits required an evaluation to determine if fish in the irrigation system were being affected by aquatic pesticide application. In Condtion 9, DEQ requires a permit registrant to verify fish control structures or other management practices are in place prior to the applying pesticides in the calendar year. Oregon Revised Statutes 498.301 through 498.346 are in place to determine when fish screens are necessary for diverting water. This statute is carried out through the State Department of Fish and Wildlife. Under ORS 498.306, minor maintenance which includes periodic inspection, cleaning and servicing is the responsibility of the water user. Assuming, where practicable, that fish control structures or other management practices are in place, their readiness needs to be checked.

6.4 Pesticide Use Practices (Condition Nos. 8 through 11)

The permit contains several pesticide use practices that are consistent with practices in irrigation systems for the use of acrolein-, copper- and xylene-based pesticides contained in individual permits, which includes:

- Where pesticide applications occur;
- Management of irrigation flows;
- Plant growth action levels;
- Gate management for irrigation systems with gates;
- Inspection requirements;
- Requirement to use a licensed applicator; and
- Employee knowledge of a spill plan.

Specific pesticide use practices applicable to irrigations systems in Owhyee Irrigation District, Old Owhyee Ditch Improvement District, Ochoco Irrigation District and Klamath Irrigation District are also included here.

This permit provides coverage for operators whose discharges of pesticides to surface waters of the state are solely from pesticide research and development activities, but consistent with EPA's pesticide general permit, these operators implement pest management measures in the permit to the extent that implementation of the pest management measure does not compromise the research design as specified in Schedule A, Condition No. 12.

7.0 Schedule A Water Quality-Based Effluent limits

Aquatic chemical pesticide applications in irrigation systems for pesticides are substantially similar due to compliance with FIFRA label requirements. “Treatment area” and “treatment period” definitions are constrained through the FIFRA application requirements, which specify the effective treatment area and period of an application. This general permit requires that FIFRA pesticide application requirements be followed. These requirements include effective target application concentrations for the aquatic herbicides for specific areas and durations that vary depending on the situations encountered within the irrigation system. This permit further requires implementation of specified pesticide use management practices to protect water quality. Regulation of these chemical pesticide residues via permit conditions and effluent limits are similar to requirements in initial Mutual Agreement and Orders and ten individual permits issued for irrigation systems. The similarity of the permit conditions in the Mutual Agreement and Orders and individual permits show that these systems can be regulated with similar requirements.

Following the 2001 Headwaters Inc. v. Talent Irrigation District decision, DEQ developed and issued Mutual Agreement and Orders to regulate the application of aquatic herbicide into irrigation systems until an NPDES permit was available. DEQ issued individual NPDES permits to irrigation operators beginning in 2002 with subsequent modifications based on challenges to the permits. The modified permits issued in 2005 and 2006 contain conditions that satisfied the challenges.

Management practices for acrolein-, copper- and xylene-based pesticides that are consistent with the permit conditions in individual irrigation district permits issued in 2005 and 2006 are included in this general permit. Individual permits issued in 2005 and 2006 do not have a mixing zone. Compliance points for this general permit are the same as the individual permits for chemical pesticide residue. As in the individual permits, compliance with an effluent limit is after a product has completed its intended use, which is why compliance with water quality standards are outside of the treatment area during treatment or within the treatment system and treatment area after the treatment period elapsed. This permit properly controls residue from treatment. Sampling can occur at discrete locations. Sampling requirements for acrolein, copper and xylene are the same in this general permit as in the individual permit to confirm compliance for a residue upon discharge to natural water.

7.1 Treatment Areas

Operators that apply chemical pesticides within irrigation systems must make that pesticide application to defined treatment areas and for specified treatment periods in accordance with FIFRA labels and management practices in this permit. This permit condition requires that discharge of aquatic chemical pesticide residuals and degradates meet water quality after a pesticide application provides its pesticidal benefit. Definitions of treatment area and treatment period make it clear that water quality compliance is expected outside the treatment area during application activities and within the treatment area after the treatment period has elapsed. Treatment of irrigation water is typically managed by closing off sections of canals or ditches that may discharge to natural water. Monitoring is required at a first point of a release to natural water, after a pesticide application. Reduced monitoring is dependent upon results and meeting specified permit conditions. Aquatic chemical pesticides must not be applied to natural waters. Natural water is defined in the permit as surface waters outside of the irrigation system.

7.2 Numeric Effluent limits

There are numeric effluent limits for acrolein, copper and xylene. The numeric effluent limits for acrolein, copper and xylene are lower than the effluent limits in the individual permits. The effluent limit for acrolein is lower because it is based on DEQ’s current human health water quality criteria for acrolein. The effluent limits for copper are based on DEQ’s current criteria for copper. DEQ’s copper criteria are based on EPA’s 2007 biotic ligand model rather than hardness. The effluent limit for xylene is lower based on new information from EPA’s Office of Pesticide Programs in the Sept. 26, 2005 document Reregistration Eligibility Decision for xylene and its 2009 addendum.

A comparison of previous individual permit effluent limits with proposed effluent limits for irrigation systems that use acrolein-,copper- and xylene-based pesticide is provided in Table 3 and 4 below.

Table 3- Comparision of Irrigation System Individual Permit Limits to Proposed General Permit Limits for Irrigation Systems

Parameter	Individual Permits	Proposed General Permit
Acrolein within Klamath basin	2.3 µg/L*	0.9 µg/L**
Acrolein outside Klamath basin	3 µg/L	0.9 µg/L**
Copper	12 µg/L	See Table 4 below for Biotic Ligand Model Regional Limits for Copper
Xylene	1.3 mg/L	0.04 mg/L
*Exception is the individual permit for North Unit which has an acrolein limit of 6 µg/L		
**Compliance is based on the Quantitation limit of 5 µg/L		

Table 4- Biotic Ligand Model Regional Limits for Copper

BLM Regional Copper Parameter	Individual Permits	Proposed General Permit
Cascade Region		0.65 µg/L*
Coastal Region		2.5 µg/L
Columbia River	12 µg/L	6.6 µg/L
Eastern	12 µg/L	8.4 µg/L
Willamette Valley		3.4 µg/L
*Compliance is based on the Quantitation limit of 2 µg/L		

Effluent limitations in reissued permits generally cannot be relaxed because of the prohibitions on backsliding established under CWA Section 402(o) and 40 CFR 122.44(l). Consequently, numeric limits for acrolein-, copper- and xylene included in the individual permits for irrigation systems are included in this general permit. A mixing zone and amount of routine sampling affect the development of a permit limit. Mixing zones were removed from individual permits in 2005/2006 and routine sampling is expected to occur once per month. In keeping with individual permits, a mixing zone is not provided in this general permit. Schedule A, condtion 2 requires compliance for acrolein-, copper- and xylene-based pesticides within the irrigation system but outside of the treatment area during the treatment period, or within the irrigation system and treatment area after the treatment period has elapsed.

7.2.1 Schedule A.2.a. – Acrolein

Acrolein is a water-soluble aldehyde that is colorless, pungent, and a highly volatile liquid. It is found throughout the environment in very small amounts and is a product of incomplete combustion.

Acrolein is the active ingredient in the aquatic herbicide Magnacide H (EPA Registration #:10707-9), which contains 95% acrolein. As an herbicide, acrolein is injected directly below the surface of moving water and moves with the flow of water, killing weeds on contact in irrigation canals and holding ponds.

The individual permit evaluation reports describe acrolein as an aquatic chemical pesticide that degrades quickly and is relatively non-persistent depending on the temperature, abundance of aquatic vegetation, and processes of hydration and volatilization. DEQ does not expect the inert ingredients or product degradates to be present at levels that would violate water quality standards in the irrigation system prior to discharges to natural waters. The inert ingredients and degradates are expected to be less toxic to aquatic organisms than the active ingredients. EPA Office of Pesticide Programs provides the following information about acrolein in the September 2008 reregistration eligibility decision for acrolein, “Acrolein forms several degradates (acrylic acid, allyl alcohol, propanol, propionic acid, oxalic acid, and ultimately carbon dioxide) in the environment.”

EPA Office of Pesticide Program reregistration eligibility decision states that for herbicidal use in irrigation canals, the maximum single application concentration of acrolein is 15 mg/L. The typical application rate is 8 mg/L. FIFRA labels for acrolein-based pesticides specify a maximum of eight applications per year and a minimum of two weeks between applications.

During the irrigation season when temperatures are warmer, weed growth is excessive and water velocities in treatment areas are higher, acrolein is not expected to be present at levels EPA Office of Pesticide Programs established as acceptable six days after label application of Magnacide H. The current FIFRA label reads: *"Water treated with Magnacide H herbicide must be used for the irrigation of fields, either crop-bearing, fallow or pasture, where the treated water remains on the field OR must be held for 6 days before being released into fish bearing waters or where it will drain into them."*

Pest management practices for acrolein-based pesticide use include meeting the FIFRA requirements for holding, or turnover by irrigating crops directly with treated water.

Acrolein dissipates over time and due to other conditions. Jacobson and Smith (1990) studied the dissipation of acrolein, applied at the highest recommended rate according to the label, to achieve a 15 mg/L (15000 µ/L) concentration for a 2-hour duration in an irrigation canal and a lateral of the canal, which was infested with aquatic plants. The dissipation half-lives for acrolein in the irrigation and lateral canals were 275 and 64 minutes, respectively. No acrolein residues were detected. The detection limit, was 0.01 ppm (10 µg/L).[14]

Results of theoretical decay calculations shown below, demonstrate that following the FIFRA required holding time of 6 days will reduce a sample from the treatment area within the irrigation system to an acrolein residual concentration that meets 0.9 µg/L. These results may vary based on plant growth and other conditions in a treatment area. The results are shown in the Table 5 below.

Table 5- Theoretical Decay Calculations of Acrolein in Irrigation Systems

Equation	**$C_t = C_o e^{-kt}$**	**$C_t = C_o e^{-kt}$**	**$A(t) = Ao(2.718^{-0.0678t})$[1]**	**$C_t = C_o (½)^{t/t_{½}}$**
C_t and A(t)= Amount remaining (µg/L)	1.47893×10^{-6}	0.9	0.9	0.8
C_o and Ao= Initial amount (µg/L)	15000	1000	15000	15000
t = Time (hrs)	144 (6 days)	44	144 (6 days)	144
k = Decay Rate (hr^{-1})[3]	0.16	0.16	----------	10.2[2]

1. FIFRA product label for Magnicide® H in Washington State.
2. *Half-life in a Weedy Irrigation Canal,* Webwiser, National Library of Medicine, https://webwiser.nlm.nih.gov/WebWISER/getSubstanceData.do?substanceId=138&displaySubstanceName=Acrolein&STCCID=&UNNAID=&selectedDataMenuItemID=76. Accessed Feb. 14, 2017.
3. *Management of Aquatic Plants with Acrolein,* Bowmer, Kathleen H., and Sainty, G.R., 1977.

7.2.2 Acrolein Water Quality Criteria

The maximum daily limit for acrolein is 0.9 µg/L (0.0009 mg/L). The discharge limit applies outside the treatment area during a pesticide application and after the specified treatment period. The permit limits for acrolein are based on recently approved EPA human health criteria in Oregon Administrative Rule Chapter 340 Division 041, Table 40: 0.88 µg/L for water and organism consumption, and 0.93 µg/L for organism consumption only.

In developing effluent limits, if water-quality based effluent limits are more stringent than technology based effluent limits, then the water-quality based effluent limits become the basis of the permit limits. EPA has not established effluent limit guidelines for acrolein pesticide use. There are FIFRA label requirements that in some cases require a pesticide be held for a period of time before discharge. As shown in Theoretical Decay Calculations of Acrolein in Irrigation Systems in Table 5 above, depending upon a expressed decay rate, a holding period for acrolein generally results in a residual concentration that is less than 0.9 µg/l and in general, the residual is equivalent to or less than the monthly effluent limit contained in this permit.

When establishing the water quality limits in a permit to protect beneficial uses, the most stringent of the water quality criteria apply. DEQ does not have freshwater aquatic life-criteria for acrolein. EPA recommends 3.0 µg/L for both the acute and chronic freshwater aquatic criteria. Beneficial uses in basins statewide include domestic water supply and fishing, therefore the human health criteria apply to acrolein-based pesticide residual.

There is limited acrolein concentration data from irrigation systems. Acrolein data for Klamath Irrigation District is typically non-detect, at 1 µg/L, but the laboratory analysis was not standardized. DEQ is specifying that a non-detect value needs to meet a laboratory standard called a 'Quantitation Limit' in order for a non-detect to be interpreted correctly for compliance. The quantitation limit for acrolein is 5 µg/L. DEQ does not have current data using a quantitation limit for compliance, but expects the 5 µg/L to be achievable based upon the provisions in 40 CFR§136. Any sample analyzed in accordance with the specified method and found to be at or below the quantitation limit complies with the permit limit as long as the best management practices associated with acrolein-based pesticide use are being followed. Along with the quantitation limit, the permit has best management practices that have to be followed for acrolein based pesticide use so that an effluent limit established at the quantitation limit will be protective of water quality. Table 6 contains a comparison of individual permit limits and proposed general permit limits for acrolein.

Table 6- Comparison of Acrolein Individual Permit Limits to Proposed General Permit Limits

Parameter	Individual Permits	Proposed General Permit
Acrolein within Klamath basin	2.3 µg/L*	0.9 µg/L**
Acrolein outside Klamath basin	3 µg/L	0.9 µg/L**
*Exception is the individual permit for North Unit which has an acrolein limit of 6 µg/L		
** Compliance is based on the quantitation limit of 5 µg/L		

7.2.3 Numeric Water Quality Based Effluent Limits for Acrolein

Both maximum daily limits and average monthly limits were calculated using the *Technical Support Document for Water Quality-based Toxics Control*, [TSD (EPA-505-2-90-001, March 1991)], recommendations for permitting. A protective two-value steady state wasteload allocation analysis is used where few or no chemical measurements are available or where daily receiving water flow records are not available. Inputs to the waste load analysis include considerations for variability in effluent data. Monitoring may occur once per month so that a maximum daily limit is equal to the maximum monthly limit. For this limit, values corresponding to a probability distribution of the effluent concentrations (95th percentile for average monthly limits, 95th percentile for maximum daily limits) is assigned to characterize effluent variability while still meeting water quality criteria chronic criteria. A waste load allocation is calculated from human health water quality criteria and ambient background data. The wasteload allocations calculated from this criteria provide an accurate comparison of the assimilative capacity of the receiving water using expected effluent variability and frequency of monitoring. The lower wasteload allocation is used in the equations to calculate the average monthly limits and maximum daily limits as shown in Table 7 below.

Inputs used in calculating permit limits consist of probability distribution of the effluent concentrations; human health criteria; background concentration; a coefficient of variation of the effluent data and frequency of monitoring. A mixing zone is not provided; dilution is not an input. A background concentration of zero µg/l takes into consideration that other sources are not expected to contribute to a discharge of acrolein and that acrolein readily decays.

Effluent is variable and permit limits are developed based on a low probability of exceeding a limit, so the permit limit considers potential effluent variability. A coefficient of variation (CV) of 0.6 is representative of a typical effluent variation or fewer than ten data points. Permit limits are statistically based to assure compliance. Input for sampling requirements is based on one sample in 30 day period so the maximum monthly limit becomes the maximum daily limit in the permit. DEQ expects that sampling will occur about once a month at a discharge point to natural water.

Table 7- Effluent Limits Calculation

	Water Quality Criteria			Required Effluent Quality Wasteload Allocations (Probability Basis 95%)		Potential Effluent Variability		Water Quality Based-Effluent Limit Confidence Level 95%	
Parameter	Water and Fish Ingestion (µg/L)	Fish Consumption (µg/L)	Ambient Background (µg/L)	Water and Fish Ingestion (µg/L)	Fish Consumption (µg/L)	Coefficient of Variation	Samples per Month	Monthly Average (µg/L)	Daily Maximum (µg/L)
Acrolein	0.88	0.93	0	0.88	0.93	0.6	1	**0.88**	**0.88**

When a water quality based-effluent limit for this parameter is not quantifiable to the extent required using EPA-approved methods, the effluent limit is based on the Quantitation Limit as the compliance evaluation level for this parameter. In this situation, a registrant will be in compliance with the effluent limitations if the average monthly and maximum daily concentrations are at or less than the Quantitation Limit listed in the Permit. An effluent limit for acrolein will be based on a Quantitation Limit of 5 µg/L.

With no mixing zone, current water quality criteria are applied at the "end of pipe," which, for irrigation systems, is designated as outside the treatment area during a pesticide application and after the specified treatment period. Concentration and time are considered in treatment. The pesticide label dictates when treated water can be released to natural water. Acrolein-based herbicide treated irrigation water will be managed. Gates are closed before herbicide treated wastewater reaches the gates and opened after freshwater has replaced the herbicide treated water in the treatment area. Treated water will be used for irrigation over crops and "turnover" with fresh water occurs or held in a closed system. With rapid decay of acrolein in the irrigation system and use of treated water to irrigate crops compliance is expected, but an effluent limit and sampling is still required upon release to natural water.

7.2.4 Schedule A.2.b. – Copper

Copper is widely used to control algae and aquatic plants and different formulations of copper compounds are used in irrigation systems. Copper sulfate and chelated copper formulations are examples of products that are currently being used. Chelated formulations of copper are less toxic to fish than copper sulfate products: chelated copper is combined with other compounds to help prevent the loss of active copper from the water.

EPA's Office of Pesticide Program May 2009 reregistration eligibility decision document for copper contains an assessment of potential risk to freshwater organisms using a Biotic-Ligand Model. This reregistration eligibility decision for copper considers that the bioavailability of copper is affected by water chemistry, stating copper is most toxic in waters of low ionic strength and or low in dissolved organic carbon (DOC) and that pH also affects toxicity. In the FIFRA analysis, water chemistry data from 811 samples nationwide were used in its BLM model. This FIFRA analysis considers the availability and toxicity of copper in its dissolved form, cupric ion (Cu^{2+}). Target use concentrations for weed and algae control can range from 0.1 to 1 mg/L (100 to 1000 µg/L). Typical application rates range from 0.2 to 0.5 mg/L for algae management.[15]

In general, copper is applied to achieve a constant concentration in a section of irrigation canal. The bioavailability of copper will dissipate as it attaches to algae and aquatic plants. Copper also settles in sediment although a pesticide formulation is intended to keep copper effective for treatment making it available to bind to algae and aquatic plants. As a pest management practice, DEQ requires treatment with a copper pesticide only when aquatic weeds or algae are present.

Under FIFRA pesticide registrations, water treated with most copper compounds can be used for swimming, drinking, fishing, livestock watering or irrigating turf, ornamental plants or crops immediately after treatment. DEQ expects water in sections treated with copper will be transported for irrigation so that treated areas will "turnover" with fresh water. Turnover occurs as treated water is replaced with freshwater and a release to areas that can come in contact with 'natural water' occurs when fresh water is present. Compliance with the permit limit is expected with this practice in place. A sample of treated water that is used for irrigation is not required. Sampling and analysis must occur when, after the treatment period elapsed, water is released from the irrigation system to natural water.

This permit requires an operator to follow current FIFRA label requirements, cautions in a label and bulletins. In general FIFRA labels for aquatic copper-based pesticide contain additional instructions for managing effective pesticide use that considers water temperature, alkalinity, target pest and managing water flow.

7.2.5 Water Quality Criteria for Copper

Oregon's water quality criteria for the protection of human health were approved by EPA in October 2011. The human health criterion for copper is equivalent to EPA's maximum contaminant level of 1300 µg/L (1.3 mg/L) established under the Safe Drinking Water Act. Copper criterion for protection of human health is much higher than the criterion for the protection of aquatic life. The more stringent of the two must be included in the permit.

Oregon's revised aquatic life copper criteria were approved by EPA on Jan. 9, 2017. The new criteria are based on the Biotic Ligand Model, following EPA's 2007 guidance for freshwater aquatic life copper.

This newly adopted aquatic life copper criteria is the basis for copper limits. DEQ's copper criteria uses EPA's 2007 biotic ligand model (a metal bioavailability model) to establish acute and chronic copper concentrations. The previous permit established copper concentrations using hardness. Hardness-based copper criteria are outdated. EPA's 2007 biotic ligand model accounts for the effect of more influential parameters on copper bioavailablility than just hardness. Copper criteria that use the biotic ligand model are more protective of freshwater aquatic life including species in Oregon waters that are federally listed as threatened or endangered.

The Copper Biotic Ligand Model software determines copper toxicity for a given set of conditions by using measurements of thirteen different water quality parameters that affect copper toxicity to aquatic organisms. These parameters are pH, dissolved organic carbon (DOC), temperature, calcium, magnesium, sodium, potassium, sulfate, chloride, alkalinity/dissolved inorganic carbon (DIC), humic acid, and sulfide.

The toxicity of copper varies in aquatic environments because the bioavailability of copper changes relative to water chemistry conditions. Due to variation in the geology, elevation, vegetation, climate, and other environmental factors within Oregon, water chemistry conditions affecting copper bioavailability are distinct for different regions of the state. They also vary over time and location within these regions.

The acute and chronic copper criteria established for each region for this statewide permit are shown in Table 8 below. These copper criteria are based on a conservative percentile of all criteria values that can currently be calculated with the biotic ligand model for each region. This assures that the general permit will protect aquatic life during water quality conditions observed at sensitive locations and times within each region. More information on the development of regional copper criteria is provided in Appendix C.

Table 8- Regional Copper Criteria Values

Region		n=	Acute (µg/L)	Chronic (µg/L)
Cascades		191	0.76	0.47
Coastal		853	2.98	1.85
Columbia River		113	7.70	4.78
Eastern		1133	9.85	6.11
Willamette Valley		2317	3.92	2.44

7.2.6 Numeric Water-Quality Based Effluent Limits for Copper

The proposed copper limit is based on DEQ's newly adopted aquatic life copper criteria. These copper limits, which are derived using the current criteria, are more stringent than the copper limit developed for ten individual permits for irrigation systems in 2005. Water quality based-numeric limits are calculated using recommendations in the *Technical*

Support Document for Water Quality-based Toxics Control, [TSD (EPA-505-2-90-001, March 1991)]. The development of these effluent limits are discussed in more detail below.

Both maximum daily limits and average monthly limits were calculated using the EPA Technical Support Document recommendations for permitting. A protective two-value steady state waste load allocation analysis is used where few or no chemical measurements are available or where daily receiving water flow records are not available. Inputs to the waste load analysis include considerations for variability in effluent data. Monitoring may occur once per month so that a maximum daily limit is equal to the maximum monthly limit. A probability distribution (95th percentile for average monthly limits, 95th percentile for maximum daily limits) is assigned to characterize effluent variability while still meeting water quality criteria for both acute and chronic criteria. A wasteload allocation is calculated from both the acute and the chronic aquatic life water quality criteria and ambient background data. The wasteload allocations calculated from each criterion are converted to long-term averages for an accurate comparison of the assimilative capacity of the receiving water using expected effluent variability and frequency of monitoring. The acute and chronic long term average is calculated and then compared. The lower long-term average is used to determine average monthly limits and maximum daily limits as shown in Table 9 below.

Inputs used in calculating permit limits consist of probability distribution of the effluent concentrations; regional acute and chronic biotic ligand model copper criteria; regional ambient copper data; a coefficient of variation of the effluent data and frequency of monitoring. A mixing zone is not provided, so that, dilution is not an input.

A permit limit considers effluent variability. A coefficient of variation (CV) of 0.6 is representative of a typical effluent variation with fewer than ten data points. Permit limits are statistically based to assure compliance. Input for sampling is based on one sample in a 30 day period so, without an average of sample results, the maximum daily limit becomes the average monthly limit in the permit. DEQ expects that sampling will occur at about once in month at a discharge point to natural water.

Calculation of an effluent limit for copper using a monitoring frequency of one sample per month is sufficient to characterize the effluent quality. DEQ generally expects that there could be one discharge per month. A tiered approach to monitoring is allowed. Less monitoring is allowed when there is compliance with a limit.

Table 9- Copper Effluent Limits Calculation

	Copper Water Quality Criteria										**Water Quality Based-Effluent Limit**	
	1 Hour	**4 Day**	**Ambient Background**	**Required Effluent Quality Wasteload Allocations (Probability Basis 95%)**		**Potential Effluent Variability**	**Samples per Month**	**Acute**	**Chronic**	**Min**	**Confidence Level 95%**	
Region	(CMC) µg/L	(CCC) µg/L	µg/L	Acute µg/L	Chronic µg/L	CV		LTA µg/L	LTA µg/L	LTA µg/L	Monthly Average µg/L	Max. Daily µg/L
Cascades	0.76	0.47	0.4	0.76	0.47	0.6	1	0.36	0.30	0.30	**0.54**	**0.65**
Coastal	2.98	1.85	0.3	2.98	1.85	0.6	1	1.4	1.2	1.2	**2.14**	**2.5**
Columbia River	7.7	4.78	0.4	7.7	4.78	0.6	1	3.6	3.1	3.1	**5.53**	**6.6**
Eastern	9.85	6.11	0.7	9.85	6.11	0.6	1	4.6	3.9	3.9	**7.07**	**8.4**
Willamette Valley	3.92	2.44	1.4	3.92	2.44	0.6	1	1.8	1.6	1.6	**2.82**	**3.4**

When a water quality based-effluent limit is not quantifiable using EPA-approved methods, the effluent limit is based on the Quantitation Limit as the compliance evaluation level for this parameter. Compliance with the effluent limitations is achieved if a sample result is at or less than the Quantitation Limit listed in the Permit. In this situation, an effluent limit of 0.65 µg/l in Cascades Region will be based on a Quantitation Limit of 2 µg/L.

Irrigation water that is treated with copper will be managed by replacing aquatic pesticide treated water with fresh, untreated water. Fresh water physically replaces and transports treated water to irrigation crops so that a discharge to natural water will not occur. This practice will be protective of water quality. Sampling is not required when treated irrigation water is used to irrigate crops.

In general, April through October are the months when pesticide application in irrigation system occur. These time periods over lap with time periods for vulnerable life stages of fish such as migration, spawning and rearing.[16] Permit limits set with no allowable mixing zone will be protective of water quality.

7.2.7 Schedule A.3. – West Division Main Canal Water Quality Criteria for Copper

Copper criteria for the constructed channel segment of West Division Main Canal, which is part of West Extension Irrigation District are contained in OAR 340-041-0315. See Table 10 below. Copper criteria for this canal is site-specific and based on canal water used for irrigation purposes.

Table 10- West Division Main Canal

Parameter	Permit Limit for constructed channel segment
Copper	200 µg/L

7.3 Schedule A.2.c. – Xylene

Xylene is an insoluble aromatic, colorless liquid solvent that must be applied with an emulsifier to disperse it in the canal flow. Xylene readily dissipates from water by degradation, volatilization, and sorption. Xylene is used as an aquatic herbicide. The 2009 Addendum to the Reregistration Eligibility Decision for Xylene (EPA Document No. 738-R-09-305, October 2009) indicates that xylene-based aquatic pesticide is only for use in 17 states that are identified under the Bureau of Reclamation Act. Oregon is included in this list of 17 states.[17]

7.3.1 Water Quality Criteria for Xylene

DEQ and EPA have not established numeric water quality criteria for xylene.

When DEQ first began issuing permits to irrigation districts for the use of xylene in 2002, the EPA-approved FIFRA label included a restriction for the discharge of xylene into natural surface waters that was no more than 10 mg/L. 10 mg/L is the maximum contaminant level set by EPA under the Safe Drinking Water Act for xylene residues in drinking water. Individual permits were issued in 2002 for irrigation systems' use of xylene-based aquatic pesticides. In these individual permits, the xylene limit of 1.3 mg/L was based on lowest observed fish toxicity levels using current information at that time. The permit evaluation report explains that a xylene limit of 1.3 mg/L was established to be protective of aquatic species with an additional margin of safety based directly on long-term toxicity. The permit evaluation report for xylene in these individual permits also noted that persistence of xylene is low, and that the estimated half-life of xylene in a model river system was 3 hours. A permit evaluation report also references a 1977 report[18], which suggests a holding time of 24 hours will reduce xylene to less than 10 mgl/L.

Similar to the permit limits for xylene established in the individual permits, current information is being used to establish xylene limits in this general permit. Under the toxics substances rule OAR 340-041-0033(4), DEQ can establish permit or other regulatory limits for toxic substances for which criteria are not included in Tables 20, 33A, or 33B, using the guidance values in Table 33C, public health advisories, and other published scientific literature. DEQ also has a narrative water quality criteria in OAR 340-041-0007(10) that may not allow the creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish. A comparison of individual permit limits with proposed general permit limits for xylene is shown in Table 11 below.

To be protective of endangered species, the safe concentration established by EPA Office of Pesticides of 0.04 mg/L for xylene is included as an effluent limit in this statewide general permit. This effluent limit will be measured at a point of

discharge to natural water with no dilution. DEQ is also adding pest management measures for holding xylene as required under the current FIFRA label. Sampling is not required when treated irrigation water is used to irrigate crops.

EPA Office of Pesticide Programs 2005 reregistration eligibility decision for xylene and its 2009 addendum supports the continued use of xylene as a pesticide and establishes a concentration of 1 mg/L in the canal system. EPA Office of Pesticide Programs 2005 reregistration eligibility decision established a concentration of 1 mg/L in order to reach a safe concentration of 0.04 mg/L (40 µ/L) with dilution in the receiving water. EPA Office of Pesticide anticipated that the dilution would provide for a safe concentration of 0.04 mg/L. The rationale for a safe concentration to protect endangered species is documented in EPA's Reregistration Eligibility Decision for Xylene (Case No. 3020) dated Sept. 26, 2005 and is based on the freshwater invertebrate 24-hour LC50 value of 1.0 mg/L and the target risk quotient for endangered species of 0.05. This permit's effluent limit of 0.04 mg/L for xylene is also consistent with ambient water quality guidelines set by British Columbia Ministry of Environment at 0.03 mg/L for the protection of freshwater aquatic life.[19]

Table 11- Comparision of Xylene Individual Permit Limits with Proposed General Permit

Parameter	Individual Permits	Proposed General Permit
Xylene	1.3 mg/L	0.04 mg/L (40 µ/L)

A mixing zone is not part of individual permits for irrigation systems and is not included in this general permit. DEQ considers a beneficial use of a waterbody when implementing CWA Section 402. Limits for xylene are set to be protective of aquatic species in the irrigation system outside the treatment area during treatment and inside the treatment area after treatment. Measurement is upon discharge to natural water, so that a 0.04 mg/L limit established to be protective of aquatic organisms is appropriate and achievable.

Holding for 96 hours prior to release or irrigating with treated water is part of the amendment in EPA Office of Pesticide Program's 2009 Addendum to the Reregistration Eligibility Decision (RED) for xylene. DEQ's proposed permit is consistent with the label option for managing irrigation system canal water that has been treated with xylene. Sampling, holding and turnover are included as management measures. Through the use of theoretical half-life calculations, in Table 12 below, it can be shown that the required FIFRA holding time of 96 hrs will reduce xylene residual to an amount that can achieve 0.04 µg/L, but these theoretical results may vary based on plant growth and other conditions in a treatment area.

Table 12- Theoretical Half-life Calculations of Xylene in Irrigation Systems

Equation	$C_t = C_o (½)^{t/t_{½}}$	$C_t = C_o (½)^{t/t_{½}}$	$C_t = C_o (½)^{t/t_{½}}$
C_t = Amount remaining (µg/L)	0.0002	2.6×10^{-39}	40
C_o and Ao= Initial amount (µg/L)**	740000	740000	740000
t = Time (hrs)	96	96	96
$t_{½}$ = Half-life (hrs)	3*	0.65**	6.77***

*DEQ 2002 Permit Evaluation Report for North Unit Irrigation District Permit No. 102628[20]

**EPA Reregistration Eligibility Decision 2005-"Xylene isomers are highly volatile and have been found to disappear rapidly from solution (WHO, 1997); for example, the half-life of o-xylene has been estimated to be 39 minutes in agitated water. The solubility limits for xylene isomers are approximately 160-180 mg/L; however, within the irrigation canals, the xylene product is applied with an emulsifier which results in a greater apparent solubility, approaching the initial 740 ppm concentration level. It is known that turbulent mixing with the irrigation waters will immediately result in a lowering of this concentration, probably rapidly approaching the solubility limits of the isomers; in addition, it is known that xylene will readily dissipate from water (by degradation, volatilization, and sorption), further reducing the water concentrations as the treated water moves down-gradient in the irrigation systems."[21]

***Theoretical back-calculation of half-life that will achieve 40 µg/L[22]

Annual reports from three of ten irrigation systems indicate use of a xylene-based pesticide. Five individual permits contained an effluent limit for xylene. Limited xylene concentration data is available but the highest sample result from

Ochoco Irrigation District for total xylene was 0.34 µg/L (0.0003 mg/L), which is roughly 100 times lower than the limit in the permit.

8.0 Schedule B – Minimum Monitoring, Reporting and Recordkeeping (Conditions Nos 1. through 20.)

The monitoring conditions in this permit are narrative. DEQ agrees with the EPA's conclusions that establishing numerical limits for most pesticide applications is not practicable, in part because there are no discrete sampling locations. DEQ agrees with EPA's conclusions that establishing a sampling regime to determine compliance with the permit effluent limits is not practicable. The issues are related.

As the EPA 2016 Pesticide General Permit Fact Sheet states, monitoring of pesticide discharges poses several challenges not generally encountered in "traditional" NPDES permitting situations. For example, there is no "wastewater discharge" *per se* from pesticide applications that is analogous to end-of-pipe discharges. For example, a manufacturing plant would typically direct its wastewater through a treatment system to remove pollutants, and then would direct the effluent through a pipe into a receiving waterbody. However, for chemical pesticide applications, at the time of application the pesticide contains both the portion serving its intended purpose as well as the potential residual for which monitoring data would be appropriate. Thus, monitoring the "outfall" in this case would merely provide data on the amount of the product as applied (information already known through the FIFRA registration process) and is not useful for comparing with any type of effluent limitation or water quality standard.

EPA considered requiring ambient water quality monitoring. However, as the EPA 2016 Pesticide General Permit Fact Sheet states, EPA determined that it was infeasible for the following reasons:

Uncertainty: Ambient water quality monitoring undertaken by an individual operator would generally not be able to distinguish whether the results were from the pesticide application for which monitoring is being performed, or some other upstream source.

Lack of applicable measurable standards: Pesticide-specific water quality standards do not exist at this time for the vast majority of constituents in the products authorized for use under this pesticide general permit.

Safety and Accessibility: Pesticides, particularly those used for mosquito control and forestry pest control, are often applied over waterbodies in remote areas, hazardous terrain, and swamps that are either inaccessible or pose safety risks for the collection of samples.

Difficulty of residue sampling for chemical pesticides: For chemical pesticides, the "pollutant" regulated by the pesticide general permit is the residue that remains after the pesticide has completed its activity, and it is this residue that would be the subject of any water quality monitoring requirement. However, the point at which only "residue" remains is not practically discernible at this time for all pesticides.

Usefulness of data: Trend data from ambient sampling programs designed to capture a sole pest control activity are more useful in determining compliance with ambient criteria or benchmarks. The Pesticide Stewardship Partnership Program ambient data are an example of such sampling because the same type of pest control occurs in the area of the water being studied.

The same difficulties arise when considering a requirement for Whole Effluent Toxicity (WET) testing. The WET test is a measure of a source of toxicity. A sample from a receiving stream cannot be attributed to or used to identify a single source of toxicity.

Pursuant to CWA sections 308 and 402(a)(2), 40 CFR 122.43(a), and other applicable implementing regulations, monitoring requirements have been included in the permit and are discussed below.

8.1 Monitoring Requirements (Condition No. 1. – 6.)

8.1.1 Visual Monitoring

In conditons 1 and 2, visual monitoring assessments are required. Visual monitoring identifies, for example, instances of detrimental impact to non-target organisms, disruption or degradation of wildlife habitat, or prevention of designated recreational or municipal uses of a waterbody that may be related to the operator's use of pesticides in a given area. Visual assessments will consist of spot checks in and around the of pesticide application for possible and observable adverse incidents, such as fish kills and/or distressed fish or macro-invertebrates.

Visual monitoring assessments are also required during the pesticide application when feasibility and safety allow. Visual assessment is not required during the course of treatment when that treatment is performed in darkness, as it is infeasible for the inspector to note adverse effects under these circumstances. Additionally, the following scenarios often rule out visual monitoring during pesticide application:

- Applications made from an aircraft;
- Applications made from a moving road vehicle when the applicator is the driver;
- Applications made from moving watercraft when the applicator is the driver;
- Applications made from a moving off-road wheeled or tracked vehicle when the applicator is the driver.

The permit requires an operator to conduct a visual monitoring assessment during any post-application surveillance to determine the efficacy of the pesticide treatment. Visual assessment of this type is only required if the operator performs post application surveillance in the normal course of business.

In ORS 634.650(1)(c)(H), post surveillance monitoring is required of State agencies using integrated pest management in order to evaluate the effects and efficacy of pest treatments. Surveillance is necessary to not only establish the species presence and their abundance, but also as an evaluation tool of the effectiveness of chemical control activities. It is important to continue surveillance following the pest management measures to assess treatment efficacy and to monitor for new pests. Surveillance can be used to determine if the current techniques are effective and whether additional pest management measures are required, particularly pesticide application. Based on follow up surveillance activity, operators can make informed decisions. These decisions serve to increase the effectiveness of their control programs and minimize the potential for pesticide discharge to water. The monitoring requirements of the permit reflect reasonable measures for good pest management practice and ODA licensed operators are currently using these practices to ensure environmental health and safety and optimal control of pest organisms.

8.1.2 Fish Gates and Control Structures

Monitoring is required for irrigation systems that use acrolein-, copper- and xylene-based aquatic pesticide. Conditions 3 and 4 ensures inspections conducted on gates or fish control structures, as applicable, are recorded prior to a pesticide application. A permit registrant must assure that all gates in the treatment area are in working order. Inspections and repairs must be documented in an inspection log. At least once a day during the period when pesticide levels in the irrigation system are likely to be above the discharge limitation for acrolein-, copper- or xylene-based pesticides, each locked gate within the treatment area and water user delivery point that has been closed as requested by the water user must be inspected. The permit registrant must document this inspection in an inspection log. Prior to the first pesticide application certain districts are required to verify fish screens or other structures or fish control management practices are in place.

8.1.3 Effluent Monitoring

Surface runoff resulting from crop irrigation is not regulated under an NPDES permit.
Sampling is not required when irrigation water that has not been treated is used to irrigate crops. Surface runoff resulting from crop irrigation that has been treated with acrolein-, copper-, or xylene-based pesticide is subject to sampling requirements.

The bulleted list below provides examples of when treated irrigation water requires sampling.

- Irrigation system return flow to a canal or ditch (e.g. tailwater) that has been treated is subject to monitoring upon discharge to natural water at its nearest point of discharge.
- An overflow from a canal or ditch to natural water following treatment is also subject to monitoring.
- Irrigation water that is representative of twice the return flow following treatment that is required to be sampled upon discharge to natural water.
- Irrigation water that is held following treatment is representative of managed flow that is required to be sampled upon discharge to natural water.

Sampling is in place to assure compliance with water quality based effluent limits for acrolein, copper and xylene and that the required management practices are effective in keeping aquatic pesticide residues from entering natural waters.

Condition 5 requires collection of a grab sample of the first aquatic pesticide application acrolein-, copper-, or xylene-based pesticide in a calendar year that discharges to natural water from each treatment's first point of discharge to natural water. Appendix D contains a table and Appendix E contains a diagram with further explanation of sampling requirements.

Monitoring is dependent upon treatment to sections of an irrigation system. Monitoring is dependent upon release nearest to natural water. Sample analysis is dependent upon use of acrolein-, copper-, or xylene-based aquatic pesticide prior to the release to natural water. The same discharge point might be sampled three times in a calendar year if over the course of a year there were three discharges: one following an acrolein-based pesticide application, one following a copper-based pesticide application and one release to natural water from the same discharge point following a xylene pesticide application.

Condition 6 contains sampling and analysis monitoring and recordkeeping requirements. Acrolein, xylene, and copper must be analyzed using EPA-approved test methods specified in 40 CFR §136 (not field test kits). When discharging treated water, samples for compliance monitoring must be obtained at the location nearest to where the treated water enters natural waters.

There is not a lot of recent monitoring data on acrolein-, copper-, xylene-based pesticide residuals from irrigation districts. Monitoring requirements in this permit will result in more data. Quantitation levels established in this permit provide consistency for data analysis.

8.2 Notification Requirements (Condition Nos. 7. through 12.)

Public notice requirements in condition 7 provide the general public in the area served by the irrigation system and DEQ notice of intended pesticide use.

In condition 8, prior to application, an operator is required to provide notice to farmers with dairy animals within its irrigation district so that farmers will have an opportunity to move animals away from irrigation ditches.

If a pesticide has a potable water use restriction on the label, then the operator must notify private and domestic water users who withdraw drinking water from the receiving water. See condition No. 9. This condition applies to impacts to known drinking water with intakes from surface water: for example, the set-back distances were not observed, or the sample result is higher than the FIFRA label indicates is safe, or the water supply intake needs to be shut off for 24 hours. While a FIFRA label does not require notifying a drinking water supplier, it implies that there is the need for contact with a drinking water supplier. No notification is required if a FIFRA label requires setbacks and these setbacks are satisfied. DEQ's Drinking Water Protection Program and the Oregon Department of Water Resources provide drinking water source information tools to identify downstream intake locations.

Notification to Oregon Emergency Response System OERS is required in condition 10 and 11 for adverse incidents. The adverse incident notification requirements do not relieve the operator from the notification and reporting requirements under FIFRA. The adverse effects reporting requirement under FIFRA Section 6(a)(2) requires pesticide registrants and their agents to notify the EPA of additional factual information regarding unreasonable adverse effects on human health or the environment from the use of a registered pesticide. A written report is required to be submitted to the local DEQ

regional field office within 30 days after reporting an adverse incident to OERS. Contents for this written report is listed in Condition 10.c.

Operators will notify OERS if there is a reportable spill or threat of a reportable spill or other unpermitted discharge to water and report specific information within 24 hours of becoming aware of the adverse incident. See condition 12.

8.3 Recordkeeping (Condition Nos. 6. and 13 through 20.)

Recordkeeping includes documentation of the monitoring required by the permit. Parameters monitored in Schedule B, Condition 6 must be recorded. Schedule F, Section C9-Records Contents also contains recordkeeping requirements for sampling and analysis.

In Condition 13 and 14, recordkeeping is required when OERS is notified of a reportable spill or threat of a reportable spill or other unpermitted discharge to water and for corrective actions.

In Condition 15, documentation that supports the rationale for not reporting an adverse incident is required. In Conditon 15.b., the name of the public or private drinking water supplier is recorded when a pesticide with potable water use restriction applies. In condition 15f. and g, all pesticide application records required by licensed pesticide applicators or pesticide consultants must be kept in accordance with ORS 634.146 and OAR 603-057-0130 and licensed private applicators must keep records in accordance with US Department of Agriculture Agricultural Marketing Service. Condition 15. contains a requirement to document any assessment environmental conditions related to pesticide use.

In condition 16, documentation associated with the use of acrolein-, copper- and xylene-based pesticide includes information such as the flow calculations used to determine when gates are closed and reopened, inspection and repair of gates, daily inspections, application logs, and public notice. Information on pesticide use in the treatment area is also required.

Monthly monitoring reports will be submitted on paper and in the future electronically. See conditions 17 and 18. Paper submissions are expected until electronic reporting that is required under 40 CFR 127 is in place for general permits. DEQ will keep registrants informed about electronic reporting requirements.

Annual reporting requirements are in Condition No. 19. Other monitoring and record retention requirements are contained in the Schedule F of the General Conditions, Schedule D, Section C.

Electronic reporting requirements are included in Condition. 18 and 20. EPA's new federal electronic reporting requirements are not yet implemented.

For irrigation systems required to conduct a time of travel study results of this study may be included in the supporting documentation section of their pesticide discharge management plan.

9.0 Schedule D - Pesticide Discharge Management Plan

Operators are required to keep a Pesticide Discharge Management Plan (PDMP) available on site. The PDMP is distinct from the technology-based or water quality-based effluent limitation provisions in the permit. The PDMP is not a limitation and does not impose requirements on discharges. Not updating a PDMP is a permit violation, but, as stated below, this permit does not impose on the operator the obligation to comply with the PDMP. Requirements are imposed by the limitations in Schedule A. The PDMP is a tool for operators to document, among other things, implementation of pest management measures to comply with the permit's effluent limitations.

DEQ is following the reasoning developed in support of the proposed EPA pesticide general permit. EPA's 2011 Pesticide General Permit Fact Sheet explains this more fully. An excerpt from the EPA Permit Fact Sheet is provided below.

"The requirement to prepare a PDMP is not an effluent limitation because it does not restrict quantities, rates, and concentrations of constituents that are discharged. CWA section 502(11). Instead, the requirement to develop a PDMP is

a permit "term or condition" authorized under sections 402(a)(2) and 308 of the Act. Section 402(a)(2) states, "[t]he Administrator shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate." The PDMP requirements set forth in the permit are terms or conditions under the CWA because the operator is documenting information on how it is complying with the effluent limitations (and inspection and evaluation requirements) contained elsewhere in the permit. Thus, the requirement to develop a PDMP and keep it updated is no different than other information collection conditions, as authorized by section 402(a)(2), in other permits. Failure to have a PDMP, where required, is a violation of the permit.[2]

While Part 2 of the permit requires the operator to select pest management measures to meet the effluent limitations in this permit, the pest management measures themselves described in the PDMP are not effluent limitations. The permit does not impose on the operator the obligation to comply with the PDMP; rather, the permit imposes on the operator the obligation to meet the effluent limitations prescribed in Parts 2.0 and 3.0. The operator is free to change, as appropriate, the pest management measures to meet the effluent limitations contained in the permit. This flexibility helps ensure that the operator is able to adjust its practices as necessary to ensure continued compliance with the permit's effluent limitations. However, the permit also contains a recordkeeping condition that requires updates to the PDMP with any such changes in the operator's practices. Thus, if an operator's on-the-ground practices differ from what is in the PDMP, this would constitute a violation of the permit's recordkeeping requirement to keep the PDMP up-to-date, and not a violation of the permit's effluent limitations, which are distinct from the PDMP. EPA recognizes, however, that because the PDMP documents how the operator is meeting the effluent limitations contained in the permit, not following through with actions identified by the operator in the PDMP as the method of complying with the effluent limitations in the permit is relevant to evaluating whether the operator is complying with the permit's effluent limitations."

In general, Schedule D requires the following documentation in the PDMP:

- (Condition 2.a) Pesticide discharge management team information;
- (Condition 2.b) Pest problem identification;
- (Condition 2.c) Pest management options evaluation;
- (Condition 2.d) Schedules and procedures pertaining to minimization of effluent limitations in Schedule A (e.g., application rate and frequency for a proposed pesticide, spill prevention, pesticide application equipment and assessing environmental conditions);
- (Condition 2.e) Response procedures (e.g., spill response procedures, adverse incident response procedures, and pesticide monitoring schedules and procedures);
- (Condition 2.f) Supporting Documents (including a copy of any portions of any documents that document the implementation); and
- (Condition 2.g) Signature Requirement.

Operators are required to keep the PDMP up-to-date and modify it whenever necessary to document any corrective actions required to comply with the effluent limitations in this permit. (Schedule D Condition No.1).

9.1 PDMP for Acrolein, Copper and Xylene Based Pesticides

The pesticide discharge management plan is used document practices associated with acrolein-, copper- and xylene-based pesticides, such as a description of employee orientation and education to ensure proper action in the event of a spill or accident.

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[2] This permit is also consistent with the decision in Texas Independent Producers and Royalty Owners Assoc., et. al. v. EPA, 410 F.3d 964 (7th Cir. 2005), where petitioners challenged EPA's issuance of the construction general permit (CGP) that covers stormwater discharges. In that case, the Court found that neither the Stormwater Pollution Prevention Plan (SWPPP) nor the Notices of Intent (NOIs) are permits or permit applications because they do not amount to limits. 410 F.3d at 978. Further, the Court found that the permit requirement to develop a SWPPP is not an effluent limitation. For the PGP, the PDMP serves a similar purpose as the CGP SWPPP.

Some, but not all, irrigation systems with individual permits were required to conduct an evaluation to determine if fish in the irrigation system were affected by aquatic pesticide application. For irrigation systems that were required under their individual permit to conduct a fish evaluation, Condition 5. requires the evaluation be kept with supporting documentation in their pesticide discharge management plan.

DEQ has not required fish screen installation. ORS 498.301 to 498.346 is in place to determine when fish screens are necessary for diverting water. Oregon Department of Fish and Wildlife implements this statute. Under the statute, minor maintenance, which includes periodic inspection, cleaning and servicing, is the responsibility of the water user.

Condition 6 requires completion of a time of travel study to minimize pesticide use and support the decisions on turnover time prior to the first application of acrolein-, copper- or xylene- based pesticide application. Knowing the flow or travel time in the irrigation system is important for meeting an effective concentration and in that way minimizing pesticide use.[23] A dye study, measurements or a combination of these two methods can be used in the travel time study.

For example, acrolein-based pesticides are applied at specific points in the system that provide for good mixing. The acrolein-based pesticide application forms a wave of treated water that flows through the irrigation canal for a certain distance before it is no longer present at effective concentrations due to dilution and degradation. Recommended application rates are based on one gallon of the product per cubic feet per second of flow in the canal. Knowing the flow in the canal will result in meeting the effective concentration where it is needed.

The same is true of copper- and xylene-based pesticides. The drip rate for continuous feed of liquid copper pesticide is based on an accurate determination of the water flow in cubic feet per second or gallons per minute. Xylene is an insoluble aromatic, colorless liquid solvent that must be applied with an emulsifier to disperse it in the canal flow. Applications are based on gallons per cubic foot per second of flow.

10.0 Schedule F- General Conditions

The general conditions that are applicable to all NPDES permits are included in Schedule F. The general conditions address operation and maintenance, monitoring and recordkeeping, and reporting requirements. Schedule F, Section C., Condition 8 requires keeping permit records for at least 3 years.

DEQ recognizes that some of these conditions do not readily apply to pesticide applications covered under the permit. For example, in Schedule F, Section A. Standard Conditions, 4. Duty to Reapply: Section B. contains information on when to renew a permit, which is already found in the Coverage and Eligibility section of this permit. Another example is in Schedule F, Section B. Operation and Maintenance of Pollution Controls, 6. Public Notification of Effluent Violation and 7. Emergency Response and Public Notification Plan, these are requirements for sanitary sewer overflows that satisfies EPA's Model NPDES Permit Language for Sanitary Sewer Overflows and are not applicable to the pesticide applications. In this permit, Schedule B contains the reporting requirements for spills and adverse incidents and documentation for corrective action necessary for reporting non compliance so that Section D. Reporting Requirements, 6. Other Compliance is not a requirement of the pesticide general permit.

The pesticide applications are subject to NPDES permits, and Schedule F is a standard requirement for all such permits. When a conflict exists, follow the conditions in Schedules A, B and D.

Appendix A: List of Irrigation Systems

Name of District	Name of District	Name of District
Baker Valley Irrigation District	Medford Irrigation District	Malheur District Improvement Co
Burnt River Irrigation District	Nye Ditch Users Inc	Ridgeview Irrigation District
Lower Powder River Irrigation District	Rogue River Valley Irrigation District	Succor Creek District Improvement Co
Powder Valley Water Control District	Talent Irrigation District	Warmsprings Irrigation District
West Eagle Valley Water Control District	Fort Vannoy Irrigation District	Owyhee Irrigation District
Greenberry Irrigation District	Grants Pass Irrigation District	Aurora Airport Water Control District
Shady Dell Water Control District	Wilderville Irrigation Improvement District	Beaver Creek Water Control Marion
Svensen Island Improvement District	Enterprise Irrigation District	Lake Labish Water Control District
Skipanon Water Control District	Horsefly Irrigation District	Santiam Water Control District
Bandon Cranberry Water Control District	Keno Irrigation District	South Santiam River Water Control
Lone Pine Irrigation District	Klamath Basin Improvement District	Columbia Improvement District
Ochoco Irrigation District	Klamath Irrigation District	West Extension Irrigation District
Jordan Water Control District	Langell Valley Irrigation District	Heppner Water Control District
Juniper Canyon Water Control District	Malin Irrigation District	Ash Creek Water Control District
Arnold Irrigation District	Midland District Improvement Co	Tillamook Bay Flood Improvement District
Central Oregon Irrigation District	Modoc Point Irrigation District	Hermiston Irrigation District
River Meadows Improvement District	Pine Flat District Improvement Co	Marion Jack Irrigation District
Three Sisters Irrigation District	Pine Grove Irrigation District	Stanfield Irrigation District
Swalley Irrigation District	Poe Valley Improvement District	Teel Irrigation District
Tumalo Irrigation District	Shasta View Irrigation District	Walla Walla River Irrigation District
Crescent Water Supply And Improvement District	Sunnyside Irrigation District	Westland Irrigation District
Wood Irrigation District	Silver Lake Irrigation District	Birch Creek Water Control
Lookingglass Olalla Water Control District	Summer Lake Irrigation District	Lower Mckay Creek Water Control District
Sutherlin Water Control District	Creswell Water Control District	Milton Freewater Water Control District
Winchester Water Control District	Dearborn Water Control District	Riverside Mission Water Control District
Rock Creek Water Control District	Junction City Water Control District	Umatilla River Water Control 02
Blue Mountain Ditch Co.	Mckenzie Palisades Water Supply	County Line Water Improvement District
Enterprise Ditch District Improvement Co	River Road Water Control District	Powder Valley Water Control District
Luce Long Ditch District Improvement Company	Devils Lake Water Improvement District	Wallowa Valley Improvement District 1
Aldridge Ditch Co. Inc	Lacomb Irrigation District	Badger Improvement District
Dee Irrigation District	Queener Irrigation Improvement District	The Dalles Irrigation District
East Fork Irrigation District	Dever Conner Water Control District	Tualatin Valley Irrigation District
Farmers Irrigation District	Grand Prairie Water Control District	Vale Irrigation District
Middle Fork Irrigation District	Little Muddy Creek Water Control District	North Unit Irrigation District
Mount Hood Irrigation District	North Lebanon Water Control District	Owyhee Ditch Company

Name of District	Name of District	Name of District
Eagle Point Irrigation District	Big Bend Irrigation District	Sidney Irrigation District
Gold Hill Irrigation District	Jordan Valley Irrigation District	May Park Ditch Co
Little Butte Irrigation Co		

Appendix B – Figures 1,2 and 3;Table 20 from USGS Water-Resources Investigations Report 93-4156, 1990-1991

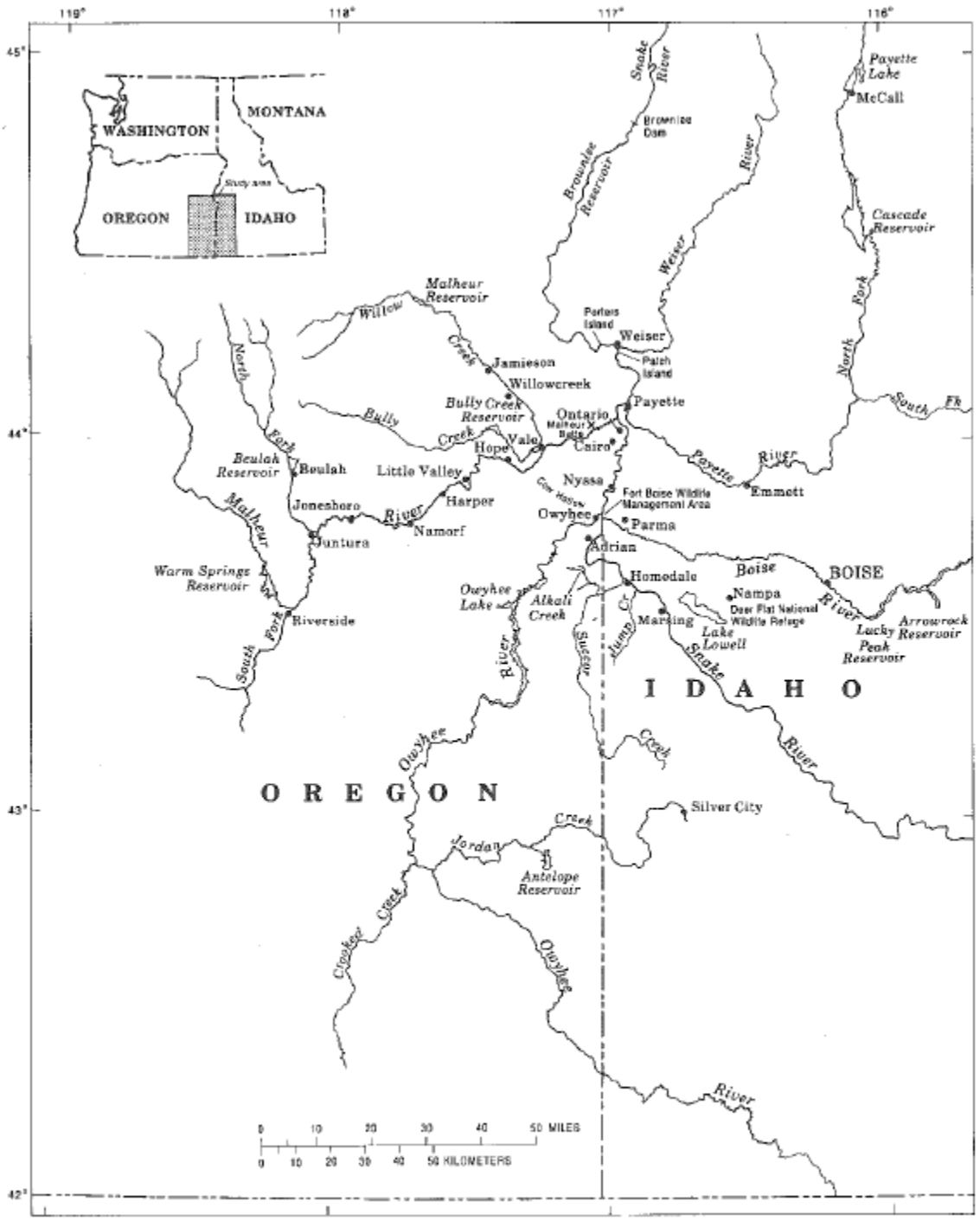

Figure 1. Location of the Malheur, Owyhee, and Snake Rivers in the study area, Oregon and Idaho, 1990–91.

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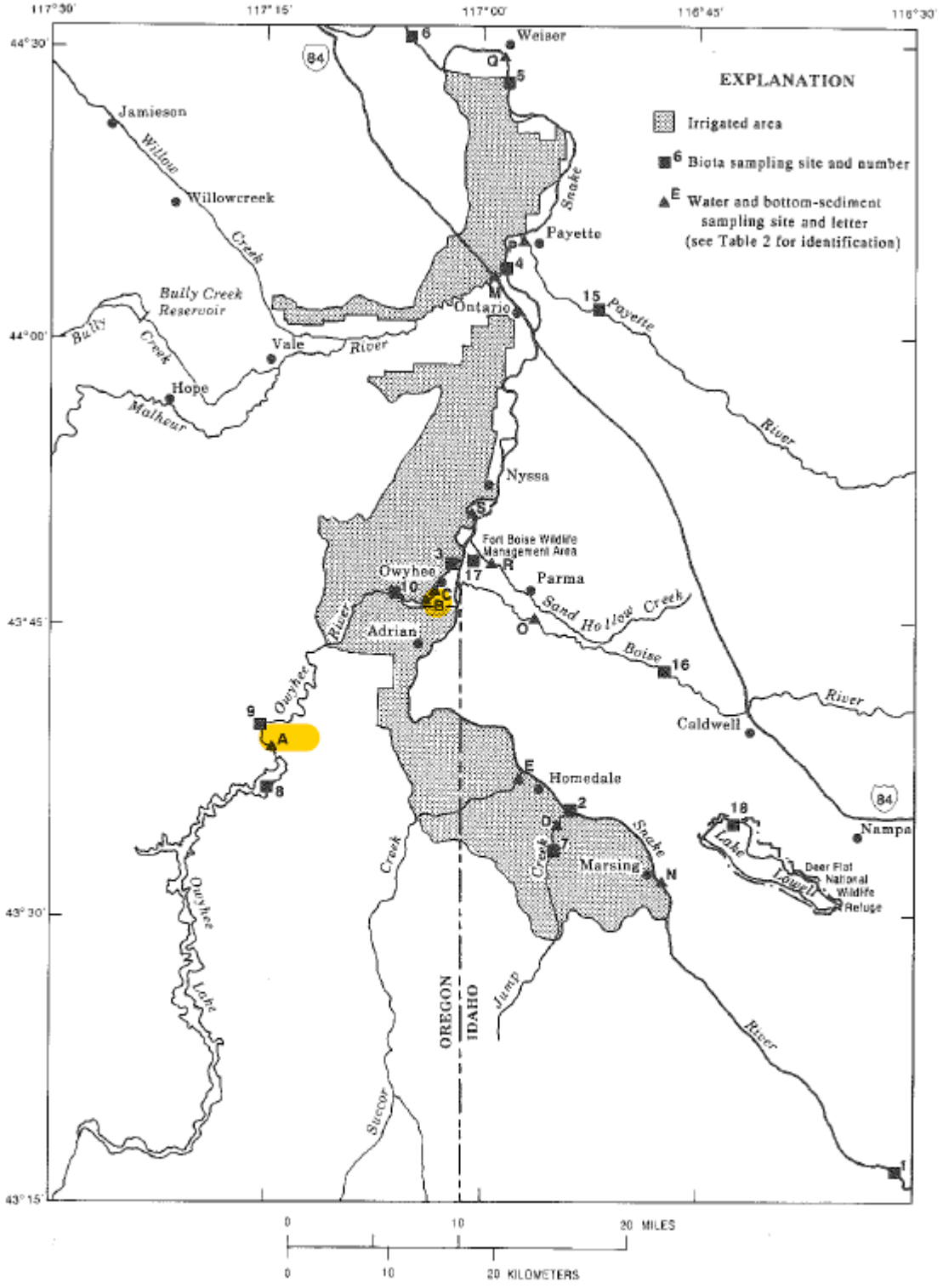


Figure 2. Location of the Owyhee project area, and Snake River system, Oregon and Idaho, 1990–91.

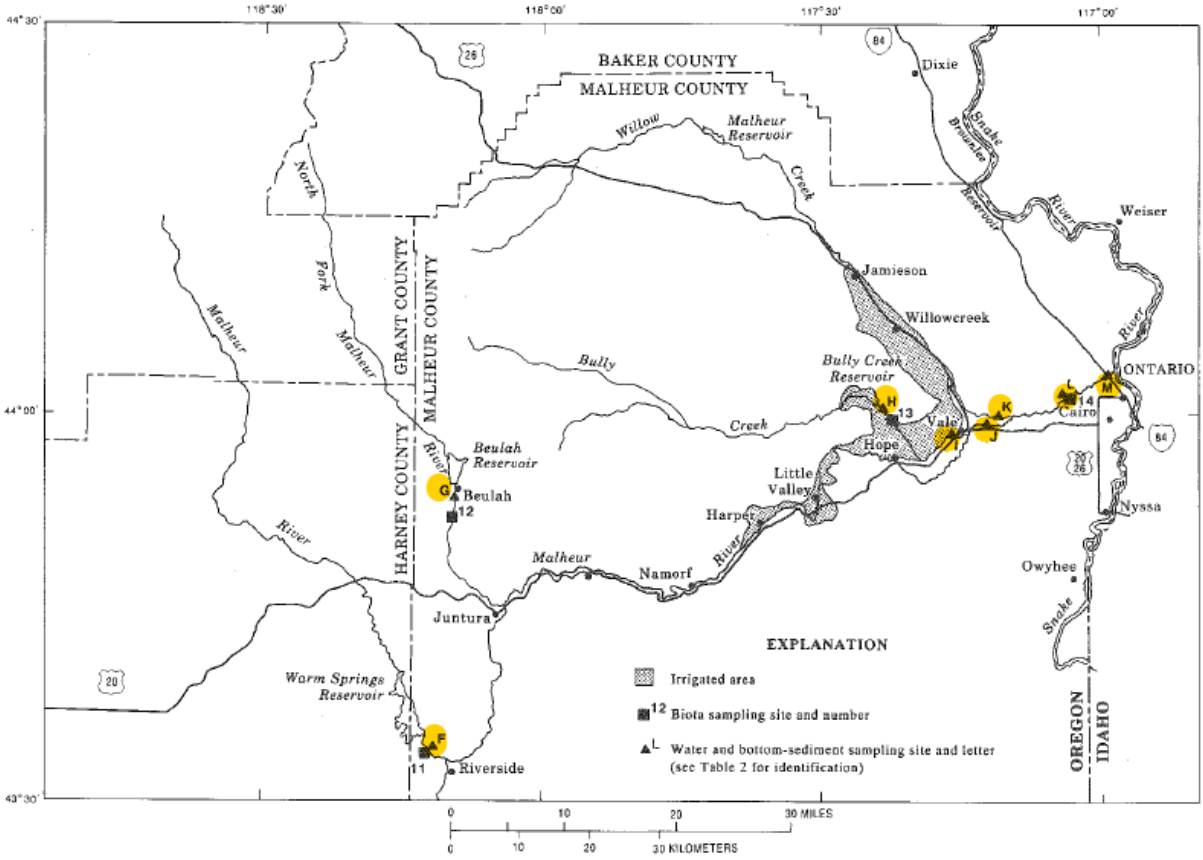


Figure 3. Location of the Vale project area, Oregon, 1990–91.

Table 20. Concentrations of dissolved elements, Owyhee and Vale project areas, and Snake River system, April-October 1990 —Continued

Figure 2 and 3 identifications	Station name	Date	Elements						
			Chromium	Copper	Iron	Lead	Manganese	Molybdenum	Strontium
N	Snake River at Marsing, ID	07-31-90	1	8	--	10	--	2	--
		10-16-90	<1	3	--	2	--	2	--
D	Jump Cr near Homedale, ID	07-31-90	2	3	--	1	--	15	--
		10-16-90	<1	3	--	<1	--	13	--
E	Succor Cr near Homedale, ID	04-17-90	2	2	--	<1	--	11	--
		08-01-90	1	4	--	<1	--	16	--
		10-16-90	1	4	--	1	--	16	--
A	Owyhee R blw Owyhee Lake, OR	04-20-90	--	--	--	--	--	--	--
		08-03-90	1	21	--	16	--	3	--
B	Overstreet Drain, OR	04-20-90	--	--	--	--	--	--	--
		08-03-90	1	3	--	<1	--	6	--
		10-16-90	1	2	--	<1	--	13	--
C	Owyhee River at Owyhee, OR	04-17-90	<1	3	35	<1	70	8	180
		08-01-90	<1	5	28	2	35	9	190
		10-18-90	<1	2	17	1	22	9	220
O	Boise River near Parma, ID	04-18-90	<1	3	--	<1	--	4	--
		08-01-90	<1	13	--	3	--	3	--
		10-17-90	<1	4	--	<1	--	<1	--
F	Malheur R blw Warmsprings, OR	04-21-90	--	--	--	--	--	--	--
		08-21-90	<1	3	--	1	--	5	--
G	N Fk Malheur R at Beulah, OR	04-21-90	--	--	--	--	--	--	--
		08-21-90	<1	1	--	<1	--	2	--
H	Bully Cr blw Bully Cr Res, OR	04-20-90	--	--	--	--	--	--	--
		08-22-90	<1	2	--	<1	--	7	--
I	Bully Creek near Vale, OR	04-19-90	--	--	--	--	--	--	--
		08-22-90	<1	2	--	<1	--	12	--
		10-19-90	<1	2	--	<1	--	9	--
J	Malheur R near Vale, OR	04-19-90	--	--	--	--	--	--	--
		08-22-90	<1	2	--	<1	--	15	--
		10-18-90	<1	2	--	<1	--	11	--
K	Willow Cr at Vale, OR	04-19-90	--	--	--	--	--	--	--
		08-22-90	<1	2	--	<1	--	20	--
		10-19-90	<1	2	--	<1	--	15	--
L	D Drain, OR	04-20-90	--	--	--	--	--	--	--
		08-23-90	<1	4	--	<1	--	16	--
		10-18-90	1	2	--	<1	--	17	--
M	Malheur River near Ontario, OR	04-16-90	<1	6	49	<1	100	10	260
		08-03-90	2	12	18	5	75	14	340
		1/ 08-03-90	2	7	--	1	--	13	--
		08-23-90	<1	9	--	1	--	16	--
		10-15-90	<1	7	9	1	25	9	340
P	Payette River near Payette, ID	04-18-90	1	3	--	1	--	2	--
		08-02-90	1	4	--	3	--	3	--
		10-17-90	<1	2	--	1	--	1	--
Q	Snake River at Weiser, ID	04-19-90	<1	3	--	1	--	3	--
		08-02-90	<1	2	--	3	--	3	--
		10-17-90	1	2	--	1	--	<1	--
R	Sand Hollow Cr inflow, ID	04-18-90	--	--	--	--	--	--	--
		07-06-90	1	7	--	2	--	2	--
		10-17-90	<1	3	--	<1	--	3	--
S	Sand Hollow Cr outflow, ID	04-18-90	--	--	--	--	--	--	--
		07-06-90	2	6	--	6	--	1	--
		10-18-90	<1	4	--	1	--	2	--

1/ Quality-assurance split sample.

Appendix C: Derivation of Regional Copper Criteria and Ambient Copper Data

Input Parameter Data Sources and Regions

DEQ compiled all available parameter data from the DEQ ambient and toxics monitoring programs, archived in the DEQ LASAR database, and the U.S. Geological Survey NWIS database, for the years 2000-2014. Data was for ambient surface water locations only.

The concentration of biotic ligand model parameters varies across the state, but the concentration of these parameters is clustered in similar groups for samples collected within specific regions of the state. These regions (See Figure 1 below) are used to summarize the concentration of biotic ligand model parameters. The regions are comprised of one or more of the EPA Level III Ecoregions for Oregon, with an additional category for sites located on the main stem of the Columbia River.

Each region contains the Level-III ecoregions indicated:

- Coastal
  - Coast Range
  - Klamath Mountains
- Willamette Valley
  - Willamette Valley
- Cascades
  - Cascades
- Eastern
  - Eastern Cascades Slopes and Foothills
  - Columbia Plateau
  - Blue Mountains
  - Northern Basin and Range
  - Snake River Plain

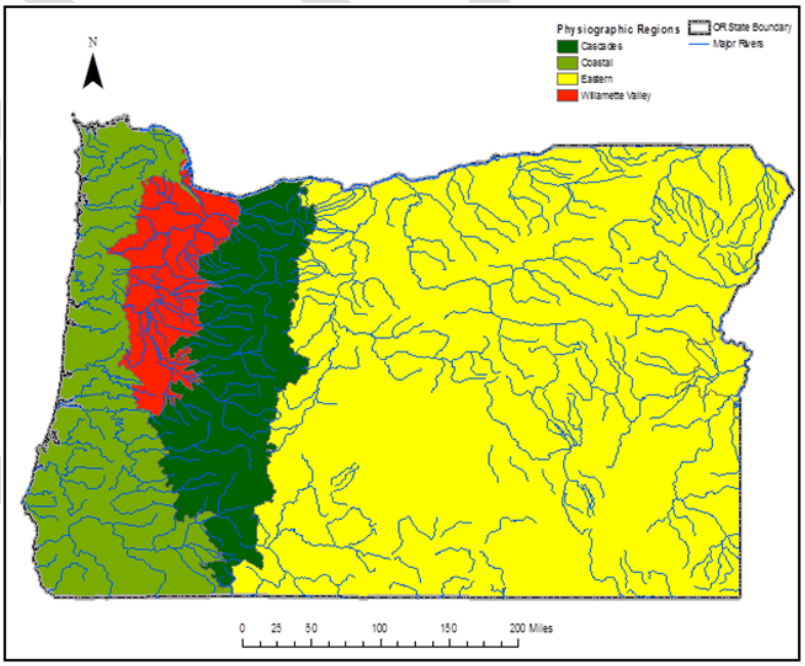


Figure 1- Biotic Ligand Model Regions

A full description of the data and the quality assurance and control procedures for the data, as well as, the analyses and procedures used to define these regions is included in DEQ's 2016 Technical Support Document: An Evaluation to Derive

Statewide Copper Criteria Using the Biotic Ligand Model which is at this web page.
https://www.oregon.gov/deq/Rulemaking%20Docs/cu2016BLMtsdRev2.pdf

Distribution of Instantaneous Copper Criteria Values from Available Data

In order to calculate instantaneous water quality criteria (IWQC) for copper, the biotic ligand model needs, at a minimum, measured values for DOC, pH, temperature, and specific conductance. The model requires these parameters be sampled at the same location and time. The IWQCs values are particularly sensitive to DOC and pH, so only samples of parameters where these had been directly measured were included in the analysis. It is possible to calculate an estimate of the concentration of any geochemical ions or alkalinity that were not directly measured by using equations based on specific conductance measured for the sample. These equations are included in the copper rule. An explanation of the full derivation of these equations is included in the Technical Support Document for Copper.

About 25% of DOC measurements are below the quantification limit (QL), also called the minimum reporting limit (MRL). These samples have low DOC concentrations where we can confirm DOC is present, but cannot accurately measure the concentration. The IWQC values are very sensitive to DOC, with low values of DOC resulting in low IWQC values. These "censored" measurements create uncertainty in the true value of IWQC for samples where DOC is below the quantification limit. The typical QL for DOC samples from the LASAR database is 1-2 mg/L. The typical QL for DOC samples from the NWIS database was 0.3 mg/L.

Figure 2 shows the percentile distribution of all IWQC samples that were calculated for the State of Oregon. The distribution of statewide IWQC values is highly skewed below the 5th percentile. The majority of IWQC values below the 10th percentile are from samples where the DOC was censored.

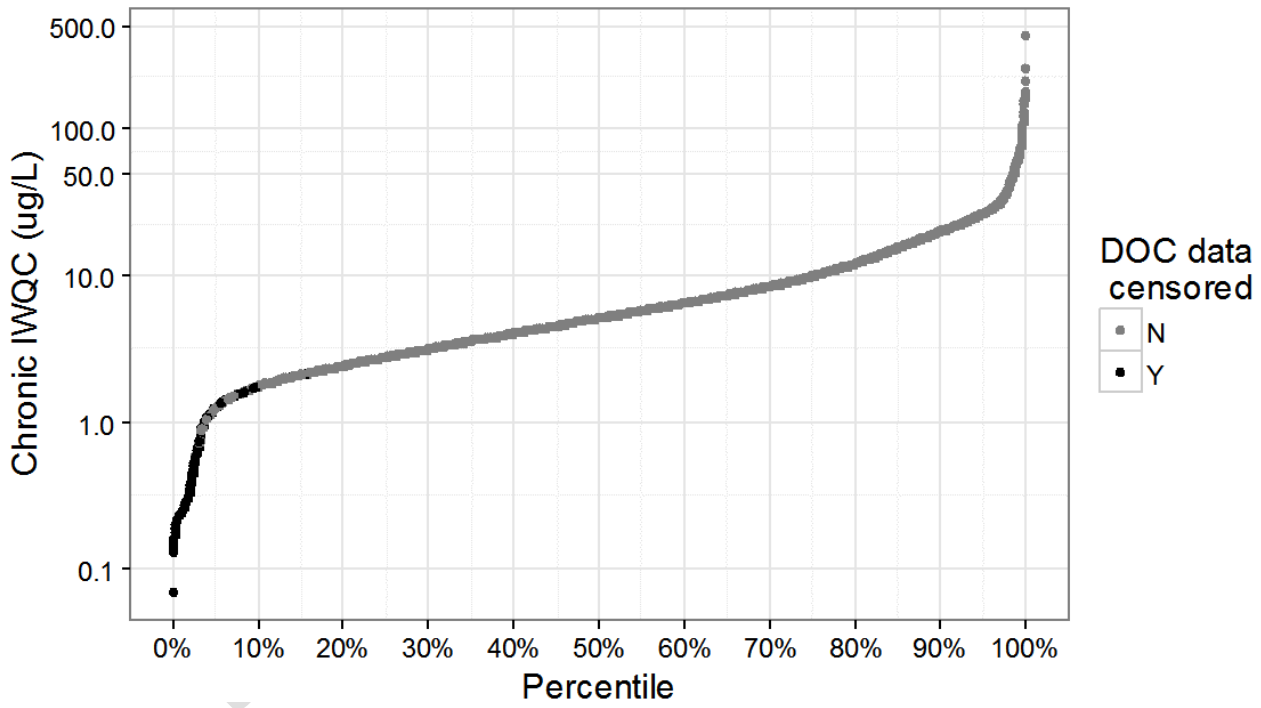


Figure 2- Statewide Chronic Instantaneous Water Quality Criteria values for Oregon, 2000-2014. n= 4,607, IWQC calculated with the biotic ligand model for samples with DOC measurements below the QL are shown as dark grey points. IWQC values calculated using accurately measured DOC are shown as light grey points.

Figure 3 shows the percentile distribution of IWQC values within each of the biotic ligand model regions of Oregon. Differences in DOC concentration and pH between regions results in a different range and distribution of IWQC values for each region. The IWQC values for the Coastal, Eastern, Willamette Valley, and to some extent the Cascades, are highly skewed below the 10th percentile. A high proportion of the samples below the 10th percentile have DOC

concentrations that are censored. Note that in the Columbia River, DOC concentrations are all above the QL, and there is no skew in the distribution at lower percentiles.

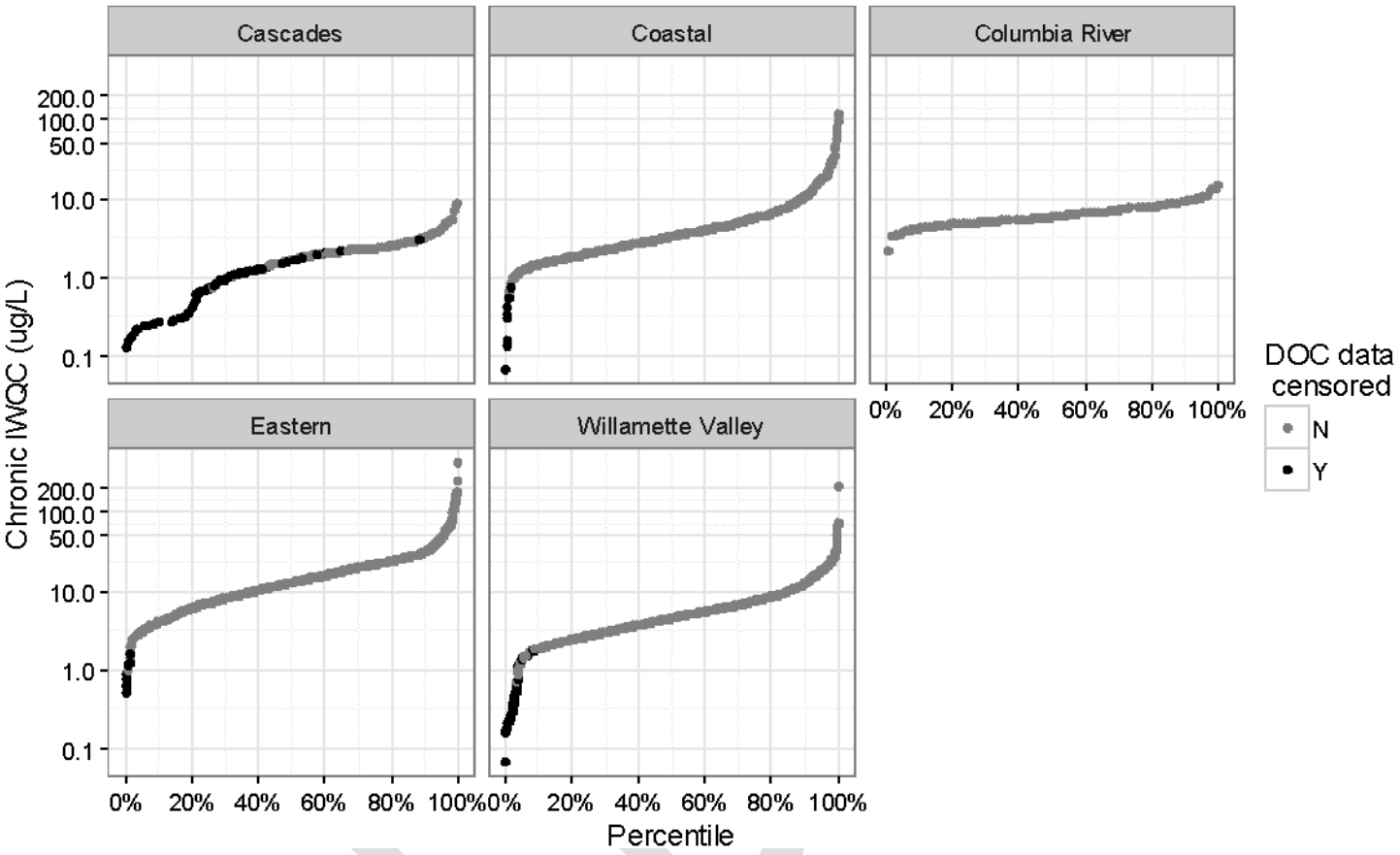


Figure 3- Regional Chronic Instantaneous Water Quality Criteria values for Oregon, 2000-2014. IWQC calculated for samples with DOC measurements below the QL are shown as dark grey points. IWQC values calculated by the biotic ligand model using accurately measured DOC are shown as light grey points.

Tables 2 and 3, below, show the value of the acute and chronic instantaneous criterion for copper at specific percentile thresholds for each region. Current quantification limits for copper are ~ 1.5 µg/L. Criterion values below this concentration would indicate that any detectable copper would be considered to exceed the criterion. Due to low ambient DOC concentrations, in combination with relatively low pH and the other biotic ligand model parameters, copper is highly bioavailable in the Cascades and Coastal regions. Due to higher DOC and pH in the Columbia River, and especially the Eastern region, copper is less bioavailable, and so the copper criteria values can be higher.

Table 1- Percentiles for Regional Chronic IWQC values.

Region	N	10th%	15th%	20th%	median	Geo-mean	CV
Cascades	191	0.28	0.3	0.47	1.6	1.3	0.78
Coastal	853	1.47	1.6	1.85	3.4	3.6	1.53
Columbia River	113	4.34	4.6	4.78	5.9	6.2	0.35
Eastern	1133	4.08	5.0	6.11	12.9	12.4	1.32
Willamette Valley	2317	1.87	2.2	2.44	4.5	4.5	1.17

Table 2- Percentiles for Regional Acute IWQC values.

Region	N	10th%	15th%	20th%	median	Geo-mean	CV
Cascades	191	0.44	0.48	0.76	2.7	2.0	0.78
Coastal	853	2.37	2.66	2.98	5.4	5.8	1.53
Columbia River	113	6.99	7.37	7.70	9.5	9.9	0.35
Eastern	1133	6.57	8.08	9.85	20.8	20.0	1.32
Willamette Valley	2317	3.02	3.49	3.92	7.3	7.2	1.17

Selection of Default Criteria for the 2000-J Pesticide General Permit

Ordinarily, the 10th percentile of criteria values for each region would be considered to provide a high degree of protection against bioavailable water quality conditions leading to copper toxicity. These criteria would represent the most sensitive conditions observed within each region, and would ensure that 90% of observed samples would be expected to be protected. However, due to the skewness and uncertainty at low percentiles of the distribution of criteria values caused by samples with censored DOC values, it is not accurate to establish the default copper criteria at this threshold. These censored samples do represent water bodies where DOC is particularly low, if not accurately measurable, so removing them from the distribution and calculating the 10th percentile of samples with quantifiable DOC would not adequately protect sensitive locations and times. In regions with high bioavailability, such as the Cascades, this may not adequately protect more than half of the observed samples.

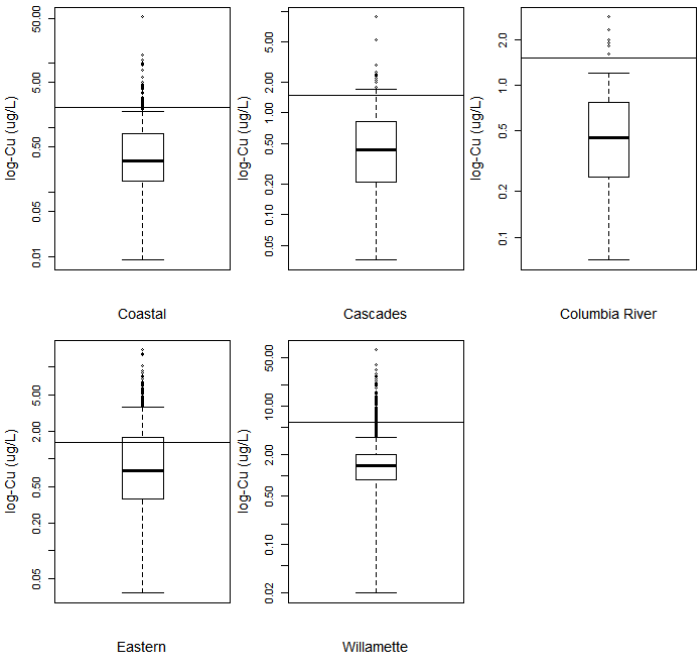
Given these considerations, DEQ is proposing to use the 20th percentile of available IWQC observed in the 5 regions to use as the copper criteria for the 2000-J general permits. In most regions, the difference between the 10th and 20th percentiles is less than 1 µg/L of copper. This percentile is expected to provide a balance between protecting sensitive water quality conditions that increase the bioavailability of copper, with the uncertainty introduced by the inability to quantify the concentration of copper at these levels.

Ambient Copper Criteria

DEQ is using the median value in each region for the ambient background copper data. Ambient background copper in each region is based on a distribution of the concentrations that were measured. Median values are estimates which were statistically modeled with the assumption that the copper data has log normal distribution.

Region	median	mean	Standard Deviation
Cascades	0.4	0.8	1.1
Coastal	0.3	0.8	2.2
Columbia River	0.4	0.6	0.6
Eastern	0.7	1.3	1.6
Willamette Valley	1.40	1.7	1.9

A summary of the median and mean ambient copper concentrations for the state, and a box plot of the distributions for copper concentration in each region is shown below. On the boxplots, the solid horizontal line is the minimum reporting limit. The bold line is the median. Edges of the box are the 1st and 3rd quartiles (75th and 25th %, or 50% of the values). The 'whiskers' show the range where 75% of the values can be found, and the open circles are outliers up to the max/minimum values.



The data shows that ambient copper values are very low. There are occasionally high outliers, but median copper levels would be expected to be in the 0.3-1.4 µg/L range.

End of Appendix C

Appendix D: Table 1 - 2000J Sampling Explanation

What kind of data	Why data are collected	Where Sample	When	Representative of	How often
Chemical Analysis for pesticide residue acrolein, dissolved copper, or total xylene	Effluent limits, Schedule A	Within treatment area Or Gate to natural water or connection to natural water	End of Treatment Period	Treatment approach in different sections of the irrigation system.	Dependent upon release to natural water, size of treatment area, results of sampling and recordkeeping.
acrolein and xylene	Pesticide Use Management for irrigation districts with gates Holding, Schedule A f.*i.*	At reopened gate nearest to natural water or where discharge from the gate enters natural water	After time of travel study is complete. Following a pesticide application Upon release to natural water/ within 30 minutes	Management of distinct separate treatments in different sections of an irrigation system First point of release to natural water from that section of irrigation system following a pesticide application.	One treatment may consist of multiple sections treated at one time. Sampling at a first point of release from one treatment that includes multiple sections is complete for each of those sections that are part of the multiple treatment for that pesticide residue. Treatment may also occur in separate sections at different times. Sampling of treatments in separate and distinct sections will be required upon first point of release to natural water for that pesticide. Once a sample that is representative of treatment is at or below an effluent limit, and meets other requirements in Schedule B 6.f. then sampling is complete for that section or sections for that pesticide residue. Larger irrigation systems may sample more than smaller irrigation systems due to size and distinct separate treatments. Reset/repeat of sampling requirements each calendar year. Each year sampling may vary based on management measures.
acrolein, copper and xylene	Pesticide Use Management for irrigation districts with gates Turnover, Schedule A f.*iii.*	At reopened gate nearest to natural water or where discharge from the gate enters natural water	After time of travel study is complete Following a pesticide application Upon release to natural water/ within 30 minutes	Management of treated water for separate treatments in different sections of an irrigation system First point of release to natural water from a section of irrigation system that has been treated.	
copper and xylene	Pesticide Use Management for irrigation districts with gates Testing, Schedule A f.*ii.*	Within treatment area prior to re-opening gates	After time of travel study completed Following a pesticide application Upon release to natural water/ within 30 minutes	Within treatment area after treatment Management of treated water for different sections of an irrigation system	
acrolein, copper and xylene	No gates	Connection to natural water	Following a pesticide application Upon release to natural water/ within 30 minutes	First point of release to natural water from the system following a pesticide application	

Appendix E: Irrigation District Diagram

One treatment may consist of multiple sections treated at one time. Sampling at a first point of release from one treatment that includes multiple sections is complete for each of those sections that are part of the multiple treatment for that pesticide residue. For example, treatment occurs in Section D, E and F, than after turnover or holding, release occurs at 3. Sampling occurs at 3.

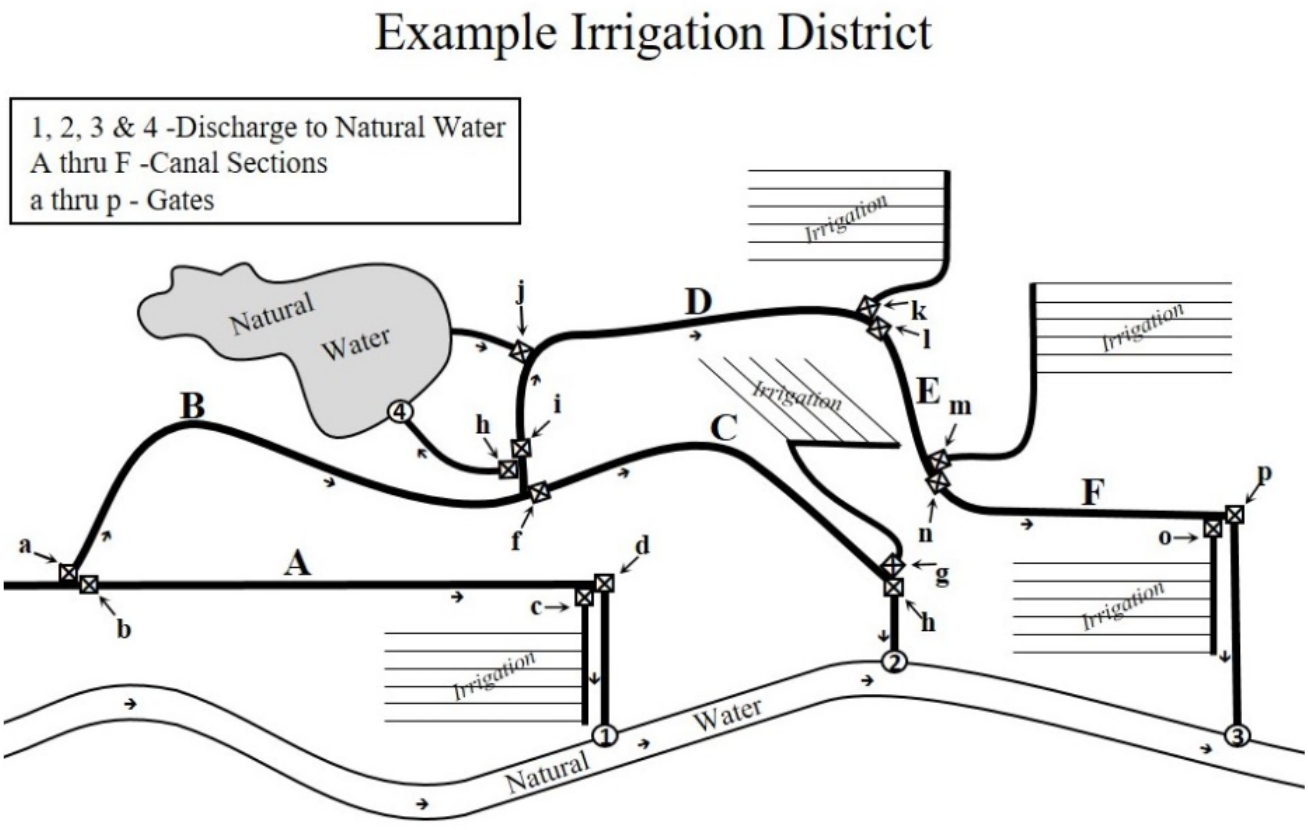
Later in the same calendar year treatment occurs:

- in section D, release occurs at 3. Unless using a different pesticide, sampling does not occur because it was already sampled for treatment in D, E and F
- in section E, release occurs at 3. Unless using a different pesticide, sampling does not occur because it was already sampled for treatment in D, E and F
  in section F, release occurs at 3. Unless using a different pesticide, sampling does not occur because it was already sampled for treatment in D, E and F

Treatment may occur in separate sections at different times. Sampling of treatments in separate and distinct sections will be required upon first point of release to natural water for that pesticide.

For example, when treatment occurs

- only in section B and it is held at 'f, i and h' before release through sections D and C. Sampling occurs at 2 because time of travel indicates it is the first point of release nearest to natural water for that treatment.
- only in section B and is held at 'f, i and h' before release through 'h' to the reservoir above section B. Sampling occurs at the point of release to the reservoir.
- only in section C with release to surface water at 2. Sampling occurs at 2.
- In sections A & B release occurs at 1. Sampling occurs at 1 even if release occurs further at 2 or 3.



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