



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

September 27, 2018

Mr. Ken Wiegardt, President
Willapa-Grays Harbor Oyster Growers Association
PO Box 3
Ocean Park, WA 98640

Re: Final Determination to Deny National Pollutant Discharge Elimination System Permit

Dear Mr. Wiegardt:

The Washington State Department of Ecology (Ecology) has completed the 30-day comment period for the tentative determination to deny the Willapa-Grays Harbor Oyster Growers Association (WGHOGA) January 8, 2016, application for an aquatic pesticide discharge National Pollutant Discharge Elimination System (NPDES) permit and applications for two Sediment Impact Zones. Ecology reviewed and considered all comments received. However, we did not find information to change Ecology's tentative denial determination. We found the proposed discharge cannot meet water quality standards to authorize the two Sediment Impact Zones and therefore the NPDES permit application is denied. The detailed basis for the decision is contained in Ecology's Toxic Cleanup Program, September 13, 2018 memorandum recommending the denial of the Sediment Impact Zone applications and the Southwest Regional Water Quality Program, September 20, 2018 memorandum recommending the denial of the NPDES permit application (see enclosed memoranda). We are notifying you, as the applicant, of this final permit decision and providing you information about your right to appeal.

Ecology reviewed the WGHOGA January 8, 2016 application for an aquatic pesticide discharge NPDES permit and applications for Sediment Impact Zones. Ecology also reviewed supporting information submitted by WGHOGA, studies and data relevant to the proposed discharge, and comments and analyses received during the State Environmental Policy Act (SEPA) environmental review. In this process, Ecology developed a Supplemental Environmental Impact Statement using the current, best available science including the 2017 EPA Risk Assessment that provided proxy reference values to compare all the monitoring results. Ecology fully reviewed the 2014 monitoring study, and the results from this commercial scale imidacloprid application indicated inconclusive pesticide efficacy with a range from a 90 percent reduction to 400 percent increase of shrimp burrows after use. Public comment received on the Draft Supplemental Environmental Impact Statement from some members of the public, federal agencies, and environmental groups provided additional documentation including studies and publications that imidacloprid is likely to affect the benthic and aquatic ecosystems beyond a localized scale. This was reflected in the Final Supplemental Environmental Impact Statement issued by Ecology.

Following issuance of the Final Supplemental Environmental Impact Statement, and as required by Washington Administrative Code (WAC) WAC 173-220-110, Ecology made a "tentative staff determination" to deny the permit on April 9, 2018. In accordance with WAC 173-220-050, Ecology



published the notice of the intent to deny the permit in the newspapers *The Chinook Observer* and *The Daily World* on April 9, 2018. Ecology opened a comment period from April 9 to May 14, 2018 (35 days) for the public to submit comments. We received numerous comments that supported the denial of the permit mostly noting generalized environmental precaution and health. There were several that opposed the tentative determination to deny the permit, including WGHOGA, noting economics, ecosystem services, and our evaluation of the biological resources inside and outside the Sediment Impact Zone. Enclosed is the compilation of Ecology's response to categorized comments, including how to find the public comments submitted.

As described in RCW 90.48.520, Ecology cannot issue a permit if the agency finds the discharge "would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria." It is the policy of the state of Washington, as set out in RCW 90.48.010, to maintain the highest possible standards to insure the purity of waters of the state consistent with protections such as "protection of wild life, birds, game, fish and other aquatic life . . ." Any permit Ecology issues must comply with surface water quality standards of the state of Washington, including WAC 173-201A, Water Quality Standards for surface waters of the state of Washington, WAC 173-204, Sediment Management Standards, and applicable federal rules. Under the Sediment management standards, a discharge that will violate or has a substantial potential to violate the sediment quality standards is required to obtain an authorized sediment impact zone. Authorization of a sediment impact zone requires compliance with several requirements as set out in WAC 173-204-415(1)(a)-(j). The two requirements that the WGHOGA's proposed discharge cannot meet are: (1) that the discharge shall not have an adverse effect to biological resources within the sediment impact zone above a minor adverse effects level; and (2) that the discharge shall not result in a violation of the sediment quality standards outside of the sediment impact zone. See WAC 173-204-415(1)(f) and (i).

WGHOGA's letter of January 2, 2018, discussed addressing the proposed discharge as an "experimental" discharge in contrast with the current application in which the discharge is for commercial purposes. WGHOGA subsequently confirmed that the January 2, 2018 letter was not a new permit application and not intended to modify the pending permit application. Although such an experimental permit application is not before Ecology, the issues related to an imidacloprid discharge would remain whether the purpose of the discharge is "experimental" or for commercial purposes. An "experimental" discharge application that is substantially similar to the current application request would likely not meet the requirements of the sediment management standards unless it addresses the harmful impact of imidacloprid on the biological resources of Washington, and the movement of imidacloprid beyond the boundaries of a sediment impact zone.

You have a right to appeal this final decision to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this decision. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

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

- **File your appeal and a copy of this Determination with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.**
- **Serve a copy of your appeal and this Determination on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.**

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

ADDRESS AND LOCATION INFORMATION

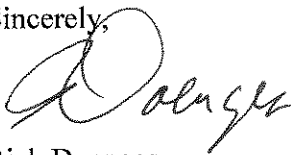
Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel Road SW STE 301 Tumwater, WA 98501	Pollution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

MORE INFORMATION

- **Pollution Control Hearings Board Website**
<http://www.eluho.wa.gov/Board/PCHB>
- **Chapter 43.21B RCW - Environmental and Land Use Hearings Office – Pollution Control Hearings Board**
<http://app.leg.wa.gov/RCW/default.aspx?cite=43.21B>
- **Chapter 371-08 WAC – Practice And Procedure**
<http://app.leg.wa.gov/WAC/default.aspx?cite=371-08>
- **Chapter 34.05 RCW – Administrative Procedure Act**
<http://app.leg.wa.gov/RCW/default.aspx?cite=34.05>
- **Ecology's Laws, rules, & rulemaking website**
<https://ecology.wa.gov/About-us/How-we-operate/Laws-rules-rulemaking>

Please feel free to contact me at (360) 407-6271 if you have questions regarding this letter, the enclosed technical memoranda, response to comments, or the appeal process.

Sincerely,

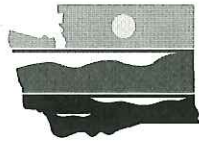


Rich Doenges
Southwest Region Manager
Water Quality Program

Enclosures: Toxics Cleanup Program memorandum, dated Sept. 13, 2018
Water Quality Program memorandum, dated Sept. 20, 2018
Response to Public Comments

By CERTIFIED MAIL: 9489 0090 0027 6021 4927 83

cc: Heather Bartlett, Ecology
Jim Pendowski, Ecology
Barry Rogowski, Ecology



DEPARTMENT OF
ECOLOGY
State of Washington

Date: September 13, 2018

To: Rich Doenges, SWRO Section Manager, Water Quality Program

From: Barry Rogowski, HQ Cleanup Section Manager, Toxics Cleanup Program
Barry Rogowski

Subject: Recommendation to deny Sediment Impact Zone applications as impacts of the discharge prohibit Sediment Impact Zone authorization and cannot be addressed via permit conditions

Background and Scope

This memorandum has been prepared by the Washington State Department of Ecology Toxics Cleanup Program (Ecology) and is a review of the proposed discharge under the application for a National Pollutant Discharge Elimination System (NPDES) permit and Sediment Impact Zone (SIZ) applications submitted by the Willapa-Grays Harbor Oyster Growers Association (WGHOGA) to discharge imidacloprid in Willapa Bay and Grays Harbor for the control of burrowing shrimp. This memorandum focuses solely on the SIZ applications. This memorandum has been updated in response to public comments received during the public comment period for Ecology's Notice of Intent to Deny National Pollutant Discharge Elimination System Permit. Ecology's Toxic Cleanup Program provided a response to comments pertaining to the Sediment Management Standards contained in a memo sent to the project file from Barry Rogowski on September 11, 2018.

1. Introduction

In 2016, the WGHOGA on behalf of a group of growers requested an Individual NPDES permit to authorize chemical applications of imidacloprid on up to 485 acres per year of commercial clam and oyster beds within Willapa Bay, and up to 15 acres per year within Grays Harbor. WGHOGA completed and submitted an application for the required NPDES permit, and applications for two SIZ authorizations for areas in Willapa Bay and Grays Harbor in April 2017.

The WGHOGA's application proposes a discharge of imidacloprid to kill native burrowing shrimp. Burrowing shrimp mortality would occur through indirect mortality or through paralysis and eventual suffocation after the shrimp can no longer maintain their burrows (Final Supplemental Environmental Impact Statement 2018 (FSEIS)). Imidacloprid is a neonicotinoid pesticide. It is a broad spectrum pesticide that targets a wide-range of invertebrates, with a lesser toxicity to vertebrates (FSEIS). As such, in an open water environment, it will affect non-target invertebrates concurrently with the target invertebrate (i.e., burrowing shrimp).

The toxicity of imidacloprid is based on interference of the neurotransmission in the nicotinic cholinergic nervous system. Imidacloprid binds to the nicotinic acetylcholine receptor (nAChR) at the neuronal and neuromuscular junctions in insects and vertebrates. The nAChR is an ion channel, and the endogenous agonist is the excitatory neurotransmitter acetylcholine (ACh). The receptor normally exists in a closed state, however, upon ACh binding, the complex opens a pore and becomes permeable for cations. The channel openings occur in short bursts, which represent the lifetime of the receptor-ligand complex. ACh is then rapidly degraded by the enzyme acetylcholinesterase (AChE). In contrast, imidacloprid bound to the nAChR is inactivated very slowly. Prolonged activation of the nAChR by imidacloprid causes desensitization and blocking of the receptor and leads to paralysis and death of biological organisms (CEPA-DPR, 2006).

The proposed chemical application under the WGHOGA application is described in detail within the 2018 Final Supplemental Environmental Impact Statement (FSEIS). The Literature Review (section 1.6.1) of the FSEIS includes a discussion of the new science and research that was evaluated during this process. This review included more than 100 research papers and the federal Environmental Protection Agency (EPA) Preliminary Aquatic Risk Assessment to Support the Registration Review of Imidacloprid. The EPA document established proposed acute and chronic chemical concentration risk endpoints for saltwater invertebrates which are important in evaluating the environmental impacts of the pesticide application proposal submitted by WGHOGA. Numerous comments received by Ecology regarding the draft SEIS included extensive review of new scientific information and research publications and potential environmental impacts. Those comments, including references and citations, are included in both Appendix B and Appendix C of the FSEIS. The FSEIS is available through Ecology at the website: <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Burrowing-shrimp-control-Imidacloprid>.

Considering the concern for pollinators and aquatic insects raised by increased, widespread use of neonicotinoid pesticides, the literature regarding imidacloprid aquatic toxicity is rapidly expanding. For example, the Center for Food Safety submitted comments regarding Ecology's Notice of Intent to Deny National Pollutant Discharge Elimination System Permit. These comments included references to twelve additional scientific research papers regarding the environment impacts of imidacloprid which have recently been published. Ecology has continued to collect other relevant publications as well.

2. Regulatory Background on the Sediment Management Standards

The Sediment Management Standards rules (Chapter 173-204 WAC) were developed to reduce and ultimately eliminate adverse effects on biological resources, including those that make up the base of the benthic food web, and reduce significant threats to human health from surface sediment contamination.¹

¹ The SMS rule Parts I-VI and Part VI were adopted under the Water Pollution Control Act, RCW 90.48, as well as the Model Toxics Control Act, RCW 70.105D and other authorities. The U.S. Environmental Protection Agency has approved the SMS Rule Parts I-VI and Part VI as federally-approved water quality standards for the State of Washington. In 1991, the EPA approved the initial version of the Sediment Management Standards in its entirety under the CWA. EPA also approved revisions to the Sediment Management Standards on September 18, 2008 and

Part III of the rule establishes sediment quality standards (SQS) – numeric and narrative criteria for marine and freshwater sediment. The SQS correspond to the long-term goals for sediment quality in Washington State. Chemical concentrations in sediments at, or below, the SQS criteria for that chemical are presumed to have no adverse effects on biological resources. Part IV of the rule includes a process for managing sources of sediment contamination, including conditioning an NPDES permit where the discharge has the potential to impact sediment and requiring use of a SIZ.

The NPDES permit applicant is required to apply for a SIZ authorization when Ecology determines that, as a result of a proposed discharge, the permit applicant will violate or create a substantial potential to violate the Sediment Management Standards of WAC 173-204-320 through WAC 173-204-420. A SIZ is an area where the applicable SQS may be temporarily exceeded due to a permitted or otherwise authorized discharge because it is not possible in the near term to reduce contamination resulting from the discharge sufficiently to meet the SQS. However, an upper limit has been placed on the allowable level of sediment contamination and impact to biological resources within a SIZ.

The discharge within a SIZ may not exceed a maximum chemical concentration or level of biological effects (often referred to as a SIZ max criteria). Ecology shall only authorize a SIZ if the discharge limitations, requirements, and compliance time periods can be conditioned sufficient to meet the Sediment Management Standards in Chapter 173-204 WAC. It is the policy of Ecology – as set out in the Sediment Management Standards rule – to only authorize a sediment impact zone in such a way as to “minimize the number, size, and adverse effects of all zones . . . with the intent to eliminate the existence of all such zones whenever practicable.” WAC 173-204-410(1)(b).

3. Regulatory Compliance for Sediment Impact Zone Authorization

Ecology determined that the WGHOGA’s NPDES permit application to discharge imidacloprid² into Willapa Bay and Grays Harbor would require Ecology to authorize a Sediment Impact Zone for each bay. The WGHOGA submitted two SIZ applications, one each for Willapa Bay and Grays Harbor. The SIZ authorization can only be approved if a demonstration can be made that the proposed discharge can meet the requirements detailed in WAC 173-204 or if the permit can be conditioned sufficient to meet the requirements of the Sediment Management Standards.

Ecology’s review indicates that the proposed discharge cannot meet two requirements for a sediment impact zone, and that a NPDES permit cannot be sufficiently conditioned to meet those requirements. Authorization of a SIZ requires compliance with several requirements as set out in WAC 173-204-415(1)(a)-(j). The two requirements which the proposed discharge cannot meet are: (1) that the discharge shall not have an adverse effect to biological resources within the sediment impact zone above a minor adverse effects level; and (2) that the discharge shall not result in a violation of the SQS outside of the SIZ. *See* WAC 173-204-415(1)(f) and (i).

again on December 18, 2015. *See* Water Quality Standards Regulations: Washington, available at <https://www.epa.gov/wqs-tech/water-quality-standards-regulations-washington> (last visited on March 2, 2018).

² The NPDES application and SIZ applications propose a discharge of imidacloprid to be applied directly to the sediment at a rate of up to 0.5 pounds of active ingredient per acre for all treatment scenarios.

A) Requirement: Adverse effects to biological resources within a sediment impact zone shall not exceed a minor adverse effects level as a result of the discharge. WAC 173-204-415(1)(f).

The impact of the proposed discharge inside the SIZ³ cannot exceed a minor adverse effects level to biological resources.

The Sediment Management Standards establishes that “minor adverse effects” are the maximum chemical contaminant concentration, maximum health risk to humans, maximum biological effects level, maximum other toxic, radioactive, biological, or deleterious substance level, and maximum nonanthropogenically affected sediment quality level allowed within a SIZ. The process to establish those criteria are set out in WAC 173-204-420⁴.

The criteria at issue with this proposed discharge is the maximum biological effects level and the maximum other toxic, radioactive, biological, or deleterious substance level.

i) Maximum Biological Effects Level

The Sediment Management Standards in WAC 173-204-420(3) establishes that the maximum biological effects level allowed within a sediment impact zone is at or below a “minor adverse biological effects level” (in other words, there cannot be more than a minor adverse effect to biological resources within the SIZ).

The minor adverse biological effects level may be set using the acute and chronic effects biological tests of WAC 173-204-315(1) as set out in WAC 173-204-420(3). Ecology reviewed the potential for the proposed discharge to exceed the biological test determination using benthic abundance as detailed in WAC 173-204-420(3)(c)(iii). Using a benthic abundance test, the proposed discharge will be determined to be at the minor adverse biological effect so long as there is no exceedance of the biological test determination. The proposed discharge will have more than a minor adverse biological effect (and thus be in exceedance of the maximum biological effects criteria⁵) if the biological test determination demonstrates the following result: the test sediment (i.e., sediment where the discharge has occurred) has less than 50% of the reference sediment mean abundance of any two of the major taxa (i.e., Class Crustacea, Phylum Mollusca, or Class Polychaeta) and the test sediment abundances must be statistically different from the reference sediment abundances (*t* test, $p \leq 0.05$).

a) Benthic Abundance Test Determination

Ecology’s review of the benthic abundance monitoring data indicates that a benthic abundance test within the SIZ would fail, given the significant decline in abundance of crustacean and polychaete invertebrates compared to the control site during the 2011 field trial in Willapa Bay in Cedar River. (Cedar River site 2011; FSEIS 2018).

³ The Sediment Impact Zones for the proposed discharge would include the site of the pesticide application (i.e., the plot) and a 25 foot buffer surrounding the plot.

⁴ WAC 173-204-420(1)(b) has reserved criteria for Non-Puget Sound marine sediment (“The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter.”) Ecology has determined that for Willapa Bay and Grays Harbor, use of the marine criteria is appropriate.

⁵ An exceedance of the maximum biological effects level can also be shown if two tests exceed the SQS criteria in WAC 173-204-320(3). See WAC 173-204-420(3)(c).

During the 2011 field trial, mean crustacean abundance in the treatment plot showed an 86% decline after 14 days, while there was little change in the control plot. After 28 days, there was more than a 40% increase in crustaceans at the control plot, while there was a 60% decrease in crustaceans on the treatment plot. After 28 days, six out of nine subgroups showed a more than 60% decrease compared to before treatment numbers. For polychaetes, after 14 days there was a 72% decrease on the treatment plot while there was a 44% increase at the control plot. At 28 days, there was a 55% decrease in polychaetes at the control plot compared to a 75% increase in the control plot.

Benthic abundance monitoring was conducted during 2011, 2012, and 2014, as part of experimental imidacloprid applications. Finding adequate matching reference sites was difficult and did not occur in all cases. During all three years, statistical power was low given high variability exhibited at sites. Pre- and post-spray monitoring could not be compared with enough rigor to meet Sediment Management Standard benthic abundance test criteria⁶. Ecology has determined that results of benthic abundance monitoring as proposed cannot be used to show that the proposed discharge would pass a benthic abundance test. (TerraStat, January 2, 2018; FSEIS 2018).

ii) Maximum Other Toxic, Radioactive, Biological or Deleterious Substances Level

The Sediment Management Standards in WAC 173-204-420(5) indicates that a discharge of toxic, radioactive, biological or deleterious substances in or on sediments shall be below levels which cause minor adverse effects in marine biological resources. As defined in WAC 173-204-200(15), "minor adverse effects" means a level of effects that has been determined by rule, that does not result in significant human health risk; and that meets the following criteria: (1) an acute⁷ or chronic⁸ adverse effect to biological resources; or (2) a statistically and biologically significant response that is significantly elevated relative to reference or control; or (3) biological effects as predicated by exceedance of an appropriate chemical or other deleterious substance standard.

a) Sediment Porewater and Surface Water is above the EPA Acute/Chronic Levels

⁶ In order to meet the conditions detailed in WAC 173-204-420(3)(c)(iii), there must be the ability to tell the statistical difference between the major taxa abundance between treatment and reference sediments in order for Ecology to be able to determine whether a SIZ is functioning as authorized. A review of the combined monitoring events showed the submitted monitoring data is inadequate to statistically evaluate the benthic community data (TerraStat, January 2, 2018; FSEIS 2018).

⁷ "Acute" effects may include mortality, larval abnormality, or other endpoints as determined by Ecology. WAC 173-204-200(1).

⁸ "Chronic" effects may include mortality, reduced growth, impaired reproduction, histopathological abnormalities, adverse effects to birds and mammals, or other endpoints as determined by Ecology. WAC 173-204-200(7).

Ecology has compared the 2014 sediment porewater results against the EPA (2017) acute and chronic marine endpoints for surface water. (FSEIS 2018). EPA recommended an acute marine invertebrate endpoint for imidacloprid of 16.5 ppb⁹ and a chronic marine endpoint of 0.16 ppb¹⁰.

In Willapa Bay, all of the on-plot surface water samples immediately after treatment significantly exceed the EPA acute toxicity endpoint of 16.5 ppb, with averages of 796 ppb (Taylor and Coast plots 2014) and 290 ppb (Nisbet plot 2014), and 800 ppb (Cedar River 2014). Maximum concentrations on-plot were measured up to 1,600 ppb.

One day post treatment, concentrations in porewater ranged from 4.7 ppb to 100 ppb, and three of eight samples exceeded the acute marine endpoint of 16.5 ppb, and all samples exceeded the chronic marine endpoint. Although concentrations (range 0.09 to 3.1 ppb) declined over 14 days, 6 of 8 (75%) samples exceeded the EPA chronic marine endpoint of 0.16 ppb. At 28 days post treatment, concentrations (range 0.11 to 1.2 ppb) continued to exceed the EPA chronic marine endpoint in 5 of 8 (63%) samples. No data were collected after 28 days so it is uncertain as to when sediment porewater declined to below the EPA chronic marine endpoint.

b) Effect to Marine Biological Resources

Ecology's review of data leads to the conclusion that the proposed discharge of imidacloprid will cause more than a minor adverse effect to marine biological resources within the sediment impact zone. The toxicity of imidacloprid is not limited to burrowing shrimp, and other biota will be present and impacted by the proposed discharge.

Burrowing shrimp live with other species, as described by Chapman et al. (2012) when detailing that "[f]unctional and absolute losses of *Upogebia* species reduce their ecosystem services and dependent symbionts" For example, soft shell clams can be expected to be co-located in an area that has burrowing shrimp. Griffen et al. (2004) found up to eight soft shell clams (*Cryptomya californica*) per burrowing shrimp burrow in Yaquina Bay, Oregon – this is comparable to what Ecology expects to find in Willapa Bay and Grays Harbor. Ecology expects that if 60-80% of burrowing shrimp are killed during spraying due to burrow collapse, then a significant portion of commensal species such as the soft shell clams would also be killed by either the impact of the imidacloprid or burrow collapse.

⁹ The U.S. Environmental Protection Agency 2017 Risk Assessment (EPA 2017) chose "*the lowest acceptable (quantitative) acute toxicity value of 33 µg a.i./L ...for estimating risks to saltwater aquatic invertebrates,*" based on toxicity to mysid shrimp. They also identified "qualitative" studies with toxicity values as low as 10 µg a.i./L. EPA notes that this value is "42x less sensitive than that for freshwater invertebrates" due in part to fewer species studied. EPA then applied a Level of Concern (LOC) safety factor of 0.5 to this value, resulting in an acute toxicity standard for marine invertebrates of 16.5 µg a.i./L. (i.e., 33 µg a.i./L x 0.5 LOC = 16.5 µg a.i./L). Inclusion of a factor of safety is a standard practice in risk assessments.

¹⁰ For chronic toxicity of saltwater invertebrates, EPA (2017) again used data on mysid shrimp to develop a 28-day No Observable Adverse Effects Concentration (NOAEC) value of 0.163 µg a.i./L and a Lowest Observable Adverse Effects Concentration (LOAEC) of 0.326 µg a.i./L based on "*significant reductions in length and weight.*" EPA (2017) includes only two chronic studies of imidacloprid effects on saltwater invertebrates. If a larger database had been available, it seems likely that lower values for chronic toxicity would have been noted for one or more invertebrate types, especially given the consistent pattern of wide variation of imidacloprid toxicity among species. For comparison, the freshwater chronic toxicity endpoint was 0.01 µg a.i./L.

Soft shell clam mortality from imidacloprid spraying was documented in the 2012 monitoring report. During post spray monitoring, off-plot impacts were documented using dead *Cryptomya* shells to estimate the areal “extent of off-target effects...by the presence or absence of these surface shells following imidacloprid treatment,” (Hart Crowser 2014).

Studies also indicate that the proposed discharge of imidacloprid will cause death or paralysis to more than 50% of Dungeness crab (a species found in Willapa Bay and Grays Harbor) within a SIZ. Crab studies by Patten and Norelius (2017) and Osterberg et al. (2012), reviewed in the FSEIS 2018, confirm that Dungeness crab juveniles and planktonic forms will be affected on- and off-plot and outside of the SIZ by the proposed discharge of imidacloprid on shellfish beds. In 2014, commercial scale application of imidacloprid to a 90 acre plot in central Willapa Bay showed high Dungeness crab mortality. After imidacloprid application 137 affected crabs and 4 live crabs were counted. (FSEIS 2018). The rate of affected juvenile Dungeness crabs was 97%. It was shown in the study that paralysis was effectively a measure of mortality since those crabs were preyed upon resulting in death.

The 2014 monitoring data confirms EPA’s (2013) conclusions that “direct effects on the individual organisms, including crab species, can also be expected” from spraying imidacloprid in the environment. (FSEIS Section 3.3.5 Animals, Affected Environment, pg. 3-34)

B) Requirement: The permitted discharge shall not result in a violation of the applicable SQS outside the area limits of the established Sediment Impact Zone. WAC 173-204-415(1)(i).

The impact of the proposed discharge outside the SIZ cannot exceed the SQS, which corresponds to a sediment quality that will result in no adverse effects, including no acute or chronic adverse effects on biological resources and no significant health risk to humans. WAC 173-204-320(1)(a). Ecology’s review indicates that the proposed discharge will result in concentrations of imidacloprid, at a level which will result in acute or chronic impact to marine invertebrates, being carried by surface water up to ¼ mile outside the SIZ.

In several trials (2012) where imidacloprid was applied to sediment in Willapa Bay, high surface water concentrations of imidacloprid were measured up to ¼ mile off-plot in a location which would be considered outside of a SIZ. The concentration of the off-plot imidacloprid was at levels 4 to 250 times that of the EPA acute (mortality) endpoint. This indicates that the proposed discharge of imidacloprid will result in concentrations in surface water (and subsequently in the sediments) that will exceed the EPA acute and chronic marine endpoint in areas outside the SIZ. These levels of imidacloprid will result in mortality, and/or reduced survival, reproduction or growth to invertebrates that come into contact with imidacloprid concentrations in these waters.

During the imidacloprid application trials, imidacloprid was frequently detected in surface water samples in the leading edge of the incoming tide in off-plot areas and would be further concentrated in drainage channels and adjacent areas covered by the rising tide.

These measured surface water concentrations would result in acute or chronic adverse effects on marine benthic invertebrates. The EPA Risk Assessment¹¹ (2017) recommended for marine aquatic invertebrates an acute toxicity endpoint of 16.5 ppb. The EPA marine aquatic invertebrate chronic toxicity endpoint is 0.16 ppb¹². Of the 60 total surface water samples collected off-plot (i.e., outside the proposed SIZ boundary) in Willapa Bay (2012), imidacloprid was detected in 50 samples (83%) with the concentration ranging from 0.043 ppb to 4,200 ppb. The proposed SIZ would cover the treatment plot and a 25 foot buffer zone. These trials documented detectable concentrations of imidacloprid up to 1,575 feet from the border of the sprayed plots. The same trial in 2012 showed off-plot concentrations reached as high as 1300 ppb and included nine detections above 100 ppb, with concentrations as high as 200 ppb at a distance of 480 meters or 1,575 feet from the treated area. Two others trials showed concentrations reached 130 ppb at a distance of 60 meters (or 196 feet) and 260 ppb at 100 meters (or 328 feet) from the treated plot.

Results from the 2012 imidacloprid application trials monitoring illustrate that nearly half (29/60 samples) of off-plot surface water samples showed exceedances of the EPA Risk Assessment acute toxicity endpoint. More than half of these (16) exceeded the EPA acute criteria by more than 10 times. While it is expected that dilution would be the dominant fate mechanism, a number of plots, such as the 2012 monitoring trials indicated, showed a broad spatial extent above the EPA acute marine endpoint. (FSEIS Section 3.3.3 Surface Water, Affected Environment, pg. 3-12 to 3-16).

The 2012 imidacloprid application trials monitoring results also indicate that of the 60 total samples, 47 showed exceedances of the EPA Risk Assessment chronic toxicity endpoint. Using EPA Risk Assessment (2017) acute toxicity endpoint of 16.5 ppb, Ecology modeled potential impacts of imidacloprid on marine invertebrates as it is carried off-plot by rising tidal waters¹³. Ecology calculated the off-plot area that could be exposed to acutely toxic levels of imidacloprid as it was carried by the rising tide.

¹¹ The EPA Risk Assessment (2017) evaluated available toxicity data for marine species and recommended acute and chronic marine biologic endpoints. Ecology views the EPA's recommended endpoints as the current best available science.

¹² Exposure to chronic or sub lethal levels of imidacloprid may be compounded by repeated exposures because imidacloprid has irreversible binding to neurological receptors so that each subsequent exposure reduces the organism's neurological capacity. Rondeau et al. (2014) showed that terrestrial insects exposed to imidacloprid have delayed mortality which may not be detected in studies with less than 10 days duration. It is not known what duration of exposure is needed to create an additive acute effect and whether a short "pulse" of high concentrations is less likely to create an effect than a sustained exposure of hours.

¹³ While Ecology's modeling indicates that imidacloprid will travel off-plot, the travel has been documented during the 2012 imidacloprid application trials. Imidacloprid was detected at the Leadbetter control plot (0.97 ppb) on the day imidacloprid was applied on treatment plots in the 2012 monitoring trials. While it is problematic that a control plot would test positive for imidacloprid when monitoring protocol dictates no measurable quantity should be present, it is important to note that the control site is over 600 meters (approximately 0.4 miles) away from the closest treated trial plot. This is a further indication of the areal extent imidacloprid can be transported off a treated plot.

Based upon modeling of the 2012 surface water monitoring results, an area approximately double the size of the modeled treated plot would experience imidacloprid levels at least five times above the acute toxicity criterion of 16.5 ppb (FSEIS 2018). In addition, the area exposed to levels exceeding the EPA acute marine biological endpoint for imidacloprid off plot is greater than five times the size of the spray plot location. For example, for every one acre treated approximately five acres will be affected above 16.5 ppb.

Monitoring trials conducted in 2012¹⁴ confirm that imidacloprid dissolves in surface water and persists in the water column during the first tidal cycle at a minimum off-plot through surface water conveyance. The highest concentrations of imidacloprid would occur during the first rising tide after application, and would dilute and flow off-plot during consecutive tidal cycles (Hart Crowser 2016). Modelling provides more clarity of the areal extent and magnitude of toxicity that surface water levels of imidacloprid pose off-plot to biological resources. *See* FSEIS Surface Water Chapter, pages 3-15 and 3-16, for a discussion of Ecology surface water modelling conducted using WGHOGA supplied data and comparing to the EPA Risk Assessment endpoints. WGHOGA comments (Paradox, May 12, 2018) acknowledge that discharge of imidacloprid would result in a percentage of sediment porewater samples outside the SIZ exceeding the applicable SQS. The SMS requires that a permitting discharge cannot result in any exceedance of the SQS outside of the SIZ. WAC 173-204-415(1)(i):

4. Sediment Impact Zone Conditions and NPDES Permit Terms and/or Conditions Evaluated to Meet Compliance Standards

Ecology has determined that the proposed discharge would exceed SQS standards and requires a SIZ. As detailed above, the proposed discharge would not meet some of the general requirements which must be complied with for authorization of a SIZ. The two requirements which the proposed discharge cannot meet are: (1) that the discharge shall not have an adverse effect to biological resources within the SIZ above a minor adverse effects level; and (2) that the discharge shall not result in a violation of the SQS outside of the SIZ. *See* WAC 173-204-415(1)(f) and (i). Ecology then reviewed whether the NPDES permit's effluent limitations, requirements, or compliance time period could be conditioned sufficient to meet the standards for authorization of a SIZ and concluded that it was not possible to condition the permit in a manner sufficient to address the issues without compromising the purpose for the discharge. The primary options reviewed by Ecology for conditioning were to:

- Decrease size of treatment plot and subsequently the SIZ;
- Decrease amount of imidacloprid applied to a treatment plot; or
- Limiting application of imidacloprid to low total organic carbon areas.

Ecology found that each potential condition (either by itself or bundled with other conditions) either (1) did not address the issues enough to bring the proposed discharge into compliance; or (2) compromised the purpose for the discharge.

¹⁴ Off-plot impacts were also seen in 2014 but spatial extent could not be determined based on lack of monitoring.

A) Addressing the issue that the proposed discharge will exceed a minor adverse effects level

Reductions in treatment plot size will not address the issue that application of imidacloprid has a more than minor adverse impact. The area being addressed may be smaller, but the impact of imidacloprid within that space will remain just as lethal.

The rate of 0.5 pounds of active ingredient per acre of imidacloprid was used to treat shellfish beds throughout the 2012 and 2014 imidacloprid application trials. Any reductions in the amount of imidacloprid applied would have a corresponding negative affect on the efficiency of that pesticide in completing its purpose (i.e., to kill burrowing shrimp).

Another potential condition is to limit the application of imidacloprid to only areas of low total organic carbon. However, this would not eliminate all of the adverse biological effects, since negative adverse biological effects have been documented in a range of sediment containing low total organic carbon in the central bay, and high total organic carbon in the north of Willapa Bay. Further, Ecology does not have any data indicating the total organic carbon throughout Willapa Bay and Grays Harbor, and would be unable to make such a condition without this information.

B) Addressing the issue that the proposed discharge will result in an exceedance of the applicable SQS outside the area limits of the Sediment Impact Zone

Imidacloprid is highly soluble with the surface water of the incoming tide and the proposed discharge will result in acute and chronic impacts outside the SIZ. It is not physically possible to prevent imidacloprid from entering the water column or, once it dissolves in the water column, being transported throughout the estuary at acute and chronic toxicity levels.

Decreasing the size of a treatment plot would result in a corresponding decrease in the size of the sediment impact zone. The area boundaries of the SIZ must include the minimal practicable surface area. WAC 173-204-415(1)(e). Therefore, this would not address the issue of a toxic concentration of imidacloprid being transported outside of the SIZ through the water column.

Decreasing the amount of imidacloprid applied may result in transportation at a level below the chronic endpoint because there will be less of the imidacloprid to dissolve into water column. However, to decrease the amount of imidacloprid applied per acre will decrease the effectiveness of the pesticide at its intended purpose of killing burrowing shrimp. Additionally, Ecology has received no data to assist it in determining the maximum amount of imidacloprid that could be applied before it results in the water column moving an amount outside of the SIZ that will result in chronic adverse effects on biological resources.

Another potential condition is to limit the application of imidacloprid to only areas of low total organic carbon. However, no data indicates that this approach would eliminate the movement of imidacloprid outside of the SIZ.

C) Additional Conditions Reviewed

Ecology looked at the addition of harrowing as a condition of the permit. This is a promising non-chemical method of controlling burrowing shrimp, however harrowing can be done by the WGHOGA without gaining approval from Ecology. There is no indication that harrowing could address the issues noted above.

Another suggested condition was additional monitoring or different types of monitoring of the proposed discharge. Monitoring would not address the issues noted above but will only give greater documentation of the impacts of use of imidacloprid in a marine environment.

5. Conclusions

It is my determination that the proposed discharge is required to obtain a SIZ. The requirements necessary to authorize a SIZ cannot be met by the proposed discharge¹⁵. It is not possible to condition a permit to meet the requirements of the SIZ. I recommend that Ecology deny the SIZ authorization applications.

Ecology's review indicates that the proposed discharge cannot meet two requirements for a SIZ, and that a NPDES permit cannot be sufficiently conditioned to meet those requirements. Authorization of a SIZ requires compliance with several requirements as set out in WAC 173-204-415(1)(a)-(j). The two requirements which the proposed discharge cannot meet are: (1) that the discharge shall not have an adverse effect to biological resources within the SIZ above a minor adverse effects level; and (2) that the discharge shall not result in a violation of the SQS outside of the SIZ. *See* WAC 173-204-415(1)(f) and (i).

¹⁵ In each year of the imidacloprid experimental trials conducted by WGHOGA, at least one significant negative environmental effect was measured which did not meet SMS SIZ requirements; e.g. in 2011, the Cedar River site experienced significant benthic invertebrate mortality; in 2012, significant surface water quality contamination was measured on and off site exceeding EPA criteria; and, in 2014 significant Dungeness Crab mortality was discovered on and adjacent to a 90-acre treatment plot.

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MEMORANDUM
WATER QUALITY PROGRAM

September 20, 2018

To: Rich Doenges, Section Manager

From: Chris Montague-Breakwell, Watershed Resources Unit Supervisor *CM-B*

Subject: Recommendation to deny WGHOGA NPDES permit application as impacts of the discharge prohibit Sediment Impact Zone authorization and cannot be addressed via permit conditions.

It is my recommendation that the Department of Ecology (Ecology) deny the Willapa-Grays Harbor Oyster Growers Association (WGHOGA) application for an National Pollutant Discharge Elimination System (NPDES) permit because the proposed discharge will not be consistent with the requirements of the Sediment Management Standards and the NPDES permit cannot be conditioned such to meet the standards of this regulation. As required by WAC 173-220-110, Ecology issued an April 9, 2018 tentative determination to deny the permit. This memo finalizes the staff determination of the WGHOGA application for an NDPES permit, recommending the application be denied.

The WGHOGA applied to Ecology for an individual NPDES permit and sediment impact zone authorizations for Willapa Bay and Grays Harbor to use the pesticide imidacloprid to control burrowing shrimp on commercial clam and oyster beds. Ecology reviewed the applications and completed a Supplemental Environmental Impact Statement (SEIS) pursuant to the Washington State Environmental Policy Act (SEPA). The review of information by Ecology, as detailed in the SEPA documents and attached memorandum from Ecology's Toxics Cleanup Program (TCP), has led to the determination that the proposed discharge would create a sediment impact with an adverse effect on biological organisms above a minor adverse biological effects level within the sediment impact zone. Additionally, the proposed discharge would result in adverse effects outside of the sediment impact zone due to the movement of the pesticide in surface water. The impact of the proposed discharge does not meet the regulatory requirements set out in the Sediment Management Standards necessary for an authorization of the sediment impact zones in Willapa Bay and Grays Harbor. Ecology must issue permits that comply with surface water quality standards of the state of Washington, including Washington Administrative Code (WAC) 173-201A, Water quality standards for surface waters of the state of Washington, WAC 173-204, Sediment management standards, and applicable federal rules. The WGHOGA proposed discharge cannot meet water quality standards and therefore the NPDES and sediment impact zone applications should be denied and no permit issued.

SEPA Environmental Review

In 2014, the WGHOGA applied to Ecology for an NPDES Individual Permit to authorize use of the neonicotinoid pesticide imidacloprid combined with Integrated Pest Management practices to suppress burrowing shrimp populations on up to 1,500 acres per year of commercial shellfish beds in Willapa Bay and up to 500 acres per year of commercial shellfish beds in Grays Harbor (up to 2,000 acres per year, total). Ecology reviewed the potential impacts of the proposed action in a Draft and Final Environmental Impact Statement (EIS) in 2014 and 2015, respectively. The *Final EIS for Proposed Use of Imidacloprid for Burrowing Shrimp Control on Commercial Oyster and Clam Beds in Willapa Bay and Grays Harbor, Washington* (Ecology 2015; hereafter referred to as the 2015 FEIS) was prepared based on scientific studies and information available at that time. Ecology issued a 5-year NPDES individual Permit (WA0039781) on April 16, 2015, with an effective date of May 16, 2015. On May 3, 2015, WGHOGA asked Ecology to withdraw the permit in response to strong public concerns. Ecology cancelled the permit on May 4, 2015. The 2015 permit was cancelled prior to the close of the appeal period and before the permit was active.

On January 8, 2016, WGHOGA, on behalf of a group of about a dozen growers, applied to Ecology for a new permit for the use of imidacloprid to control burrowing shrimp on commercial clam and oyster beds in Willapa Bay and Grays Harbor. The 2016 proposal requested authorization to treat a reduced amount of acreage (up to 500 acres per year, total, in the two estuaries), and the application detailed the use of boats and/or ground equipment to apply liquid and granular pesticide rather than aerial applications from helicopters. The 2016 permit application for the use of imidacloprid, including the revised scope, was evaluated in a supplemental EIS in the context of additional research performed, and additional literature published on the environmental effects of imidacloprid since the 2015 FEIS was issued.

The proposed pesticide application and impacts are described in the 2018 Final Supplemental Environmental Impact Statement (FSEIS). The Literature Review (section 1.6.1) of the FSEIS includes a discussion of the new science that was evaluated during the supplemental EIS process. The review included more than 100 research papers and the federal Environmental Protection Agency (EPA) Preliminary Aquatic Risk Assessment to Support the Registration Review of Imidacloprid. The EPA Risk Assessment proposed acute and chronic chemical concentration risk endpoints for saltwater invertebrates. The FSEIS is available through Ecology at the website: <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Burrowing-shrimp-control-Imidacloprid>.

Regulatory Information

a) National Pollutant Discharge Elimination System Permit

The Federal Clean Water Act (1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act (CWA) is the NPDES, administered by the federal Environmental Protection Agency (EPA). The EPA delegated authority to the state of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The Legislature defined Ecology's authority and obligations for the

wastewater discharge NPDES permit program in Chapter 90.48 Revised Code of Washington (RCW 90.48). Ecology may also issue State Waste Discharge permits under its state Water Pollution Control Act (RCW 90.48) authority for state waters, which includes both surface waters and groundwater. Where appropriate, Ecology issues a combined NPDES/State Waste Discharge permit under both authorities.

The Sediment Management Standards, Parts I-IV, in WAC 173-204, are federally approved water quality standards for the State of Washington.¹

The discharge of chemicals to waters of the state requires coverage under an NPDES permit. Ecology has issued general and individual NPDES permits for discharges of aquatic pesticides and other chemicals since 2002.

An NPDES permit must include conditions that ensure the discharge will meet established water quality standards. WAC 173-201A-510. The following regulations apply to Individual NPDES permits:

- Procedures Ecology follows for issuing NPDES permits [chapter 173-220 Washington Administrative Code (WAC)].
- Water quality criteria for surface waters (chapter 173-201A WAC).
- Water quality criteria for ground waters (chapter 173-200 WAC).
- Whole effluent toxicity testing and limits (chapter 173-205 WAC).
- Sediment management standards (chapter 173-204 WAC).
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC).

As described in RCW 90.48.180, Ecology cannot issue a permit if the agency finds the discharge “as proposed in the application will pollute the waters of the state in violation of the public policy declared in RCW 90.48.010.” It is the policy of the state of Washington, as set out in RCW 90.48.010, to maintain the highest possible standards to insure the purity of waters of the state consistent with protections such as “protection of wild life, birds, game, fish and other aquatic life . . .” Also, as stated in RCW 90.48.520, “[i]n no event shall the discharge of toxicants be allowed that would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria.” Therefore, if a federal wastewater discharge permit cannot be conditioned to have the discharge meet water quality standards, Ecology cannot issue the permit.

b) Sediment Impact Zones Authorization Determination

If the applicable sediment quality standards of WAC 173-204-320 through 173-204-420 (Marine Sediment Quality Standards) will be exceeded due to a proposed discharge, Ecology is required to issue a sediment impact zone consistent with the Sediment Management Standards. A

¹ In 1991, the EPA approved the initial version of the Sediment Management Standards in its entirety under the CWA. EPA also approved revisions to the Sediment Management Standards on September 18, 2008 and again on December 18, 2015. See Letter from Daniel D. Opalski, Director, EPA Office of Water and Watersheds to Maia Bellon, Director Department of Ecology (December 18, 2015) (available at <https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-12182015.pdf>).

sediment impact zone is an area where the permitted discharge can have a temporary impact that exceeds the applicable sediment quality standards, but only up to the minor adverse effects criteria. There are several other requirements that must be met for Ecology to be authorized to establish a sediment impact zone. Requirements for a sediment impact zone (including establishment, maintenance, and closure) must be set out either through a discharge permit or other formal administrative action. Ecology shall only authorize a sediment impact zone if the permit discharge effluent limitations, requirements, and compliance time periods can be conditioned sufficiently to meet the standards of WAC 173-204-400 through 173-204-420. Because Parts III-IV of the Sediment Management Standards are federally recognized water quality standards, any discharge permit issued by Ecology must meet those standards and criteria set out in the Sediment Management Standards.

Recommendation

Ecology's Water Quality Program is the department expert for issuance of NPDES permits, and worked in concert with the Toxic Cleanup Program for guidance related to Sediment Management Standards and sediment impact zone authorization. The memorandum authored by Ecology's Toxics Cleanup Program (dated September 13, 2018) addressed to Southwest Regional Office Water Quality Section Manager, Rich Doenges, explains how a sediment impact zone cannot be authorized for Willapa Bay or Grays Harbor as the proposed discharge will exceed the applicable sediment quality standards, and the requirements for authorization of a sediment impact zone cannot be met. Ecology has reviewed the requirements for a sediment impact zone authorization and determined that it is not possible to condition the individual permit effluent limitations, requirements, or compliance time periods to meet the standards of the Sediment Management Standards. Because Ecology cannot allow the discharge of toxicants that would violate any water quality standard, including sediment criteria and dilution zone criteria, the NPDES permit should not be issued.

For the foregoing reasons, it is my recommendation that the WGHOGA permit application be denied.