



Regional and Local Pesticide and Ground Water Monitoring Results, 2017 Executive Summary

ISDA Technical Summary #55

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Introduction and Background

The Idaho State Department of Agriculture (ISDA) Ground Water Program implements the Idaho Pesticide Management Plan (PMP) (2001), and the Rules Governing Pesticide Management Plans for Ground Water Protection (IDAPA 02.03.01) (Idaho PMP Rule). The Idaho PMP Rule requires the ISDA to conduct monitoring and response actions associated with pesticide detections in Idaho ground water and to help prevent further contamination that may result in exceeding drinking water standards. In 2017 ISDA staff collected samples from 257 wells from major aquifers throughout Idaho. These wells are primarily used for domestic drinking water. ISDA submitted ground water samples to be tested for more than 100 pesticides or their breakdown components at the Idaho Food Quality Assurance Laboratory (IFQAL), Twin Falls, ID. The testing methods at IFQAL allow pesticides to be detected at low levels; these pesticides detected in drinking water do not indicate a health risk until reference points are exceeded. A sub-set of select wells was also tested for 82 Volatile Organic Compounds (VOC). No well monitored in 2017 exceeded a drinking water standard or reference level.

Detections of pesticides are compared against reference points to determine response and recommendations. In order to be protective of the water resources, there are response levels in the Idaho PMP Rule that occur at various percentages of a reference point, such as 20% of a drinking water standard. Most of the response requirements at the lower levels are to monitor and educate, with increasing needs to identify potential pesticide sources. The first and second response levels are at pesticide concentrations where there are expectations of the water being acceptable for drinking water without health risks. However, at the third and fourth response levels there is a greater concern that the water is no longer drinkable and the pesticide concentrations could lead to human health issues.

The Idaho PMP Rule divides pesticide detections into the following response levels:

Level 1: Detection above the laboratory detection limit to less than 20% of the reference point.

Level 2: Detection at 20% to less than 50% of the reference point.

Level 3: Detection at 50% to less than 100% of the reference point.

Level 4: Detection at or greater than 100% of the reference point.

There were measurable detections of pesticides in 123 of the 257 monitored wells. On average, at wells with pesticides detected, the concentrations were at 3% of the reference point, falling into the Level 1 response category. Over 98% of the wells tested fall into or below the Level 1 response category of the Idaho PMP Rule, which are at levels protective of human health. Five wells, and six pesticides, were found with pesticide concentrations above the Level 1 response category. One well had detectable pesticide concentrations that were greater than half the recommended levels (Level 3 category) for the measured Desethyl atrazine. There was also a Level 2 category detection of Atrazine and breakdown products near Ashton, ID. Two wells were greater than half the reference point for herbicide Triallate; both of these wells have known historical and site-specific problems. One well was south of Lewiston, ID, and the other was near Ashton, ID. Both of these wells fall into the Level 3 response category. The

well near Lewiston, ID also had a Level 2 response category for Pentachlorophenol. Wells near these locations do not have comparable pesticide concentrations, if any were detected, indicating that these are isolated problems. In the Dacthal restriction area, monitoring results found one well in which Dacthal was identified above 20% of the reference point, thereby falling into the Level 2 response category. Several of these Level 2 or greater wells are discussed in more detail below and in Annual Technical Summaries. No well monitored in 2017 exceeded a drinking water standard or reference level.

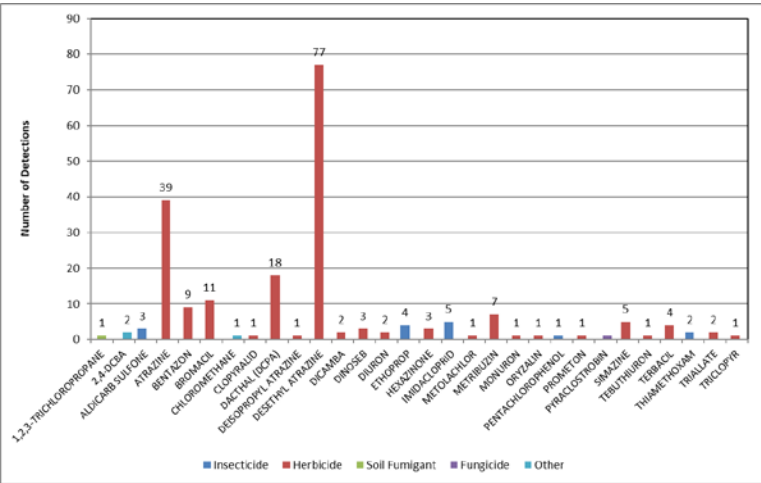
In eastern Idaho, the project developed and initiated in 2015 was incorporated into a long-term project to monitor for methyl bromide and its breakdown components and the potential ground water impacts at wells near locations within the Pale Cyst Nematode Eradication Program Area. There were no measured pesticides or their breakdown products associated with the nematode eradication program in these wells.

The snowpack from the winter of 2016/2017 was significantly greater than average; it is suspected that this snowpack and subsequent ground water recharge may have affected some well water quality. Long-term data are required to confirm this initial observation.

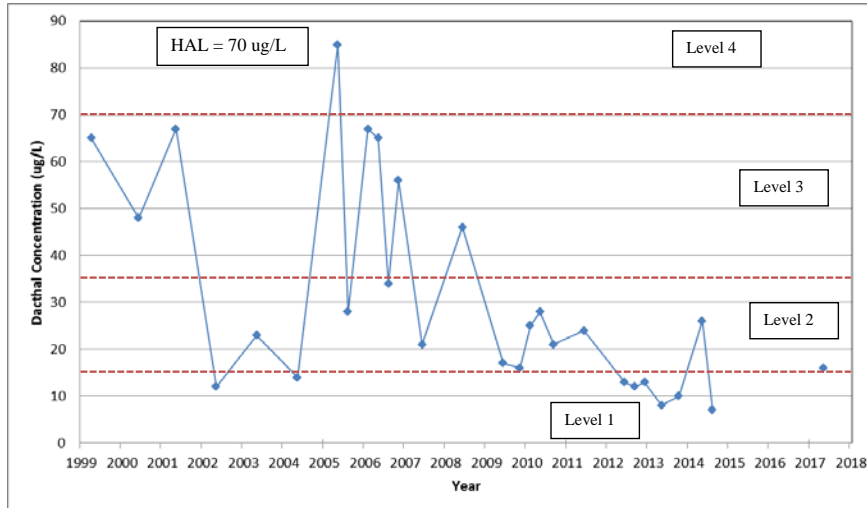
Detailed analyses of the 2017 results are available in the *Regional and Local Pesticide and Ground Water Monitoring Results, 2017: Technical Summary #56*.

Water Quality Findings

Monitoring of 257 wells occurred in the following counties: Ada, Bingham, Bonneville, Canyon, Cassia, Elmore, Fremont, Gem, Gooding, Idaho, Jefferson, Jerome, Kootenai, Latah, Lewis, Lincoln, Madison, Minidoka, Nez Perce, Owyhee, Payette, Twin Falls, and Washington. There were 30 different pesticides, metabolites/breakdown products, or VOCs detected in 2017 (Table 1). Atrazine (and its breakdown products) is the most commonly identified pesticide in the ground waters of Idaho. The vast majority of these detections are within the Level 1 response. The Atrazine concentrations are examined individually, along with the summed product of Atrazine and the breakdown products, Desethyl atrazine and Deisopropyl atrazine (Table 1). Frequent detections of pesticides occur from sampling domestic wells, especially in vulnerable aquifer areas. Of the 257 monitored wells, there were no measurable detections of pesticide residues in 134 wells, low-level detections in 118 wells and 5 wells with pesticide concentrations at levels of concern. Three wells that have pesticide concentrations within the Level 3 Category are described below and in the Annual Technical Summaries, along with a section on monitoring near and around the Dacthal Restriction Area.

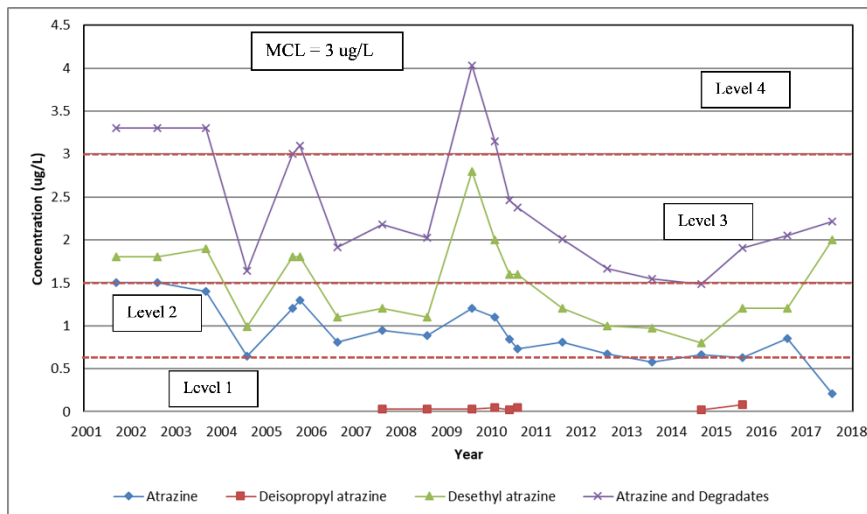


Dacthal Restricted area project



80 $\mu\text{g/L}$ (which is approximately 80 parts per billion [ppb]), which was greater than the 70 $\mu\text{g/L}$ reference point. Of the 41 wells tested across the State for Dacthal, 18 wells had measurable detections, while 13 wells had Dacthal present, but below the quantifiable range, the remaining wells did not have identifiable Dacthal.

Nez Perce County Atrazine sub-project



may account for some of these long-term concentrations. There is annual monitoring of this well, but the surrounding well data suggest that these concentrations are from an isolated source that remains unidentified. At this time the water quality does not exceed the drinking water standard, if concentrations continue to increase there is concern that this water may no longer be a suitable drinking water source and an alternate drinking water source or treatment option should be identified.

Triallate

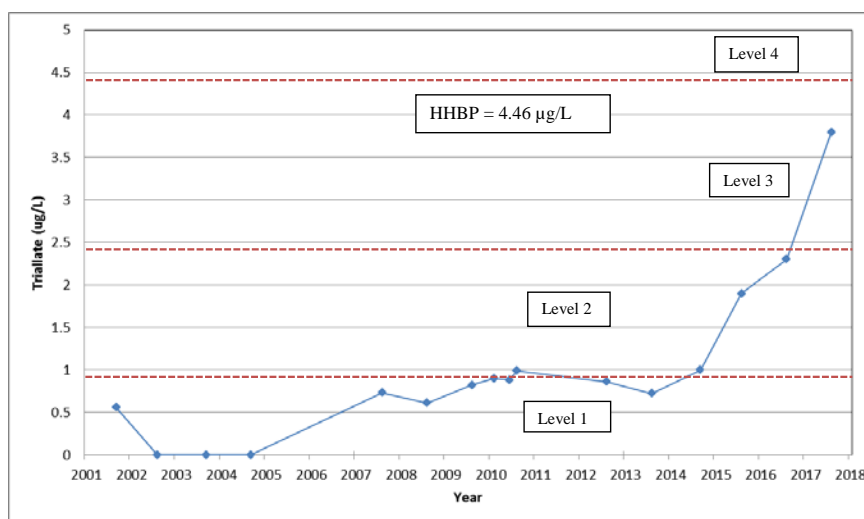
There is not a Drinking Water Standard (also known as the Maximum Contaminant Level [MCL]) for Triallate. Historically, ISDA examined Triallate data using the Food Quality Protection Act Drinking Water Level of

There were 41 wells tested for Dacthal in 2017. This was a directed effort to determine if there were changes from the historic range. Therefore, wells with prior ISDA detections were tested. All the wells monitored and tested for Dacthal had concentrations within their individual historic detection range. Only one well was identified as having concentrations in the Level 2 response category in 2017. Dacthal monitoring data for this well are not available for 2015 and 2016. Historically this well had measured Dacthal concentrations greater than

The Nez Perce County Atrazine sub-project area is located south of Lewiston and Lewiston Orchards along Waha Road. The project was initiated in response to an elevated detection of Atrazine in a well from the Clearwater Plateau Regional Project. Multiple wells were sampled in this area in 2017; wells up and down gradient were not identified with pesticide concentrations near those found in well 9501901. Atrazine and its breakdown products are known to persist in ground water significantly longer than in surface water, which

Comparison (FQPA DWLOC) reference point listed in the 2001 US EPA RED. However, based on the more recent Human Health Benchmarks for Pesticides (HHBP) values, Triallate is listed as having a carcinogenic drinking water level recommendation between 0.446 and 44.6 µg/L depending on the acceptable carcinogenic risk level between 10^{-6} and 10^{-4} . The reference level is based on its carcinogenic properties; each state can determine their acceptable risk factor between 10^{-6} and 10^{-4} . Idaho has proposed a 10^{-5} risk factor for carcinogens. The 10^{-5} risk factor would lead to a HHBP reference level of 4.46 µg/L.

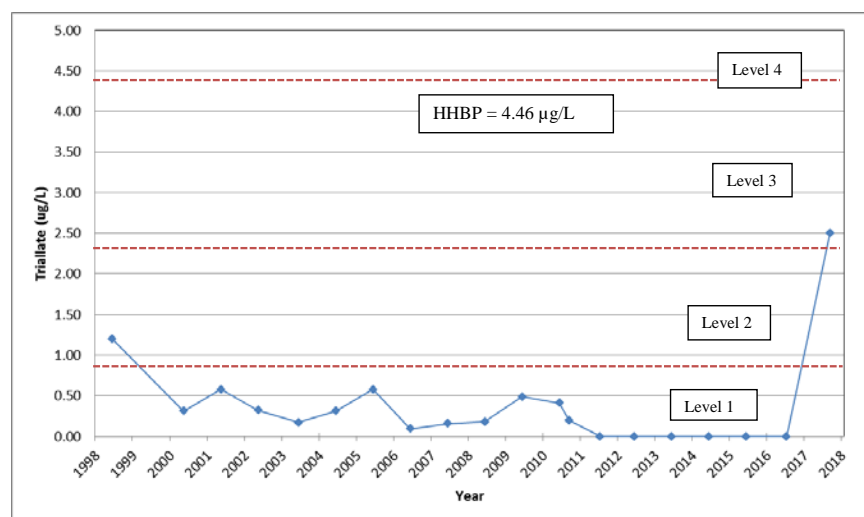
Greencreek Triallate sub-project



Wells in the Greencreek Triallate sub-project are a sub-set of the Clearwater Plateau Regional Project south of Lewiston, Idaho and are specific to concerns surrounding well 9501401. Four wells north of Greencreek, ID and were sampled for pesticides in 2017 as part of the sub-project. The Triallate concentration in well 9501401 was at a Level 3 detection, which is below the reference point. Triallate is listed by the US EPA as a potential carcinogen. The identified concentrations indicate that Triallate is increasing. Wells sampled nearby

did not have any detections of Triallate. However, only recommended levels are being exceeded, no drinking water standards are being exceeded.

Ashton Area Local Project



The time series data for Triallate in well 3200101 are displayed from 1998 through 2017. Triallate is a commonly used herbicide for grain crops in eastern Idaho. Triallate had not been detected between 2011 and 2016 after being elevated since the first sampling in 1998. It is suspected that the snowpack in the Henry's Fork Subbasin during the winter of 2016/2017 and subsequent melt and infiltration led to mobilization of Triallate in the soil column. Long-term monitoring is required to determine if this increase

is a short-term or a long-term concern.

Conclusions

Of the 257 monitored wells in 2017, there were no measurable detections of pesticide residues in 134 wells, there were low-level detections in 118 wells, and 5 wells had pesticide concentrations at concerning levels. Testing of regional, local and PMP projects resulted in detections of pesticides in ground water throughout Idaho. Frequent detections of pesticides occur from sampling domestic wells, especially in vulnerable aquifer areas. As previously discussed, the Atrazine-breakdown products and Triallate are the only pesticides detected over 50% of a health-based reference point. Dacthal, Atrazine-breakdown products and Pentachlorophenol were detected above 20% of a reference point. ISDA is responding to those situations with education, use inspections, promotion of management techniques, and locally intensive monitoring.

There were 30 different pesticides, metabolites/breakdown products, or VOCs detected in 2017. Most were detected at low concentrations. Several pesticides appear to have increasing concentrations, such as Atrazine in multiple wells across the state. Long-term monitoring is required to determine the magnitude and longevity of those increases. Statewide response processes have been implemented, primarily consisting of educational outreach, increased inspections and continued monitoring. There are concerns in certain areas where multiple low level pesticides are detected in individual wells. Some wells also have detections of multiple active ingredients and breakdown products that may have similar, but unknown human health toxicological effects in their combination. Except for the five wells with pesticide concentrations at levels of concern, pesticide concentration in the ground water are significantly below Human Health Benchmarks. These pesticide detection data may be used to make regulatory and/or voluntary changes related to applications of pesticides.

Currently, there are no indications that appropriate and widespread application of pesticides are leading to contamination of the aquifers or impacting beneficial uses. However, there are widespread detections of pesticides in both shallow and deep wells throughout the State of Idaho. Additionally, data from 2017 suggest that there may be residual reservoirs of pesticides in the soil column. It is unknown to what extent or magnitude might be in these potential pesticide reservoirs and what their effects might be on the ground water quality. Long-term monitoring is required to ensure that the current application and management practices are effective.

Recommendations

ISDA will respond to the pesticide detections from this project in accordance with the response section of IDAPA 02.03.01 Rules Governing Pesticide Management Plans for Ground Water Protection. ISDA will continue to follow-up and conduct monitoring in 2018. ISDA personnel will continue to educate the pesticide applicators on the importance of adhering to label requirements and to apply all pesticides according to federal and state laws, and enhanced enforcement monitoring where inappropriate uses are identified. ISDA personnel will continue to educate home and well owners. ISDA shares our data with the Idaho Department of Environmental Quality (DEQ), US EPA, our cooperators and inspectors. ISDA will continue to monitor ground water and aquifers throughout the State of Idaho.

Acknowledgments

ISDA Water Program staff would like to thank the homeowners in the Project areas who allowed us to access and sample their wells. Without their participation and cooperation, these Projects would not be possible. Prevention is the key to protecting Idaho's aquifers and maintaining pesticide registrations and uses in Idaho. We would also like to recognize the United States Environmental Protection Agency and our various grant supporters, without whose contribution, these reports would not be possible.

A very special thank you goes to the ISDA Field Staff and to IFQAL staff, all of whom went above and beyond to work with the ISDA Division of Agricultural Resources staff to meet project goals. The author would like to thank Elizabeth Palmateer, Sherman Takatori and Doug Chan of ISDA for editorial review of this document.

Table 1. Summary of Pesticide Detections from ISDA Regional Projects in 2017.

Pesticide	Number of Detections	Maximum (µg/L)	Average (µg/L)	Minimum Detection Limit (µg/L)	Reference Point (µg/L) and Source	County with Detection and Number
1,2,3-Trichloropropane	1	0.590	0.590	0.5	100 – DWEL	Ada (1)
2,4-DCBA	2	0.070	0.072	0.05	N/A	Bonneville (1), Minidoka (1)
Aldicarb Sulfone	3	0.090	0.130	0.05	2 – MCL	Ada (3), Ada (1)
Atrazine	39	0.073	0.230	0.025	3 – MCL	Ada (1), Canyon (3), Cassia (11), Elmore (3), Fremont (1), Gooding (1), Jefferson (1), Minidoka (3), Nez Perce (2), Owyhee (2), Payette (2), Twin Falls (6), Washington (3)
Atrazine (sum of products)*	92	2.210	0.164	---	--- **	---
Bentazon	9	0.314	1.600	0.05	200 – MCL	Ada (1), Elmore (1), Minidoka (1), Nez Perce (1), Owyhee (1), Payette (2), Washington (2)
Bromacil	11	0.379	1.300	0.05	3500 – DWEL	Elmore (3), Gooding (1), Minidoka (1), Twin Falls (3), Washington (3)
Chloromethane	1	0.550	0.550	0.5	N/A	Bingham (1)
Clopyralid	1	1.300	1.300	0.1	960 – HHBP	Fremont (1)
Total Dacthal (DCPA)	18	3.737	16.000	0.08	70 – HAL	Canyon (2), Owyhee (11), Payette (2), Washington (3)
Deisopropyl Atrazine	1	0.063	0.063	0.05	--- **	Minidoka (1)
Desethyl Atrazine	77	0.119	2.000	0.025	--- **	Ada (9), Canyon (4), Cassia (13), Elmore (5), Fremont (1), Gooding (2), Jefferson (1), Jerome (2), Lincoln (1), Minidoka (4), Nez Perce (2), Owyhee (6), Payette (4), Twin Falls (10), Washington (13)
Dicamba	2	2.325	4.500	0.1	4000 – HAL	Gooding (1), Payette (1)
Dinoseb	3	0.151	0.280	0.05	7 – MCL	Fremont (2), Owyhee (1)
Diuron	2	0.070	0.079	0.025	100 – DWEL	Minidoka (1), Nez Perce (1)
Ethoprop	4	0.187	0.590	0.025	11.4 – HHBP	Canyon (1), Owyhee (3)
Hexazinone	3	0.093	0.140	0.025	400 – HAL	Cassia (1), Jefferson (1), Minidoka (1)
Imidacloprid	5	0.056	0.110	0.025	360 – HHBP	Bonneville (1), Minidoka (3), Owyhee (1)
Metolachlor	1	0.100	0.100	0.05	700 – HAL	Payette (1)
Metribuzin	7	0.151	0.470	0.05	70 – HAL	Ada (1), Cassia (1), Fremont (1), Jefferson (2), Minidoka (1), Owyhee (1)
Monuron	1	0.034	0.034	0.025	N/A	Fremont (1)
Oryzalin	1	0.170	0.170	0.05	41.1 – HHBP	Bingham (1)
Pentachlorophenol	1	0.310	0.310	0.05	1 – MCL	Idaho (1)
Prometon	1	0.360	0.360	0.025	400 – HAL	Minidoka (1)
Pyraclostrobin	1	0.026	0.026	0.025	220 – HHBP	Idaho (1)
Simazine	5	0.053	0.100	0.025	4 – MCL	Cassia (1), Minidoka (4)
Tebuthiuron	1	0.110	0.110	0.025	500 – HAL	Fremont (1)
Terbacil	4	0.174	0.300	0.05	90 – HAL	Ada (4)
Thiamethoxam	2	0.164	0.240	0.05	77 – HHBP	Fremont (1), Owyhee (1)
Triallate	2	3.150	3.800	0.05	4.46 – HHBP	Fremont (1), Idaho (1)
Triclopyr	1	0.170	0.170			Fremont (1)

*Summation of Atrazine, Desethyl atrazine and Deisopropyl atrazine. All three are not always detected together.

**Breakdown product(s) of Atrazine. No reference point available, Atrazine MCL of 3 µg/L is used.

MCL – EPA Maximum Contaminant Level, 2012 Edition of the Drinking Water Standards and Health Advisories

HAL – EPA Lifetime Health Advisory, 2012 Edition of the Drinking Water Standards and Health Advisories

DWEL – EPA Drinking Water Equivalent Level, 2012 Edition of the Drinking Water Standards and Health Advisories

HHBP – Human Health Benchmarks for Pesticides, 2017

µg/L or microgram per liter is approximately equivalent to parts per billion

For additional information about this program or projects, please contact Curtis Cooper, Idaho State Department of Agriculture at (208) 332-8597 or email at WaterQuality@isda.idaho.gov