→ Melissa Gildersleeve

WSWRA WASHINGTON STATE WATER RESOURCES ASSOCIATION

WATER QUALITY PROGRAM
DEPARTMENT OF ECOLOGY

DEC 22 2014

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December 19, 2014

Mr. Kelly Susewind
Assistant to the Director
Washington State Department of Ecology
Ecology Headquarters
PO Box 7600
Olympia, WA 98504-7600

Dear Mr. Susewind:

On behalf of the board of directors and members of the Washington State Water Resources Association (WSWRA) we are writing to provide to your comments on the preliminary draft rule for human health criteria water quality standards. We believe these comments will be helpful as we move forward with discussions surrounding the use of aquatic pesticides under our NPDES irrigation systems permits.

The WSWRA and its members have worked cooperatively with the Department of Ecology staff to shape the content of our irrigation systems NPDES permits. Since 2001 we have completed several scientific studies to support the permits. These include fate and transport modeling in support of the use of acrolein, xylene and copper. We have also conducted a study of the effects of endothall (Cascade) on certain fish species. In that vein, we are offering technical comments on the proposed water quality standards potentially impacting the future use of acrolein under our NPDES permits.

The Department of Ecology has informally requested that groups present them with any comments on the preliminary draft rule for human health criteria water quality standards before the mid-January release of the draft rule for public comment. We have participated in the delegates' table discussions of this proposed draft rule and have met with representatives of Ecology on various occasions to discuss the potential impacts to our NPDES permit and the use of acrolein under that permit. The preliminary draft rule proposes a limitation of one part per billion for the use of acrolein under NPDES permits. This limitation will severely hamper our effective use of acrolein under the permits in the future. This has prompted us to engage your staff in discussions surrounding the future use of acrolein under our NPDES permits.

WSWRA appreciates the continued cooperation and support of the Department of Ecology at all levels. Ecology staff making themselves available for several direct phone calls, in person meetings and conference calls before and after the September 30th release of the proposed HHC rule. WSWRA understands that acrolein is only one of many chemicals listed in the proposed rule further emphasizing the efforts by Ecology to engage us directly when so many are impacted by the rule. We know there are many other stakeholders with interests in this rule placing significant demand of your department's resources.

Our discussions with Ecology representatives have been very productive and we believe are leading us in a positive direction regarding the future use of acrolein under the permit. In this process we have identified certain critical issues. Because of this we have decided to provide feedback on the rule based on these preliminary discussions. These comments should be read as our attempt to identify certain key issues that may help us better understand how to shape the next irrigation systems NPDES permit. Our discussions to this point have included issues related to the human health criteria water quality standards and the aquatic life criteria water quality standards. As a result we have moved ahead of your current preliminary draft rule to a broader discussion of our permit.

We hope that you will find our comments useful as we move forward with our discussion regarding the permit. We will also be providing Ecology with information about how irrigation districts use acrolein safely and effectively and explaining how important this product is to maintaining irrigation canals for the purpose of water delivery on farm. We look forward to continuing to work with Ecology staff to find solutions to important issues related to the future permit. We appreciate their willingness to work with us in light of their busy schedules associated with the preliminary draft rule.

If you have any questions please let us know.

Sincerely,

Thomas G. Myrum
Executive Director

Cc: Heather Bartlett, Water Quality Program Manager

Attachment: Comments on HHC WQ Preliminary draft rule

Herein are technical comments and recommendations submitted on behalf of the Washington State Water Resources Association (WSWRA) to address the operational impacts on irrigation districts by the proposed Human Health Criteria (HHC) limitation on acrolein identified in the Preliminary Draft of the Toxics Language & Table (WAC 173-210A-240) released by the Washington Department of Ecology ("Ecology") on September 30, 2014 (WDOE 2014a).

1. **EPA's recommended bioaccumulation factor parameter input should replace the bioconcentration factor used to calculate Ecology's proposed 1 ppb HHC for acrolein.**

   Table 240 (WDOE 2014a) and supporting documents (WDOE 2014b, 2014c) provide information on the methodology and input parameters used to calculate acrolein's HHC limit at 1 ppb (Table 1). For the draft rule, Ecology proposes to apply a state-wide policy that indiscriminately uses bioconcentration factor (BCF) values and not bioaccumulation factor (BAF) values across all toxic substances listed in the draft Table (WDOE 2014a). We recommend the use of BCF and BAF on a chemical-specific basis. In particular, the use of the bioconcentration factor (BCF) parameter for acrolein's criterion determination should be carefully reexamined given the chemical property, fate and nature of discharges into state waters. Further, the federally recommended BAF approach outlined in the Ambient Water Quality Criteria (AWQC) for acrolein (Table 1; USEPA 2014) replaces EPA's historic BCF parameter input to account for mechanistic processes, metabolic biotransformation, and bioavailability in all surrounding media. EPA's updated AWQC suggests that BCF is not an ideal parameter for acrolein criterion determination, where:

   > *These estimated BAFs replace the BCF of 215 L/kg used in the 2009 criteria derivations, which was calculated from a measured steady-state bioconcentration from a study of bluegills and represented all trophic levels.* (page 6, USEPA 2014)

   The EPA further recommends the adoption of BAFs over BCFs:

   > *The utilization of a bioaccumulation factor rather than a bioconcentration factor better represents the amount of a contaminant accumulating in an organism because it accounts not only for the organism's exposure to the pollutant in the water column, but also from the food chain and surrounding environment as well as biotransformation of the pollutant in the organism due to metabolic processes.* (page 10, USEPA 2014)

   Implementation of the BAF parameter to calculate Washington's acrolein criterion is reasonable for the following reasons: 1) irrigation districts are Washington's only regulated dischargers of acrolein under the NPDES; 2) no other known inputs from non-Clean Water Act (CWA) sources of acrolein have been identified; and, 3) due to the volatile and non-bioaccumulative nature of acrolein, and "episodic" discharges by irrigation districts, there is not a chronic exposure or legacy source risk to the food web path. In the draft's supporting documents, Ecology confirms that it is practical for a chemical-specific BAF approach be used (page 31, WDOE 2014c):

> *If a pollutant is largely from direct CWA-regulated discharges to waters, and the food web path goes from that water concentration to the organism, without large input from other non-CWA sources that are either actively entering the water column or from other sources already sequestered in the environment from past activities, a BAF might be most reflective of the sources regulated under the CWA.*

Adoption of the BAF would not contradict Ecology's reasons presented in the decision for the draft rule (page 31-32, WDOE 2014c) since irrigation districts are the only acrolein discharge source. This falls within Ecology's perceived regulatory limits of the CWA, where "the CWA addresses contaminant discharge directly to waters of the state (not other sources or areas)."

Recommendations: (1) BAF should replace BCF as a more relevant parameter to determine the acrolein human health criterion, see Table 1; (2) Because of the episodic nature of discharges and the improbable occurrence of chronic exposure, Ecology should consider amending values for parameter inputs that assume the risk of chronic exposures (RfD). We further suggest that language in the proposed rulemaking that allow for "Best Management Practices" (BMPs) on upcoming NPDES permits to maintain the current 21 ppb POC limit for irrigation districts. As further discussed below, this would accommodate mixing zones for human health or aquatic life criterion compliance (see Item 3).

2. The Aquatic Life Criteria (ALC) for acrolein needs reevaluation since it is an outdated value and applicability to the Pacific Northwest is uncertain.

We acknowledge the potential for Ecology to adopt the federal ALC to replace the HHC for acrolein, particularly if criterion compliance within mixing zones are implemented. The draft HHC states on page 2: *The department may revise the following criteria for aquatic life on a statewide or water body-specific basis as needed to protect aquatic life occurring in waters of the state and to increase the technical accuracy of the criteria applied.* The ALC for any given toxicant is derived from toxicity data of the most sensitive species (USEPA 1985). However, we have reservations on acrolein's federal ALC recommendation since the freshwater criterion is based on a single study that tested the African clawed frog, *Xenopus laevis* (Holcombe et al. 1987; USEPA 2009) (Table 2). *X. laevis* is a species that does not inhabit the Pacific Northwest, and we are not aware of any studies that document amphibian species at irrigation district POCs in Washington. As a result, this makes it difficult to discern the relevance of the *X. laevis* study to this water quality rulemaking.

Recommendations: Ecology should reference the federal ALC with caution. Scientifically defensible data is needed to ensure that "*...aquatic communities and the existing and designated uses of waters are being fully protected*" (WDOE 2014a). These data uncertainties can be resolved by adopting one of the following two approaches: (1) substituting existing *X. laevis* data with data collected on amphibians native to the Pacific Northwest; or, (2) apply data from surrogate species. For

example, rainbow trout (*Oncohynchus mykiss*) may prove to be a reasonable surrogate, since similar patterns in relative toxicity between amphibian species and *O. mykiss* were recently reported (Birge et al 2000; Weltje et al 2013). We surmise that this would be an ideal approach because of the importance of salmonids in the region. However, the currently accepted *O. mykiss* data presented in Table 2 represents only one study (Holcombe et al. 1987) and the LC50 should be verified. As indicated in Table 2, either amphibian or *O. mykiss* LC50 data would need to be collected in a laboratory study before implementing rule changes because available data are not sufficient to make a credible ALC determination. Irrigation districts have historically worked with Ecology to address similar data needs when herbicide toxicity uncertainties existed (Courter et al. 2011).

3. **Proposed HHC Rulemaking should include language that allows irrigation districts to monitor compliance downstream of points of discharge into natural water bodies, areas known as "mixing zones."**

Many districts discharge into large volumes of flowing water. For example, delivery conveyances in the Roza and Sunnyside Valley Irrigation Districts release water into the Yakima River, where receiving flow is up to 10,000 cfs during the application season (Table 3). The high flow significantly reduces discharge concentrations, thereby decreasing chemical exposure to human and aquatic life. For this reason, it is prudent to account for this high flow effect when considering compliance to the state's human health or aquatic life criterion. Irrigation districts can be expected to comply with an acrolein POC limit of 21 ppb and comply with criterion within mixing zones. Using Roza and Sunnyside Valley Irrigation Districts as examples, Table 3 provides an illustration of the capacity of irrigation districts to meet reasonable criteria to protect human and aquatic life in mixing zones when POC levels are limited at 21 ppb.

Recommendation: We recommend Ecology to maintain the current 21 ppb effluent limitations at the existing POCs for irrigation districts, as identified in the 2012 NPDES permit. For new permits, we recommend that additional compliance points be established within mixing zones that are contained wholly within receiving natural waterways. The language in the new proposed rulemaking should provide the opportunity to allow for human health or aquatic life criterion compliance within mixing zones in receiving waters.

Tables

	NTR[1]	USEPA		Washington		
		2009[2]	2014[3]	*Proposed* 2015[4]	BAF Hypothetical, Chronic	BAF Hypothetical, Acute
Methodology[5]		2000	2000	2000	2000	2000
RfD (µg/kg/d)		--	0.50	0.50	0.50	TBD
ADI (µg/kg/d)		15	--	--	--	--
RSC			0.20	1.0	1	1.0
BW (kg)	70	70	80	80	80	80
DI (L/d)	2	2	3	2	2	2
FI (kg/d)	--	0.0175	--	--	--	--
FCR (kg/d)	6.5	--	0.011	0.175	0.175	0.175
BCF (L/kg)	215	215	--	215	--	--
BAF (L/kg)	--	--	0.984*	--	0.9705**	0.9705**
Criteria (µg/L)	**320**	**6**	**3**	**1**	**18**	**> 18**

Table 1. Summary of historical, present and input parameters of federal and Washington standards used for the determination of Human Health Criteria for Acrolein for the consumption of water and organisms. Hypothetical columns under Washington accounts for recommended adjustments outlined in the text. "BAF Hypothetical, Chronic" considers Washington's proposed HHC input parameters, but adopts the federally recommended BAF parameter to replace BCF. Similarly, "BAF Hypothetical, Acute" considers the same, but suggests an RfD to accommodate a realistic acute exposure potential. TBD = denotes information to be determined based on acute exposure.

*mean TL2, TL3, and TL4 modeled values
**modeled value for TL4 (Trophic Level 4)
Chemical-specific criterion equation (USEPA 2000): (RfD * RSC * BW) / [DI + (FCR * BCF)]
RfD (Reference Dose; considers ADI, safety factor and margin of safety)
ADI (Acceptable Daily Intake)
RSC (Relative Source Contribution)
BW (Human Body Weight)
DI (Drinking water intake)
FI (Fish Intake)
FCR (Fish Consumption Rate)
BCF (Bioconcentration Factor)
BAF (Bioaccumulation Factor)

[1] National Toxics Rule (1986)
[2] USEPA (2009)
[3] USEPA (2014)
[4] WDOE (2014c)
[5] USEPA (2000)

GMAV (µg/L)	Species	SMAV (µg/L)	# of studies value based on	Study, lifestage, endpoint
32.98	Coho salmon, *Oncorhynchus kisutch*	68	1 (Lorz et al 1979)	Flow-through, smolt, LC50
	Rainbow trout, *Oncorhynchus mykiss*	16	1 (Holcombe et al 1987)	Flow-through, fry, LC50
28.77	Fathead minnow, *Pimephales promelas*	28.77	4	
27.19	Bluegill, *Lepomis macrochirus*	27.19	2	
14	White sucker, *Catostomus commersoni*	14	1	
7	African clawed frog, *Xenopus laevis*	7	1 (Holcombe et al 1987)	Flow-through, juvenile, LC50
3	**Aquatic Life Criterion**			

Table 2. Acrolein's ALC is derived from one study involving a non-native amphibian species. *O. mykiss* (a potentially relevant, surrogate species) data is also derived from a single study. This table outlining the Genus Mean Acute Values (GMAV) and Species Mean Acute Values (SMAV) is adapted from the *Ambient Aquatic Life Water Quality Criteria for Acrolein* (USEPA 2009). GMAVs are based on averaged data across toxicity research studies, and used to derive the Freshwater Final Acute Value (FFAV) using the *Guidelines* (USEPA 1985). The ALC is determined to be approximately half the FFAV.

Year	District	Actual Effluent (cfs), ± SEM	Actual Receiving (cfs), ± SEM	End Concentration, Complete Mixing (ppb), ± SEM; [range]
2008	SVID	3.13 ± 0.54	1,856 ± 267	0.08 ± 0.01; [0.00, 0.05]
2008	Roza	49.58 ± 9.16	2,212 ± 359	1.04 ± 0.17; [0.00, 2.97]
2011	Roza	1.20 ± 0.10	4,440 ± 2550	0.01 ± 0.00; [0.00, 0.02]
2011	SVID	7.27 ± 1.51	3,642 ± 682	0.14 ± 0.04; [0.00, 0.96]
2012	SVID	4.74 ± 1.31	2,832 ± 608	0.06 ± 0.02; [0.00, 0.25]
2013	SVID	3.40 ± 1.04	1,492 ± 317	0.06 ± 0.02; [0.00, 0.14]

Table 3. Theoretical mixing zone scenarios for Roza and Sunnyside Valley Irrigation Districts where 21 ppb acrolein effluent is released into receiving state waters. The theoretical mixing zone in receiving waters assumes homogeneous mixing of a Theoretical Max Effluent of 21 ppb. "End Concentration" = ("Theoretical Max Effluent" x "Actual Effluent")/"Actual Receiving". The range of "End Concentration" values are provided to illustrate minimum and maximum concentration values.

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