



Regional and Local Pesticide and Ground Water Monitoring Results, 2019 Executive Summary

ISDA Technical Summary #59

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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 ground water monitoring. Pesticide detections in the ground water have response actions described in the Idaho PMP Rule. The goal is to limit and prevent ground water contamination that may lead to limits on water use and drinkability. ISDA staff collected samples from 255 wells from major aquifers throughout Idaho in 2019. 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 IFQAL testing methods can detect pesticides at low levels (parts per trillion). The low-level detections are typically 100 to more than 1,000 times lower than a reference point. ISDA can then respond to these the typical low-level detections before they increase to near a reference point. A sub-set of select wells was tested for 82 Volatile Organic Compounds (VOC). No well monitored in 2019 exceeded a drinking water standard or reference level.

Detections of pesticides are compared against reference points to determine response and recommendations. A reference point is a generic term used to describe the acceptable human consumption levels; since not all pesticides have a drinking water standard. In order to be protective of the water resources, there are response levels in the Idaho PMP Rule that occur at various detected 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 with minimal health risks. However, at the third and fourth response levels there is a greater concern that the water has limited drinkability. At the third and fourth response levels, pesticide concentrations could lead to human health issues. ISDA responses outlined in the PMP Rule are more demanding as the pesticide concentrations increase. If widespread concerning levels of pesticides are found, ISDA may enact pesticide use restrictions in specified locations.

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 93 of the 255 monitored wells. At wells with pesticide detections, the average concentration was at 3% of their associated reference point. Over 98% of the wells tested fall into or below the Level 1 response category of the Idaho PMP Rule, these detections should be

at levels protective of human health. Five wells, and three different pesticides, were found with pesticide concentrations above the Level 1 response category. One well, near Greencreek, ID had detectable pesticide concentrations that were greater than half the recommended levels (Level 3 category) for the measured Triallate concentrations. There were 4 detections at the Level 2 category. One of the Level 2 category detections was in the Lewiston, ID area with Desethyl atrazine at 33% of the reference point. Two of the Level 2 category detections were for Dacthal concentrations near Homedale, ID, both at 20% of the reference point. One well with measured concentrations of the herbicide Triallate near Ashton, ID was at 20% of the reference point or a Level 2 response category. There were decreases in 2019 in most of these wells/pesticides since 2017. All of these wells of concern are discussed in more detail below and in Annual Technical Summaries. Other wells near these locations do not have these pesticide concentrations, indicating that these are isolated problems. No well monitored in 2019 exceeded a drinking water standard or reference level.

In eastern Idaho, a 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 have been no measured pesticides or their breakdown products associated with the nematode eradication program in these wells.

A new project was developed in the Upper Teton Valley near Driggs, ID. No pesticides were detected in any of these new wells. Monitoring in the Juliaetta, ID area expanded the number of wells in the Latah Regional Project; one well was identified with low-level pesticides. Monitoring will continue in these areas to develop long-term baseline monitoring.

Detailed analyses of the 2019 results are available in the *Regional and Local Pesticide and Ground Water Monitoring Results, 2019: Technical Summary #60*.

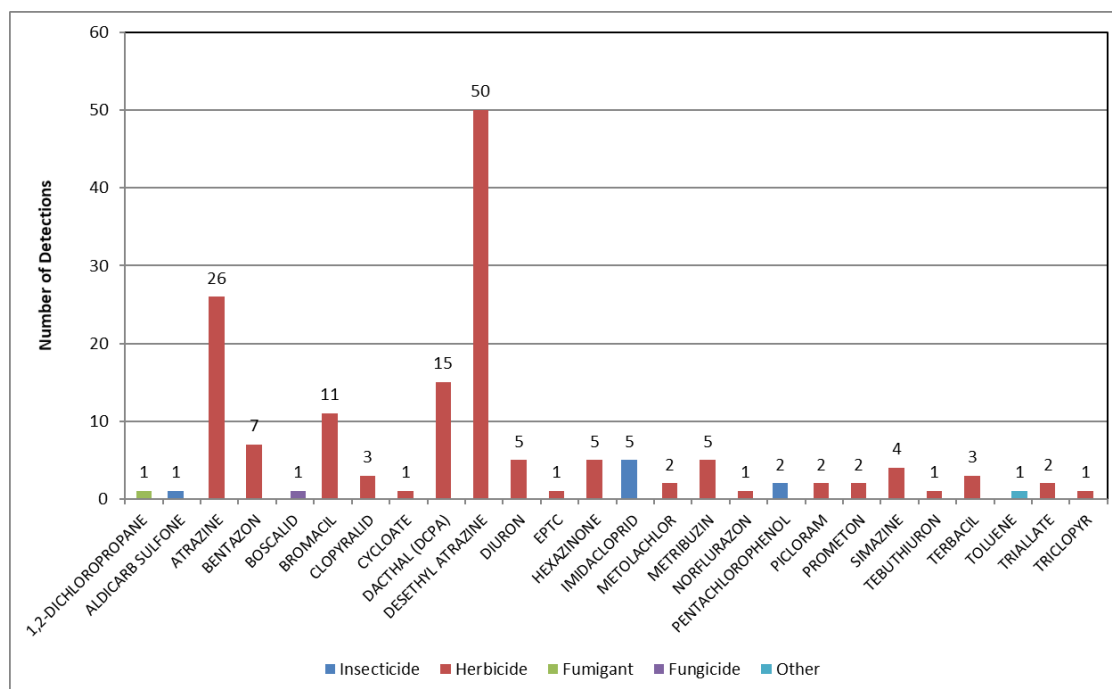
Water Quality Findings

Two-hundred fifty-five (255) wells were monitored in the following 25 counties in 2019: Ada, Bingham, Bonneville, Canyon, Caribou, Cassia, Elmore, Franklin, Fremont, Gem, Gooding, Idaho, Jefferson, Jerome, Kootenai, Latah, Lewis, Madison, Minidoka, Nez Perce, Owyhee, Payette, Teton, Twin Falls, and Washington counties. There were 26 different pesticides, metabolites/breakdown products, or VOCs detected in 2019 (Table 1). Frequent detections of pesticides occur from sampling domestic wells, especially in vulnerable aquifer areas. Of the 255 monitored wells, there were no measurable detections of pesticide residues in 162 wells. Low-level detections were found in 88 wells, whereas an additional 5 wells had pesticide concentrations at concerning levels, which is at or above 20% of a reference point.

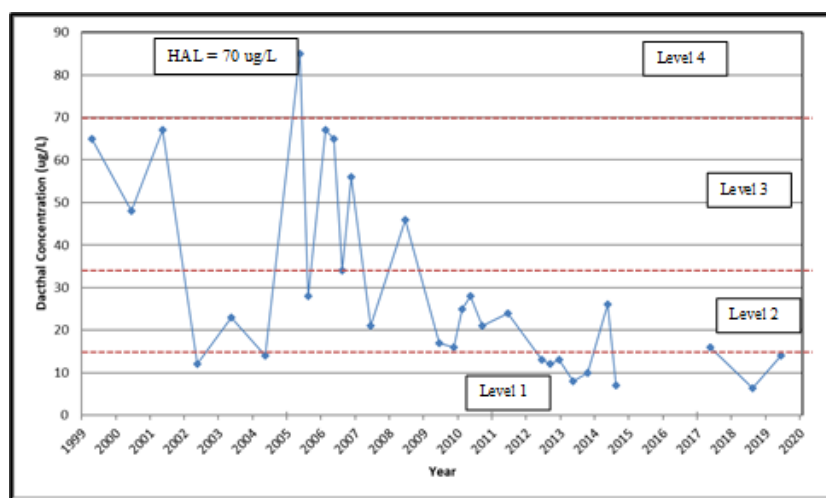
One well was identified as having an herbicide, Triallate, concentration within the Level 3 Category. Triallate was the only pesticide detected over 50% of a health-based reference point. Triallate, Atrazine-breakdown products and Dacthal were detected at or above 20% of a reference point. The pesticides are described below and in the Annual Technical Summaries, along with a section on monitoring near and around the Dacthal Restriction Area.

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. The summed concentrations of Atrazine and metabolites are also compared against the Atrazine Reference Point. The metabolites are also known to be toxic; therefore, the summation offers information that is more protective of Human Health than the individual components. Atrazine is an herbicide often used in corn production. Atrazine and/or its metabolites were detected in 54 wells. Only one (1) well had Atrazine concentrations greater than the Level 1 response category, which is greater than 20% of the Atrazine drinking water standard or Maximum Contaminant Level (MCL). The summed Atrazine detections were below 10% of the reference point in 49 of the 54 wells with detections.



Dacthal Restricted area project

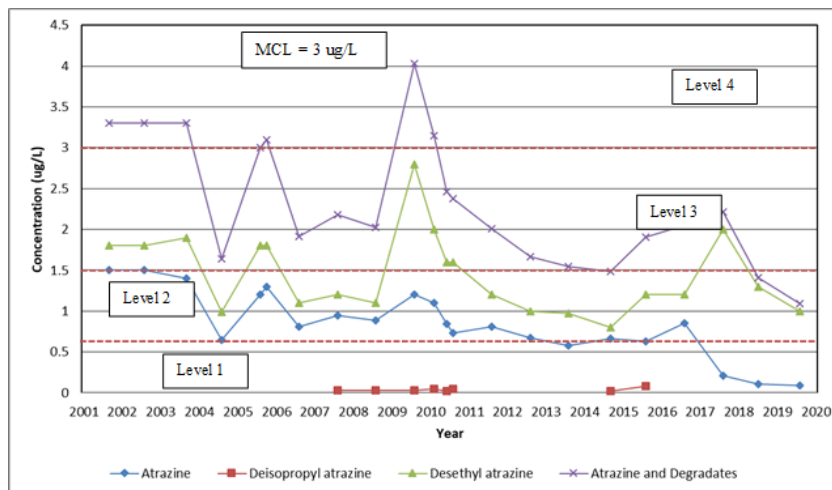


There were 28 wells tested for Dacthal in 2019. Dacthal is an herbicide often used in onion production. This was a directed effort to determine if there were changes from the historic range. Therefore, only wells with prior ISDA detections were tested. All the wells monitored and tested for Dacthal had concentrations within their individual historic detection range. Two wells were identified as having concentrations above a Level 1 response in 2019. Data for one of these wells are included in the time series

chart. Dacthal monitoring data for this well are not available for 2015 and 2016. Historically this well had measured Dacthal concentrations greater than 80 $\mu\text{g/L}$ (which is approximately 80 parts per billion [ppb]),

which was greater than the 70 µg/L reference point. Of the 28 wells tested across the State for Dacthal, 15 wells had measurable detections, while the remaining wells did not have measureable Dacthal concentrations. In and near the Dacthal Restricted-use area, two wells had Dacthal concentrations at 20% of the Reference Point. Both of these wells had increases from 2018. Both wells have a history of between year increases and decreases. This current increase is within the historic norm. Over 20-years of Dacthal data are available from ISDA monitoring at these wells.

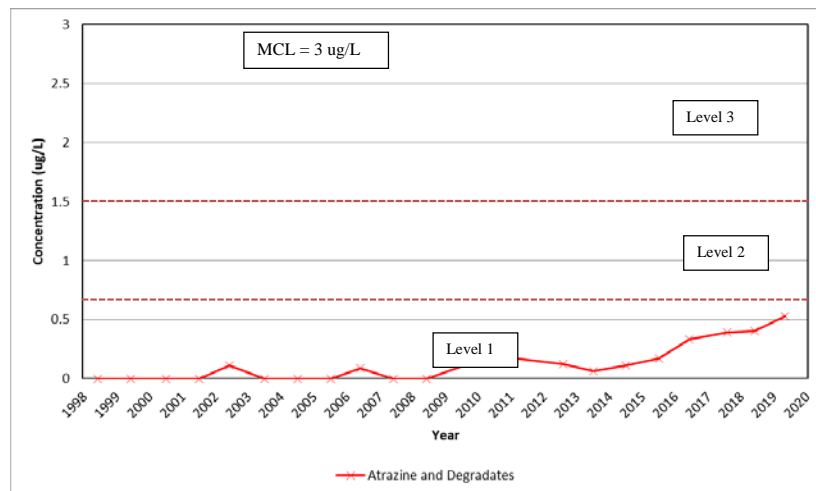
Nez Perce County Atrazine sub-project



The Nez Perce County Atrazine sub-project area is located south of Lewiston, ID 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 2019. 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 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 were to increase again 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.

Twin Falls County Project (780) Castleford area



In 2019 there was one well in the Castleford, ID area that was identified as having increasing concentrations of Atrazine and/or metabolites. The 2019 combined Atrazine concentrations were measured at 0.53 µg/L or at 18% of the 3 µg/L MCL and were all in the form of Desethyl atrazine, which is the primary form historically found in the well. Most of the detected Atrazine has been in the form of Desethyl atrazine and other forms are not displayed in the chart. This percentage of the reference point is in the Level 1

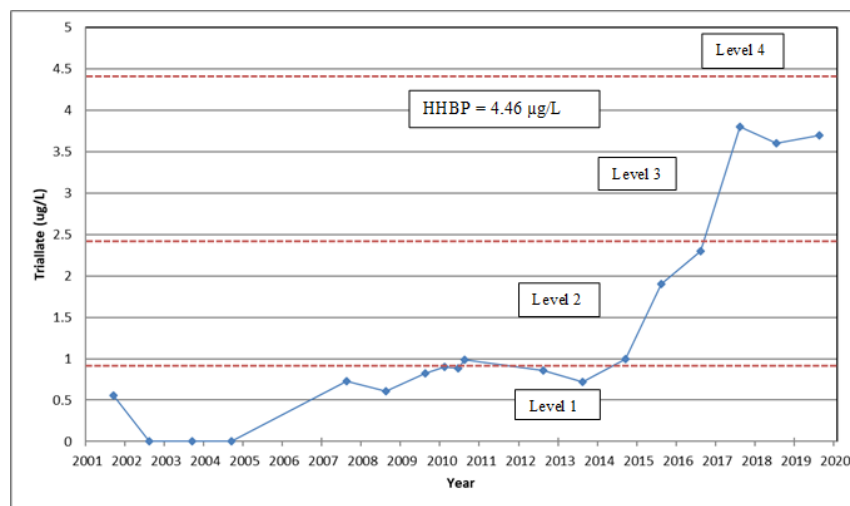
response category. It is unknown if the increasing concentrations of Atrazine and/or metabolites are more

widespread and not currently being identified. There is a proposal to increase the monitoring in the Castleford, ID area in 2020 to determine the extent of the Atrazine presence in the ground water. Proposed increased monitoring near to this well are precautionary, but necessary to determine the extent of the Atrazine and metabolite concentrations nearby.

Triallate

Triallate is an herbicide typically used in grain crops. 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 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 used a 10^{-5} risk factor for carcinogens. The 10^{-5} risk factor would lead to a HHBP reference level of 4.46 µg/L. This reference point, however, is a recommended level and not a drinking water standard/MCL.

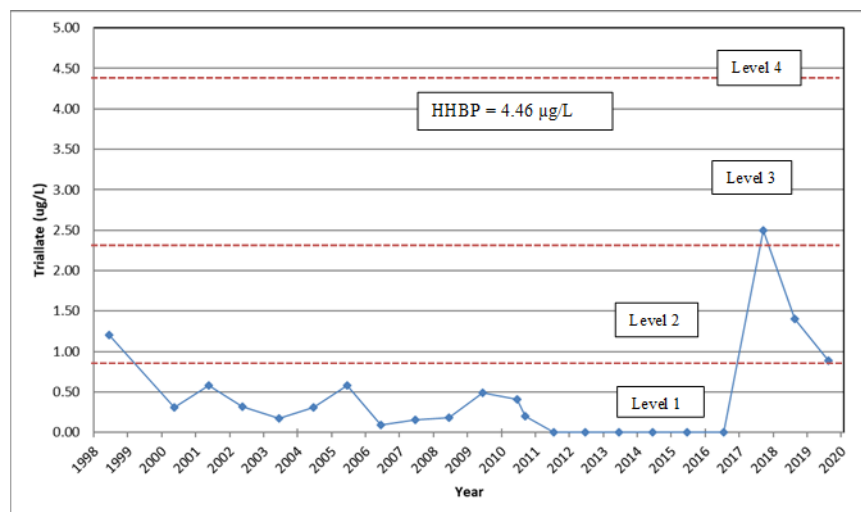
Greencreek Triallate sub-project



stabilizing, or could increase again. Wells sampled nearby did not have any detections of Triallate. Long-term monitoring is required at this location.

Wells in the Greencreek Triallate sub-project are a sub-set of the Clearwater Plateau Regional Project south of Lewiston, ID and are specific to concerns surrounding well 9501401. Four wells north of Greencreek, ID were sampled for pesticides in 2019 as part of the sub-project. The Triallate concentration in well 9501401 remained at a Level 3 detection, which is elevated, but below the reference point. The time-series and measured concentrations indicate that Triallate may either be

Ashton Area Local Project



The time series data for Triallate in well 3200101 are displayed from 1998 through 2019. 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. In 2019 the

concentrations decreased to 20% of the reference point, a decrease from 56% in 2017. Long-term monitoring is required to determine if the 2017 increase is a short-term spike, or a sign of a long-term concern.

Conclusions

Of the 255 monitored wells in 2019, there were no measurable detections of pesticide residues in 162 wells. There were low-level detections in 88 wells, and an additional 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 herbicide Triallate was the only pesticides detected over 50% of a health-based reference point. Triallate, Atrazine-breakdown products and Dacthal were detected at or 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 26 different pesticides, metabolites/breakdown products, or VOCs detected in 2019. Most were detected at low concentrations. Several pesticides appear to have increasing concentrations, such as Atrazine, in multiple wells across the state, but long-term monitoring is required to determine the magnitude and longevity of those increases. However, several wells identified in 2017 with significant increases had concentrations decrease in 2018 and 2019. Statewide response processes have been implemented, primarily consisting of educational outreach and continued monitoring. Except for the five wells with pesticide concentrations at levels of concern, pesticide concentrations are significantly below drinking water standards and/or recommendations. 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 pesticide residue accumulation and contamination of the aquifers and 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, and the high snowpack winter and spring flooding, followed by increases in pesticide concentrations in many wells, and the subsequent decreases 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 2019. 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. 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 Hailey Shingler (Idaho Department of Environmental Quality), Ginger Goodman and Sherman Takatori of ISDA for editorial review of this document.

Table 1. Summary of Pesticide Detections from ISDA Regional Projects in 2019.

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-Dichloropropane	1	0.640	0.640	5	5 -- MCL	Canyon (1)
Aldicarb sulfone	1	0.063	0.063	2	2 -- MCL	Ada (1)
Atrazine	26	0.110	0.057	3	3 -- MCL	Canyon (2), Cassia (6), Elmore (2), Fremont (1), Gooding (1), Jefferson (1), Minidoka (3), Nez Perce (2), Owyhee (1), Payette (2), Twin Falls (5)
Atrazine (sum of products) *	54	1.088	0.126	---	---**	---
Bentazon	7	0.530	0.203	200	200 -- HAL	Minidoka (1), Owyhee (1), Payette (3), Washington (2)
Boscalid	1	0.200	0.200	1400	1400 -- HHBP	Caribou (1)
Bromacil	11	6.000	0.848	70	70 -- DWEL	Cassia (1), Elmore (3), Minidoka (2), Payette (1), Twin Falls (2), Washington (2)
Clopyralid	3	0.560	0.287	960	960 -- HHBP	Caribou (1), Fremont (1), Idaho (1)
Cycloate	1	1.000	1.000	30	30 -- HHBP	Minidoka (1)
Dacthal (DCPA)	13	14.000	5.107	70	70 -- HAL	Canyon (2), Owyhee (10), Payette (1)
Desethyl atrazine	50	1.000	0.107	3	3 -- MCL	Ada (4), Canyon (3), Cassia (6), Elmore (3), Franklin (1), Fremont (1), Gooding (1), Jefferson (1), Jerome (1), Minidoka (3), Nez Perce (2), Owyhee (5), Payette (5), Twin Falls (8), Washington (6)
Diuron	5	0.140	0.060	100	100 -- DWEL	Elmore (1), Minidoka (2), Nez Perce (1), Bingham (1)
EPTC	1	1.300	1.300	300	300 -- HHBP	Minidoka (1)
Hexazinone	5	6.500	1.349	400	400 -- HAL	Ada (2), Cassia (1), Minidoka (2)
Imidacloprid	5	0.065	0.042	360	360 -- HHBP	Caribou (1), Cassia (1), Jefferson (1), Minidoka (1), Bingham (1)
Metolachlor	2	0.300	0.194	700	700 -- HAL	Caribou (1), Minidoka (1)
Metribuzin	5	2.800	0.624	70	70 -- HAL	Ada (1), Jefferson (2), Minidoka (1), Bonneville (1)
Norflurazon	1	0.040	0.040	96	96 -- HHBP	Elmore (1)
Pentachlorophenol	2	0.120	0.108	1	1 -- MCL	Idaho (1), Minidoka (1)
Picloram	2	4.200	2.275	500	500 -- MCL	Owyhee (1), Latah (1)
Prometon	2	0.310	0.173	400	400 -- HAL	Franklin (1), Minidoka (1)
Simazine	4	0.110	0.062	4	4 -- MCL	Cassia (1), Minidoka (3)
Tebuthiuron	1	0.065	0.065	500	500 -- HAL	Fremont (1)
Terbacil	3	0.240	0.137	90	90 -- HAL	Ada (3)
Toluene***	1	0.630	0.630	N/A	N/A	Bonneville (1)
Triallate	2	3.700	2.295	4.46	4.46 -- HHBP	Fremont (1), Idaho (1)
Triclopyr	1	0.170	0.170	300	300 -- HHBP	Latah (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, 2018 Edition of the Drinking Water Standards and Health Advisories

HAL – EPA Lifetime Health Advisory, 2018 Edition of the Drinking Water Standards and Health Advisories

DWEL – EPA Drinking Water Equivalent Level, 2018 Edition of the Drinking Water Standards and Health Advisories

HHBP – Human Health Benchmarks for Pesticides

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