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Review of the Groundwater Pesticide Detections in the 2019 and 2020 Washington Dept. of Health's Public Water Supply System Dataset

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Introduction

The Washington State Department of Agriculture (WSDA) is the agency responsible for developing pesticide use regulations, and managing pesticide use and distribution in Washington State. WSDA has the authority to regulate pesticides and to prevent contamination of surface and groundwater from pesticides statutorily through Washington's Pesticide Control and Pesticide Application Acts (RCW 15.58). Implementation of surface water and groundwater quality protection is partially achieved with active involvement during the federal pesticide registration process and input during state supplemental registrations to ensure that adequate label restrictions protecting surface and ground water quality are developed. Monitoring surface water and groundwater throughout the state is essential to evaluate water quality impacts of pesticide usage and identify concerns that may warrant further investigation.

WSDA has limited monitoring and data resources available to adequately evaluate pesticide occurrences in groundwater or explore (via monitoring) areas identified as vulnerable to pesticides of concern. Public water supply system (PWSS) sampling as required by the Washington State Department of Health (DOH) is the only consistent, ongoing, statewide groundwater monitoring effort at this time.

WSDA reviews the PWSS data annually to compare detected legacy and current-use pesticide concentrations to Environmental Protection Agency (EPA) established drinking water criteria. Drinking water criteria are concentrations of drinking water contaminants that could pose adverse risk to human health. These values are primarily Maximum Contaminant Levels (MCL) or Health Advisory Levels (HAL). This report identifies the pesticide and pesticide-related contaminants detected in the 2019 and 2020 DOH PWSS dataset and compares them to the most current EPA drinking water criteria.

Methods

WSDA staff reviewed samples from the PWSS dataset between Jan. 1, 2019 and Dec. 31, 2020. There were 87 pesticide or pesticide-related chemicals that were tested for. Not every chemical was tested at every well or tested each year. Of the 9,209 sampling locations in the dataset, 2,049 wells were tested for pesticides with a frequency of, on average, once or twice over the two-year sampling period. Of those wells, approximately 32% were tested for over 20 unique pesticides. When a pesticide or pesticide-related chemical detection was identified, the concentration of the chemical was compared to EPA's 2018 Edition of the Drinking Water Standards and Health Advisories Tables (EPA 2018).

The Washington State Pesticide Management Strategy, created by WSDA, outlines the process to protect groundwater from pesticides and the various actions that could be taken when a detected pesticide has a concentration within the WSDA response levels described in Table 1 (Cook and Cowles 2009). Initial actions, like those associated with Level 1 and 2 responses, include evaluating the extent of the pesticide occurrence, working with registrants and producers to determine the source, and identifying voluntary best management practices in partnership with local conservations districts. For pesticides with confirmed concentrations between 75% and 100% of an EPA drinking water criteria (Level 4), actions WSDA may consider include use prohibition areas or other enforcement measures.

Table 1 — ***Response levels in the WSDA Pesticide Management Strategy***

Level 1: Confirmed detected concentration between 10% and 20% of an EPA drinking water criteria
Level 2: Confirmed detected concentration between 20% and 50% of an EPA drinking water criteria
Level 3: Confirmed detected concentration between 50% and 75% of an EPA drinking water criteria
Level 4: Confirmed detected concentration between 75% and 100% of an EPA drinking water criteria

2019-2020 Data Summary

WSDA reviewed the 2019 and 2020 PWSS groundwater data to determine if currently registered or historically used pesticides are leaching into the underlying Washington aquifers. Throughout the state, 13 pesticides were detected in PWSS samples (Table 2). The majority of the pesticides detected were well below EPA drinking water criteria. Three pesticides (DCPA, dinoseb, and EDB) were detected at concentrations exceeding drinking water criteria at least once. Additionally, four pesticides (1,2-dichloropropane, DCPA, dinoseb, and EDB) were detected within WSDA response Levels 1 through 4 and warranted further review.

The data reviewed here provides an example of the pesticides that are detected in municipal wells DOH requires to conduct sampling. This information may assist in determining how the state should prioritize resources and develop regional studies to learn more about the sources of the contamination and identify potential groundwater protection measures.

*Table 2 — **List of all pesticides detected between 2019 and 2020 with their associated maximum concentrations and EPA drinking water criteria***

Analyte	Use*	Number of detections	Maximum concentration detected (µg/L)	Drinking water criteria (µg/L)	Type of criteria†
1,2-Dichloropropane	SF-L	11	0.88	5	MCL
2,4-D	H	2	0.55	70	MCL
Atrazine	H	4	0.181	3	MCL
Bromacil	H	4	2.29	70	HAL
Dalapon	H-L	8	3.1	200	MCL
DCPA acid metabolites	H	63	221	70	HAL
Dicamba	H	2	4.3	4,000	HAL
Di-n-butyl phthalate	PMI-L	5	3.22	640	HAL
Dinoseb	H-L	7	43.8	7	MCL
EDB (Ethylene dibromide)	SF-L	1	0.099	0.05	MCL
Hexachlorocyclo-pentadiene	PMI-L	4	0.33	50	MCL
Metribuzin	H	1	0.29	70	HAL
Picloram	H	21	2.09	500	MCL

* *H: Herbicide; SF: Soil fumigant; PMI: Pesticide manufacturing ingredient; L: Legacy pesticide*

† *Type of criteria includes EPA established Maximum Contaminant Level (MCL) and EPA established Health Advisory Level (HAL)*

For additional information on pesticides in groundwater, including brand name examples, current labeled uses, and leaching potential, please refer to the WSDA factsheet "Understanding Pesticide Leaching Potential and Protecting Groundwater" (WSDA 2020).

Detections within WSDA Response Levels

Table 3 summarizes the pesticides with detected concentrations that fell within a WSDA response level identified in the Washington State Pesticide Management Strategy (Cook and Cowles 2009).

*Table 3 — **DOH data 2019 and 2020 pesticide detection count within each WSDA response level***

Analyte	Level 1	Level 2	Level 3	Level 4
1,2-dichloropropane	10	0	0	0
DCPA acid metabolites	4	6	5	6
Dinoseb	1	4	0	2
EDB	0	0	0	1

EDB, dinoseb, 1,2-dichloropropane, and DCPA were the four analytes detected with concentrations above 10% of an EPA drinking water criteria in the DOH 2019 and 2020 sampling periods. EDB was banned for use by the EPA in 1983 and dinoseb was banned for use by the EPA in 1986 (Powell 1997, EPA 1986). With no current legal uses, WSDA has no follow-up groundwater sampling investigations planned in response to the detections of these banned pesticides. The public well with an EDB detection is non-active and listed for emergency use only. All detections of dinoseb were found at the same public well, that is listed active in the DOH database. WSDA will consult with DOH to learn of the current uses of this well, and assess the history and cropping patterns in the region. 1,2-dichloropropane was historically registered as a soil fumigant with the last registration ending in 1989; currently it is allowed as an impurity only (DHHS 2021, EPA 2020). Although no longer used as a soil fumigant, there is evidence that 1,2-dichloropropane is persistent in groundwater (EPA 2019). In 2021, the U.S. Department of Health and Human Services recommended that groundwater monitoring data for 1,2-dichloropropane are needed to fully evaluate the persistence of this chemical (DHHS 2021). WSDA will work with DOH to continue tracking detections of 1,2-dichloropropane in PWSS and evaluate the need for follow-up investigations to further understand the extent and persistence of this pesticide. DCPA, also known as dacthal, is currently registered for use in Washington for several agricultural commodities. Out of the 21 DCPA detections that fell within the WSDA response levels, 18 were from wells in Grant and Walla Walla counties. WSDA is actively assessing DCPA detections in Grant County in partnership with DOH and Grant County Conservation District. Staff have conducted past studies in Walla Walla County to further investigate elevated detections of DCPA as well. The evaluation is ongoing as DCPA continues to be detected at elevated concentrations in Washington State.

WSDA will continue working with DOH to establish regional water quality monitoring projects to respond to these detections, including the active work in Grant County. Response may include follow-up groundwater quality monitoring, education and outreach events, and engaging with the local agricultural sector to learn more about potential sources of contamination and identify mitigation measures.

Recommendations

WSDA will continue to review DOH PWSS data to better understand what pesticides are reaching the groundwater in Washington and compare these values to established drinking water criteria. Although this dataset is the best available resource for monitoring pesticide detections in drinking water in Washington, the testing list is limited. The test panels at DOH (current under WAC 246-390) are not updated annually to incorporate newly registered pesticides. The analyte list used by WSDA includes pesticides that are not on the DOH test panels, some of which have been detected in WSDA-led groundwater quality projects. The DOH PWSS data could be greatly enhanced by regional groundwater studies in Washington that include a more robust pesticide analyte list.

A more comprehensive background dataset on pesticide occurrences and concentrations could assist the state in getting ahead of potential contamination concerns associated with current-use pesticides. A more complete analysis of pesticides in groundwater could guide WSDA's work in local pesticide stewardship projects. These cooperative efforts between WSDA, local conservation district partners, DOH, and the agricultural community engage local communities to identify and implement groundwater protection practices targeted at specific local land-use practices. These types of projects have the potential to address groundwater contamination concerns through prevention measures, avoiding costly treatment alternatives.

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