



Regional and Local Pesticide and Ground Water Monitoring Results, 2014

ISDA Technical Summary #52

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Introduction

The Idaho State Department of Agriculture (ISDA) Ground Water Program has been implementing 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 state to conduct monitoring, and response actions associated with pesticide detections in Idaho ground water and to prevent contamination that may result in drinking water exceedances. Regional and local pesticide ground water monitoring has been conducted throughout numerous aquifers in Idaho. Monitoring of over two hundred wells occurred in 2014 for the following counties: Ada, Bonneville, Canyon, Cassia, Elmore, Fremont, Gem, Gooding, Idaho, Jefferson, Jerome, Kootenai, Lewis, Lincoln, Minidoka, Nez Perce, Owyhee, Payette, Twin Falls and Washington.

The goal of the monitoring efforts has been to statistically determine the potential impacts to ground water and to conduct response monitoring in areas where there have been frequent and elevated detections. The response monitoring to implement the PMP rule has been accomplished to develop a better understanding of impacts from registered active ingredients that have been detected in Ada, Elmore, Fremont, Idaho, Nez Perce, Owyhee and Payette Counties.

The samples collected from all wells were tested for 91 pesticides at the University of Idaho Analytical Sciences Laboratory (UIASL) and some wells were tested for 82 Volatile Organic Compounds (VOCs) at the Idaho Bureau of Laboratory (IBOL). ISDA has worked with the UIASL to create a specialized list of analytes that are registered for use in Idaho and have potential to reach ground water.

Numerous pesticides have been detected. Response processes have been implemented primarily consisting of educational outreach. The information may be used to make regulatory and/or voluntary changes related to applications of pesticides. Reports, educational fact sheets, and education and training workshops with pesticide applicators have been completed.

Background

The Division of Agricultural Resources Ground Water Program is responsible for a variety of programs, laws and rules for protection of ground water from pesticides. ISDA has a cooperative agreement with EPA to implement the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Additionally, the Idaho PMP and the Idaho PMP Rule require the state to respond to pesticide detections in Idaho ground water.

The state response, as outlined in these two documents, is based on four distinct levels established by pesticide detection concentrations as they relate to a percentage of a reference point. A reference point is based on a health standard, such as a maximum contaminant level (MCL), lifetime health advisory level (HAL), or reference dose (RfD). The PMP Rule divides the pesticide detections into the following 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.

ISDA response actions increase and become more comprehensive as the detection level increases. The majority of the detections are lower in concentration. Most efforts are related to education and promoting Best Management Practices (BMPs) related to proper pesticide use, storage, disposal and protection of ground water quality. This report describes the results for monitoring and trends through 2014.

Regional and Local Pesticide Monitoring Results by Project

Regional and local pesticide ground water monitoring has been conducted throughout numerous aquifers in Idaho. Two-hundred and fourteen (214) wells were monitored in the following counties in 2014: Ada, Bonneville, Canyon, Cassia, Elmore, Fremont, Gem, Gooding, Idaho, Jefferson, Jerome, Kootenai, Lewis, Lincoln, Minidoka, Nez Perce, Owyhee, Payette, Twin Falls and Washington (Table 1). The pesticides detected for 2014 are provided in Table 2. There were 22 different pesticides detected and the majority of the detections were in the Level 1 category.

Table 1. Summary of 2014 Pesticide Sampling of ISDA Regional Projects.

Project Number and Name	Number of Wells Sampled (214 total wells)
220: Lower Boise Regional Study	8 ^{1,2}
223: Roswell Local Study	1 ^{1,2}
310: Owyhee County Local Study	5 ^{1,2} , 5 ^{1,3}
320: Ashton Area Local Study	2 ¹
330: Nez Perce County Local Study	2 ^{1,4}
340: Fruitland Area Local Study	5 ^{1,2}
360: Idaho County Local Study	1 ¹
530/760: Eagle Area Local Study	6 ^{1,2}
710: Washington and Payette Counties Regional Study	25 ^{1,2}
730: Minidoka County Shallow Aquifer Regional Study	21 ¹
740: Minidoka County Deep Aquifer Regional Study	7 ¹
750: Jerome-Gooding-Lincoln Counties Regional Study	14 ¹
770: Payette and Gem Counties Regional Study	5 ^{1,2}
780: Twin Falls County Regional Study	12 ¹
790: Cassia County Regional Study	26 ¹
805: Middle Henrys Fork Central Basin Regional Study	4 ¹
810: Elmore Area Local Study	5 ¹
820: Rathdrum Prairie Regional Study	6 ¹

830: Mud Lake Regional Study	5 ¹
840: Bonneville Regional Study	4 ¹
860: North Owyhee County Regional Study	6 ^{1, 2, 3}
865: Grand View and Bruneau Areas Regional Study	10 ^{1, 2}
870: Northern Gooding County (Bliss) Regional Study	5 ¹
890: Hammett and Glenns Ferry Areas Regional Study	7 ¹
950: Clearwater Plateau Aquifer Regional Study	14 ¹
955: Lewis County Local Study	2 ¹

¹ Chlorinated Acid Pesticides (18), Organochlorine Pesticides (10), Organophosphate and nitrogen pesticides (46), Phenylurea pesticides (8), Carbamate pesticides (9). University of Idaho Analytical Sciences Laboratory (ASL).

² Volatile Organic Compounds, EPA 532.2, Idaho Bureau of Laboratories.

³ Monitoring was conducted in May, August 2014

⁴ Monitoring was conducted in June, October 2014

Water Quality Findings

A total of 214 wells were tested for various pesticides in regional and local project areas in 2014. One-Hundred and thirty-three (133) wells out of the 214 wells sampled had positive detections of 22 different pesticides. There were 277 detections of various pesticides. The most frequently detected pesticides were: Atrazine (95), Desethyl Atrazine (86), DCPA (26), Bromacil (16), Metribuzin (9), Hexazinone (9), Simazine (7), Bentazon (4), Diuron (4), Terbacil (3), Picloram (3), Prometon (3), Terbacil (3), Tebuthiuron (2), 1,2,3-Trichloropropane (2), Bromoxynil (1), Metolachlor (1), Triallate (1), 2,4-D (1), Chlorothalonil (1), Deisopropyl Atrazine (1), Dinoseb (1), 1,2-Dichloropropane (1) (Table 2).

Table 2. Summary of Pesticide Detections from ISDA Regional Projects in 2014.

Pesticide	Number of Detections	Maximum (µg/L) (Min. – Max.)	Reference Point (µg/L)	County with Detection and Number
Atrazine	95	0.66 (0.025 – 0.66)	3 (MCL) ¹	Ada (7), Bonneville (2), Canyon (4), Cassia (19), Elmore (6), Fremont (1), Jefferson (2), Jerome (2), Lincoln (1), Minidoka (10), Nez Perce (2), Owyhee (10) Payette (8), Twin Falls (8), Washington (13)
Bentazon	4	0.43 (0.2 – 0.43)	200 (HAL) ²	Canyon (2), Payette (1), Washington (1)
Bromacil	16	0.51 (0.05 – 0.51)	70 (HAL) ²	Ada (1), Gooding (1), Owyhee (2), Payette (1), Twin Falls (4), Washington (4)
Bromoxynil	1	0.1	105 (HAL) ⁴	Cassia (1)
Chlorothalonil	1	0.025	105 (HAL) ⁴	Cassia (1)
DCPA (Dacthal)	26	26 (0.08 – 26)	70 (HAL) ²	Ada (2), Canyon (1), Gooding (2), Owyhee (12), Payette (4), Washington (2)
Deisopropyl Atrazine ³	1	0.025 ³	Nez Perce (1)
Desethyl Atrazine ³	86	0.8 (0.025 – 0.8) ³	Ada (7), Bonneville (1), Canyon (5), Cassia (20), Elmore (4), Fremont (1), Gooding (1), Jefferson (1), Jerome (2), Lincoln (1), Minidoka (5), Nez Perce (2), Owyhee (8), Payette (6), Twin Falls (10), Washington (12)

Dinoseb	1	0.63	7 (MCL) ¹	Owyhee (1)
Diuron	4	0.056 (0.026 - 0.056)	21 (HAL) ⁴	Ada (1), Cassia (1), Elmore (1), Minidoka (1)
Hexazinone	9	0.11 (0.05- 0.11)	400 (HAL) ²	Ada (1), Cassia (3), Jefferson (1), Washington (2)
Metolachlor	1	0.05	700 (HAL) ²	Minidoka (1)
Metribuzin	9	2.0 (0.031 – 2.0)	70 (HAL) ²	Ada (3), Elmore (1), Fremont (1), Jefferson (3), Owyhee (1)
Picloram	3	0.26 (0.15 – 0.26)	500 (MCL) ¹	Elmore (1), Nez Perce (1), Washington (1)
Prometon	3	0.05 (0.05)	400 (HAL) ²	Elmore (1), Washington (2)
Simazine	7	0.075 (0.026 – 0.075)	4 (MCL) ¹	Canyon (1), Cassia (4), Minidoka (2)
Tebuthiuron	2	0.12 (0.05 – 0.12)	500 (HAL) ²	Fremont (1), Washington (1)
Terbacil	3	0.40 (0.21 – 0.40)	90 (HAL) ²	Ada (3)
Triallate	1	1.0	0.45 (FQPA DWLOC) ⁵	Idaho (1)
1,2,3-Trichloropropane	2	0.86 (0.61 – 0.86)	2.8 (HAL) ⁴	Ada (2)
1,2-Dichloropropane	1	0.95	5 (MCL) ¹	Canyon (1)
2,4-D	1	0.23	70 (MCL) ¹	Minidoka (1)

¹MCL – EPA Maximum Contaminant Level, 2012 Edition of the Drinking Water Standards and Health Advisories

²HAL – EPA Lifetime Health Advisory, 2012 Edition of the Drinking Water Standards and Health Advisories

³Breakdown product of Atrazine, no reference point available, MCL for Atrazine of 3 µg/L is used.

⁴HAL – EPA Lifetime Health Advisory, calculated from EPA RfD listed in 2012 Edition of the Drinking Water Standards and Health Advisories

⁵FQPA DWLOC – Food Quality Protection Act Drinking Water Level of Concern value listed in EPA RED document

Twenty-two (22) different types of pesticides were detected including two metabolites and two Volatile Organic Compounds (VOCs) (Table 2). The number of pesticides detected per well were: thirty-nine wells (29% of wells with detections) had one detection, sixty-six wells (50%) had two detections, seventeen wells (13%) had three detections, eight wells (6%) had four detections, three wells (2%) had five detections and one well (1%) had six detections.

The Idaho PMP Rule outlines processes to protect ground water from pesticides and defines pesticide detections based on the concentration of the detection compared to a reference point. The reference point refers to health based concentrations. Idaho has adopted the EPA's MCLs in the Idaho Ground Water Quality Rule (1997). An MCL is defined by EPA as the highest level of a contaminant that is allowed in drinking water and is an enforceable standard (EPA, 2006). Where no MCL exists, the ISDA will use EPA Lifetime Health Advisories (HAL), if they exist. A Health Advisory is defined by EPA as an estimate of acceptable drinking water levels for a chemical substance based on health effects information and is not a legally enforceable standard. The Lifetime Health Advisory (HAL) is the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for a lifetime of exposure (based on a 70kg-adult consuming two liters of water per day) (EPA, 2006). If a HAL does not exist, then an

EPA Reference Dose (RfD) number is used. The EPA defines a RfD as an estimate (with uncertainty spanning perhaps an order of magnitude) of daily oral exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime (EPA, 2006). Reference points can be found in numerous documents. The reference points used by ISDA to implement the PMP Rule, and referred to throughout this document, are found in the sources cited in Table 2.

The PMP Rule breaks the pesticide detections into detection levels as a percent of Reference Points. The majority of the detections were found in Level 1 (Table 3). Level 2 detections were found for Dacthal (DCPA), Atrazine, Desethyl Atrazine, 1,2-Dichloropropane and 1,2,3-Trichloropropane (Table 3). Level 3 detections were found for the combined concentrations of Atrazine and Desethyl Atrazine combined (Table 3). A Level 4 detection was found for Triallate (Table 3).

Table 3. Pesticide detected relative to concentration levels as a percent of Reference Points.

Ground Water Pesticide Concentration Level	Pesticides
Level 4 (> 100% of Reference Point)	Triallate
Level 3 (50% to < 100% of Reference Point)	Atrazine and Desethyl Atrazine Combined
Level 2 (20 to < 50% of Reference Point)	Dacthal (DCPA), Atrazine, Desethyl Atrazine, 1,2-Dichloropropane, 1,2,3-Trichloropropane
Level 1 (< 20% of Reference Point)	Atrazine, Bentazon, Bromacil, Bromoxynil, Chlorothalonil, DCPA (Dacthal), Deisopropyl Atrazine, Desethyl Atrazine, Dinoseb, Diuron, Hexazinone, Methiocarb, Metolachlor, Metribuzin, Picloram, Prometon, Simazine, Tebuthiuron, Terbacil, Triallate, 2,4-D

Pesticide Monitoring Results by Project

Elmore County Local Project

A total of five wells were sampled for pesticides in the Elmore County Local Project. All five wells had at least two pesticide detections per well. One well had three detections and another well had six detections. All detections were below any health standards set by the EPA and were within the Level 1 category. The pesticides detected were Atrazine, Bromacil, Desethyl Atrazine, Diuron, Metribuzin, Picloram and Prometon (Table 4).

Table 4. Summary of 2014 Pesticide Results from the Elmore County Local Project.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Atrazine	5 (100%)	0.081 (0.025 – 0.081)	3 (MCL) ¹
Bromacil	3 (60%)	0.51 (0.12 – 0.51)	90 (HAL) ²
Desethyl Atrazine	3 (60%)	0.19 (0.04 – 0.19)	... ³
Diuron	1 (20%)	0.04	21 (HAL) ²
Metribuzin	1 (20%)	0.04	70 (HAL) ²

Picloram	1 (20%)	0.26	500 (MCL) ¹
Prometon	1 (20%)	0.05	400 (HAL) ²

¹MCL – EPA Maximum Contaminant Level.

²HAL – EPA Lifetime Health Advisory.

³Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

Eagle Local Project

Six wells in the Eagle Local study were sampled for pesticides and Volatile Organic Compounds (VOCs). The VOCs were tested due to historic detections of 1,2-Dichloropropane (1,2-DCP) and 1,2,3-Trichloropropane (1,2,3-TCP), which are breakdown products from an old formulation of a soil fumigant used in the area. The VOC 1,2,3-TCP was detected in two of the six wells (Table 5). The EPA Lifetime Health Advisory Level for 1,2,3-TCP is 2.8 µg/L (Table 5). Atrazine and Desethyl Atrazine was detected in all six wells, Metribuzin and Terbacil in three wells, DCPA (dacthal) in two wells and Bromacil in one well. All pesticide detections were within the Level 1 category (a detection above the detection limit to less than 20% of the reference point) established by the Idaho PMP Rule and below any health standards set by the EPA. The 1,2,3-TCP detection was a Level 2 category detection.

Table 5. Summary of 2014 Pesticide Results from the Eagle Local Project.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
1,2,3-Trichloropropane	2 (33%)	0.86 (0.61 – 0.86)	2.8 (HAL) ¹
Atrazine	6 (100%)	0.04 (0.025 – 0.04)	3 (MCL) ²
Bromacil	1 (16%)	0.16	90 (HAL) ³
DCPA (Dacthal)	2 (33%)	0.08 (0.08 – 0.08)	70 (HAL) ³
Desethyl Atrazine ⁴	6 (100%)	0.057 (0.044 – 0.057)	... ⁴
Metribuzin	3 (50%)	0.044 (0.036 – 0.044)	70 (HAL) ³
Terbacil	3 (50%)	0.40 (0.21 – 0.40)	90 (HAL) ³

¹HAL – EPA Lifetime Health Advisory, calculated from EPA RfD listed in 2012 Edition of the Drinking Water Standards and Health Advisories

²MCL – EPA Maximum Contaminant Level.

³HAL – EPA Lifetime Health Advisory.

⁴Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

Ashton Local Project

The elevated concentrations of Triallate in one well east of Ashton led to the development of the Fremont County Local Project. Also, there has been another well with elevated Atrazine and Desethyl Atrazine that has continued to be sampled. A variety of wells in the area have been selected in order to characterize the extent of elevated Triallate and Atrazine concentrations in the ground water.

Six wells were sampled for pesticides in 2014 and three wells had positive detections (Table 6). All detections were below any health standards and were within the Level 1 category. Atrazine and Desethyl Atrazine were detected in one of the six wells and Tebuthiuron was detected in one well. Metribuzin was detected at 2 ppb in one well. For the third year in a row, Triallate was not detected in the well that has had elevated Triallate for a number of previous years. A summary of the pesticide detections from the 2014 monitoring effort is presented in Table 6.

Table 6. Summary of 2014 Pesticide Results from the Fremont County Local Project.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Atrazine	1 (16%)	0.093	3 (MCL) ¹
Desethyl Atrazine	1 (16%)	0.2	... ²
Metribuzin	1 (16%)	2.0	70 (HAL) ³
Tebuthiuron	1 (16%)	0.12	500 (HAL) ³

¹MCL – EPA Maximum Contaminant Level.

²Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

³HAL – EPA Lifetime Health Advisory, 2012 Edition of the Drinking Water Standards and Health Advisories

The trend for Triallate in well 8052801 is displayed in Figure 1. Triallate is a commonly used herbicide for grain crops in eastern Idaho. Triallate has not been detected in 2011 through 2014 after being elevated over the drinking water reference point of 0.45 µg/L since the first sampling in 1998. Without an established MCL, HAL or RfD for Triallate; the Food Quality Protection Act (FQPA) Drinking Water Level of Concern (DWLOC) value of 0.45 µg/L is then utilized.

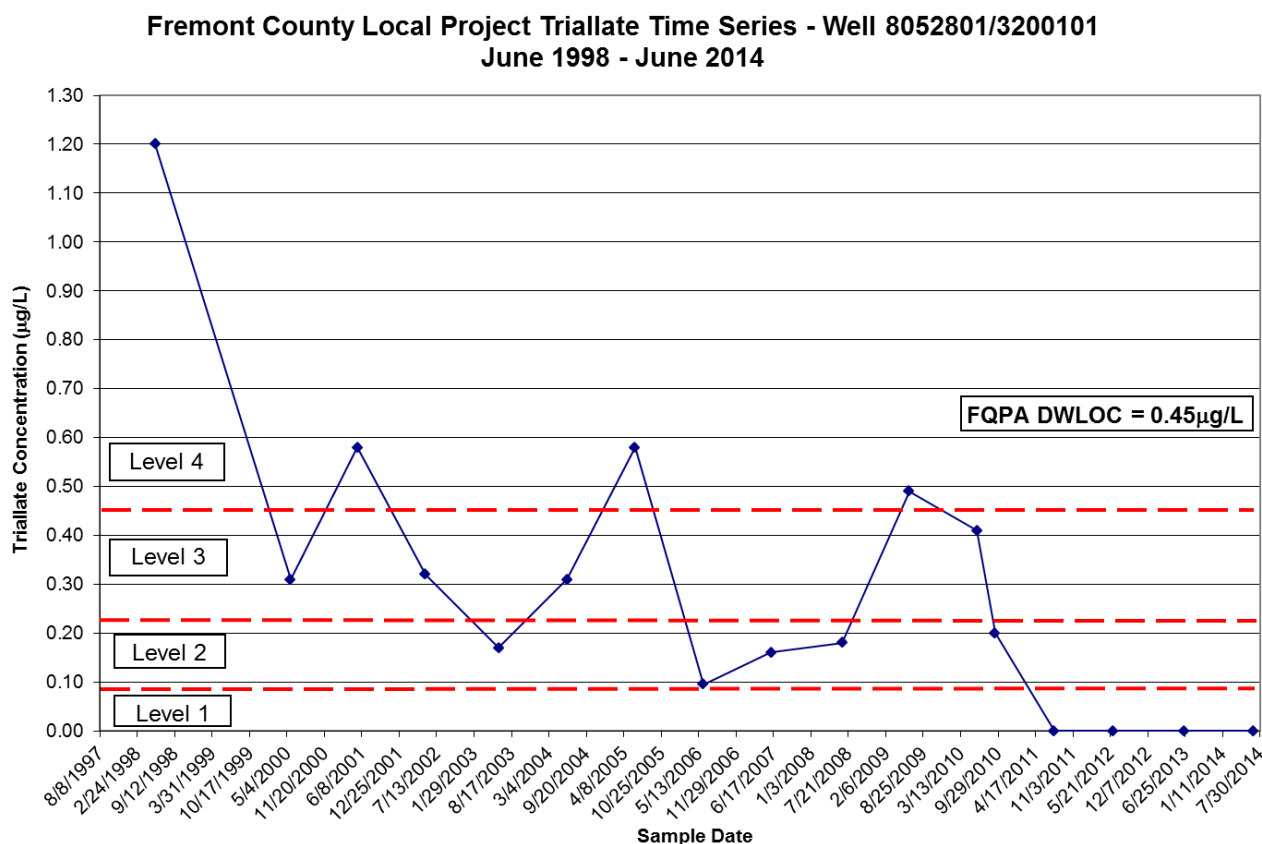


Figure 1. Time series trend for Triallate in well east of Ashton, Idaho.

Atrazine, Desethyl Atrazine and Deisopropyl Atrazine were first detected in 2003 in well 8053501 east of Ashton (Figure 2). The original detections were lower in concentration and considered Level 1 detections. In 2006 the concentrations detected were Level 3 Atrazine and Level 2 Desethyl Atrazine detections. The combined concentrations were Level 4 concentrations. The concentrations were found to be lower in 2007 and were Level 1 detections. The concentrations have been Level 1 since 2007. The trend for Atrazine and Desethyl Atrazine is displayed in Figure 2. No other pesticides were detected in 8053501 in 2014. In previous years, other pesticides were detected including Monuron and 2,4-D.

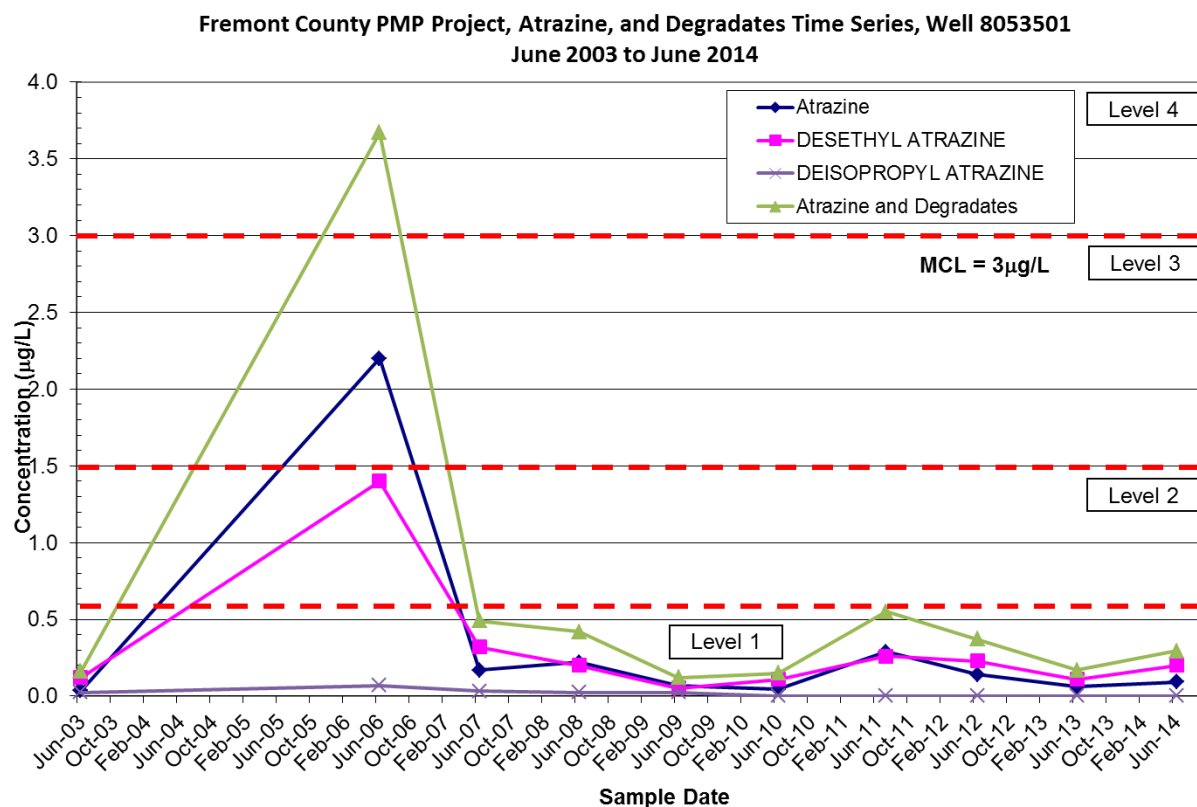


Figure 2. Time series trend for Atrazine, Desethyl Atrazine, Deisopropyl Atrazine and combined concentrations in a well east of Ashton, Idaho.

Fruitland Local Project

A total of five wells were sampled for pesticides for the project area in 2014. Previous elevated detections of Atrazine and Desethyl Atrazine have been of concern. Four wells had positive detections of pesticides in 2014. The three wells studied over time continue to have Atrazine and Desethyl Atrazine detections at low concentrations within the Level 1 category (Table 7). There were also detections of DCPA (Dacthal) in three of the wells (Table 7). All pesticide detections in the follow up sampling were below any health standards set by EPA or the state of Idaho.

Table 7. Summary of 2014 Pesticide Results from sampling five wells for the Fruitland Local Project.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Atrazine	4 (80%)	0.32 (0.025 – 0.32)	3 (MCL) ¹
DCPA (Dacthal)	3 (60%)	4.4 (0.15 – 4.4)	70 (HAL) ²
Desethyl Atrazine	3 (60%)	0.17 (0.03 – 0.17) ³

¹MCL – EPA Maximum Contaminant Level.

²HAL – EPA Lifetime Health Advisory. 2012 Edition of the Drinking Water Standards and Health Advisories

³Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

The Atrazine and Desethyl Atrazine concentrations in wells 3400101, 3400501 and 3400801 have been tracked over time to determine if the concentration trend has decreased (Figures 3, 4, 5, 6 and 7). Atrazine and Desethyl Atrazine concentrations in all three wells have decreased into the Level 1 category in 2008 and 2009 and have stayed at Level 1 since 2010 (Figures 3, 4, 5, 6 and 7). In general, a similar pattern of degradation and decrease in concentration has been observed for the three wells. The area is vulnerable to pesticide leaching due to sandy and sandy loam soils and shallow ground water.

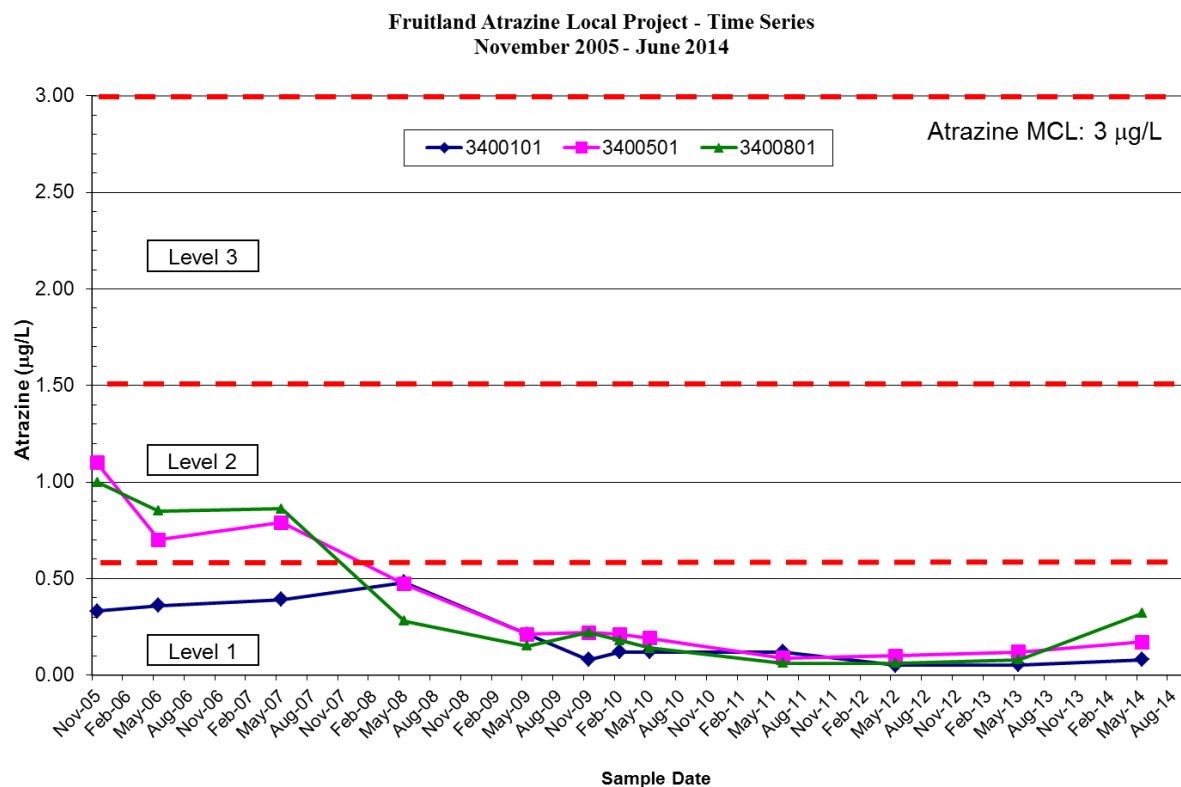


Figure 3. Time series trend for Atrazine in three wells sampled over time near Fruitland, Idaho.

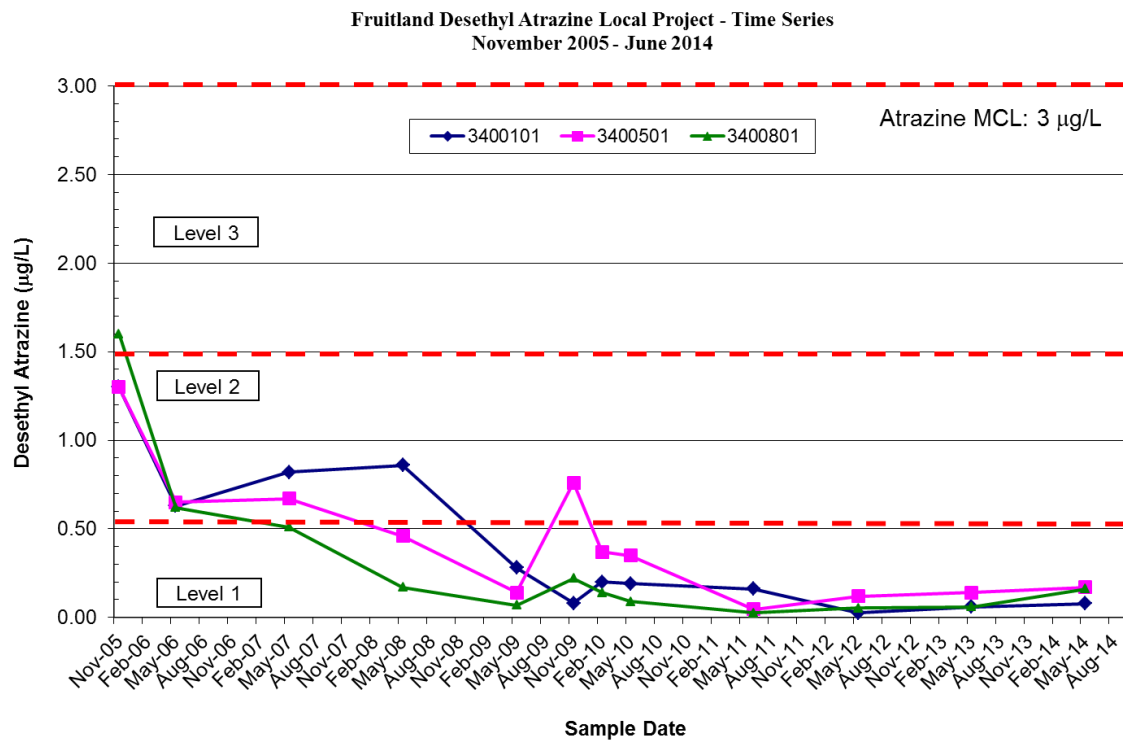


Figure 4. Time series trend for Desethyl Atrazine in three wells sampled over time near Fruitland, Idaho.

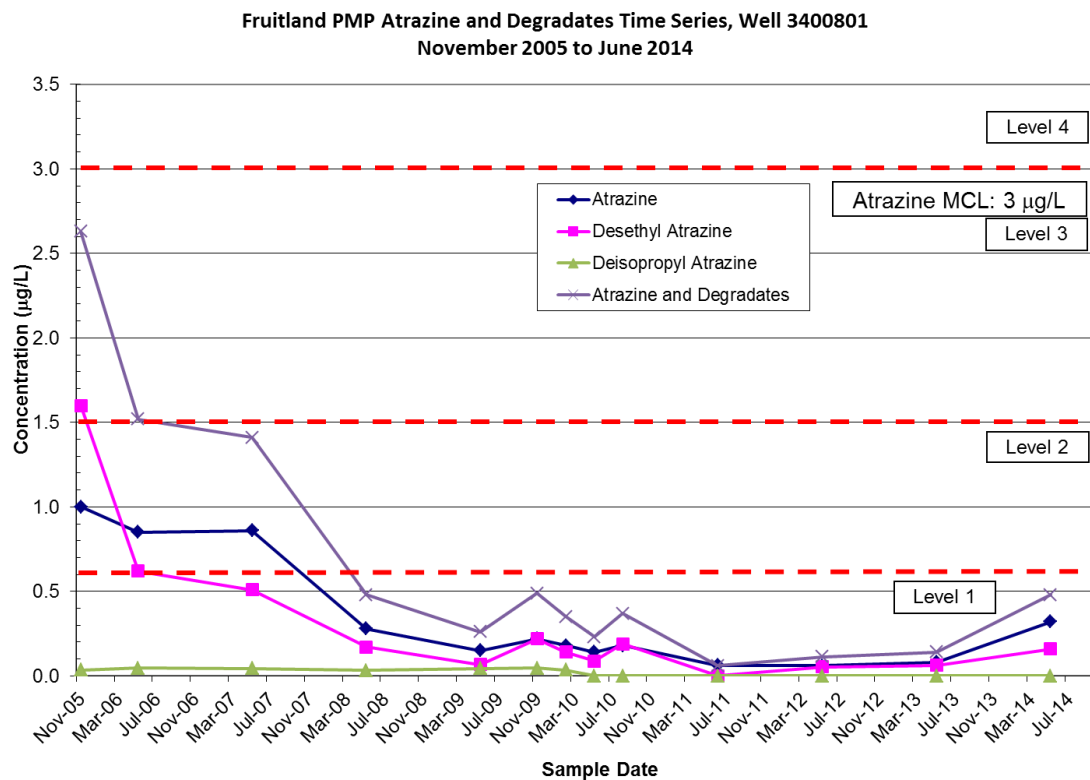


Figure 5. Time series trend for Atrazine and breakdown products for well 3400801 near Fruitland, Idaho.

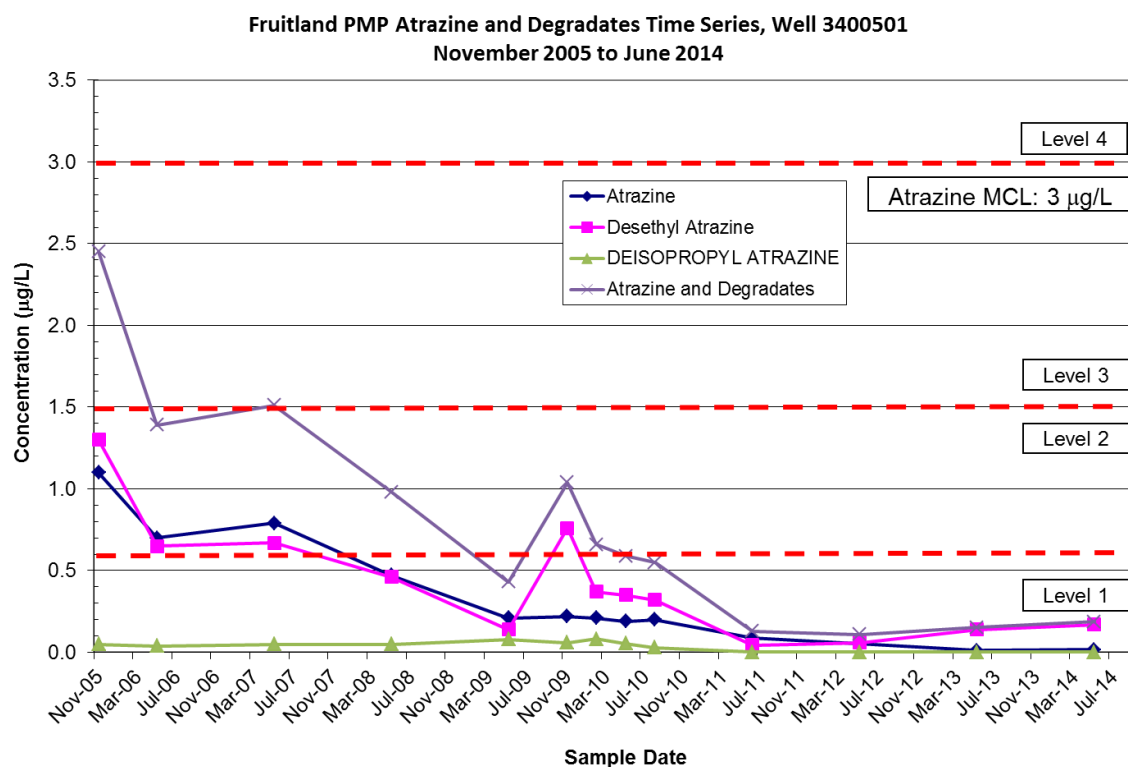


Figure 6. Time series trend for Atrazine and breakdown products for well 3400501 near Fruitland, Idaho.

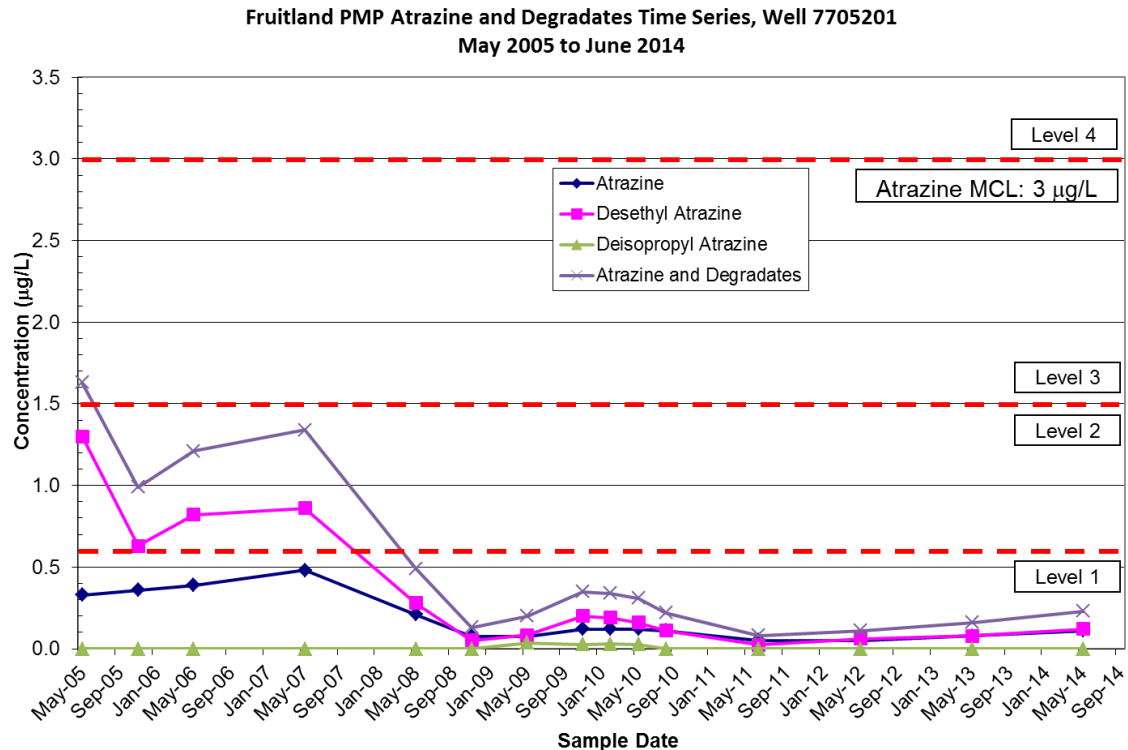


Figure 7. Time series trend for Atrazine and breakdown products for well 7705201 near Fruitland, Idaho.

Owyhee Local Project

The local project located in northwest Owyhee County is designed to evaluate wells and Dacthal (DCPA) concentrations over time as a part of the Dacthal (DCPA) PMP that was established in 2007. DCPA was prohibited from use in an area south of Homedale, near well ID 8601101. Wells southwest of Homedale have been sampled in response to the elevated detection of DCPA in well ID 8601101, that was originally part of the North Owyhee County Regional Project. A total of eleven wells in the area were sampled in May 2014 and the five wells were sampled again in August 2014.

Nine of the eleven wells sampled in May 2014 had pesticide detections. Nine wells had DCPA detections with a high concentration of 26 µg/L in well 8601101, which is a Level 2 detection (Table 8). The pesticides Atrazine, Bromacil and Desethyl Atrazine were all detected at the Level 1 concentration (Table 8). Four of the five wells sampled in August 2014 had DCPA detections with a high concentration of 7 µg/L in well 8601101, which is a Level 1 detection (Table 8). The pesticides Atrazine, Bromacil and Desethyl Atrazine were detected at the Level 1 concentration (Table 9) in two wells. Results are displayed in Table 9. The trend for DCPA in well 860110 and 3200201 are displayed in Figure 8 and 9. The concentration of DCPA has decreased from over 80 µg/L in 2005 to consistently less than 30 µg/L since 2009. In May 2013, the DCPA concentration was a Level 1 concentration of 8 µg/L, but increased to 26 µg/L in May 2014, which is a Level 2 detection. In August 2014, the DCPA concentration in 8601101 decreased to 7 µg/L (Figure 8). Tracking the trend in well 8601101 and other wells nearby will be important in determining if the management approach is working to protect ground water in this area.

Table 8. Summary of May 2014 Pesticide Results from the Owyhee County Regional Project. Eleven wells were sampled near Homedale and Marsing, Idaho.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Atrazine	2 (18%)	0.026 (0.025 – 0.026)	3 (MCL) ¹
Bromacil	1 (9%)	0.061	70 (HAL) ²
DCPA (dacthal)	8 (72%)	26 (0.26 – 26)	70 (HAL) ²
Desethyl Atrazine	1 (9%)	0.038	--- ³

¹MCL – EPA Maximum Contaminant Level.

²HAL – EPA Lifetime Health Advisory.

³Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

Table 9. Summary of August 2014 Pesticide Results from the Owyhee County DCPA (Dacthal) PMP Project. Five wells were sampled near Homedale and Marsing, Idaho.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Atrazine	1 (20%)	0.025	3 (MCL) ¹
Bromacil	1 (20%)	0.37	70 (HAL) ²
DCPA (dacthal)	3 (33%)	7 (2.8 – 7)	70 (HAL) ²
Desethyl Atrazine	1 (20%)	0.025	--- ³

¹MCL – EPA Maximum Contaminant Level.

²HAL – EPA Lifetime Health Advisory.

³Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

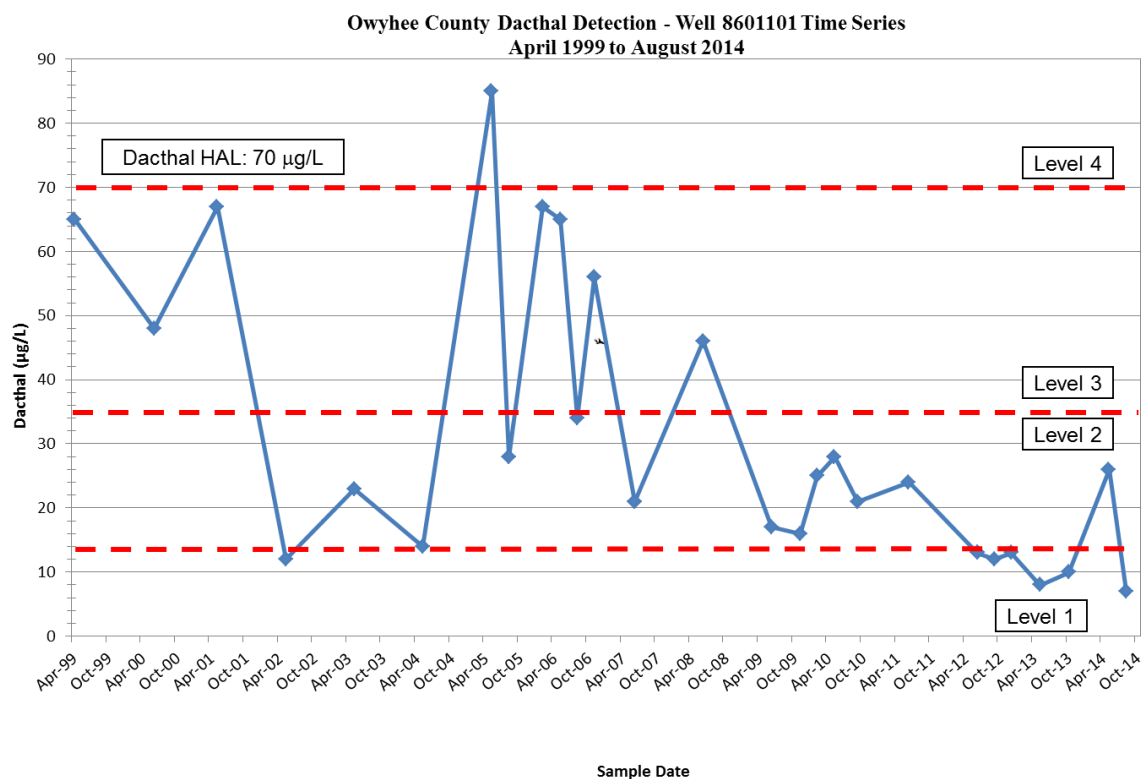


Figure 8. Trend for Dacthal (DCPA) concentrations in well 8601101 southwest of Homedale, Idaho.

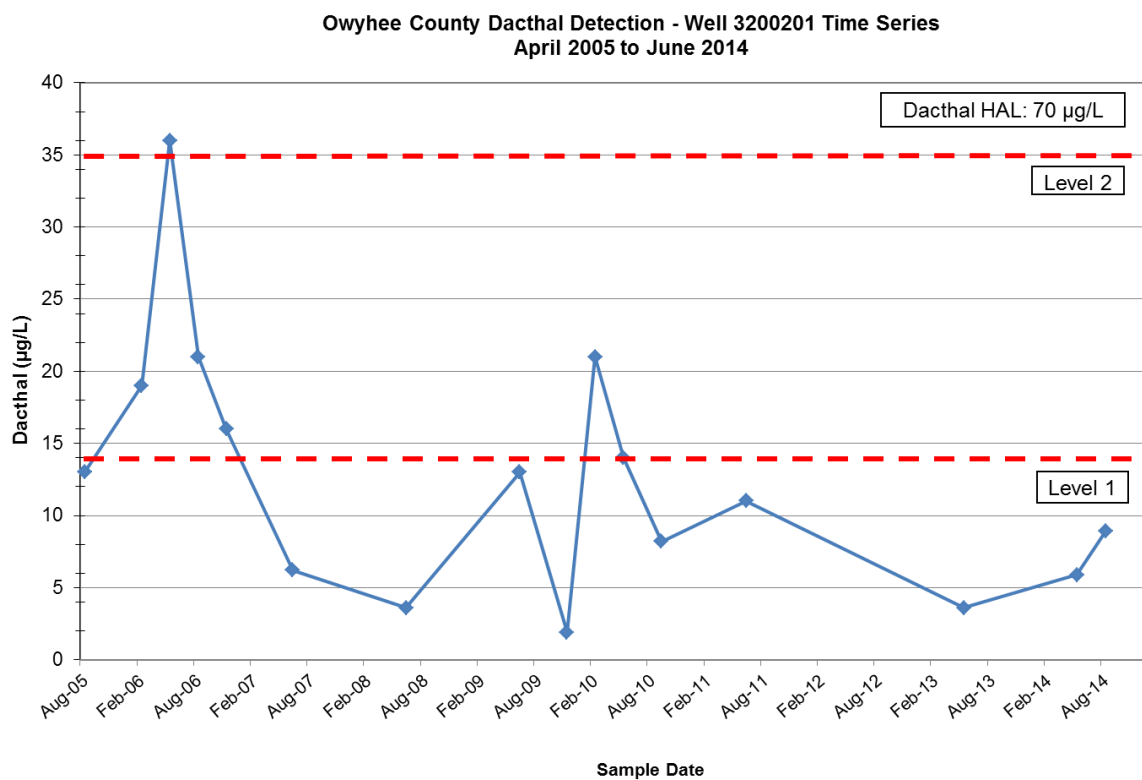


Figure 9. Trend for Dacthal (DCPA) concentrations in well 3200201 southwest of Homedale, Idaho.

Nez Perce County Local Project

The Nez Perce County local project 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 Study in 2001. Three wells were sampled in 2014 including well 9501901/3100101, which has had elevated Atrazine and Desethyl Atrazine.

Two of the three wells sampled had pesticide detections, including well 9501901/3100101. Atrazine and Deisopropyl, Desethyl Atrazine and Picloram were detected in well 9501901/3100101. The concentrations of Atrazine and Desethyl Atrazine were below the individual reference points for these pesticides (Table 10). The other pesticide Picloram, was detected at a concentration below the reference point (Table 10).

Table 10. Summary of 2014 Pesticide Results from the Nez Perce County Atrazine PMP Project. Three wells were sampled south of Lewiston, Idaho.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Atrazine	2 (77%)	0.58 (0.58)	3 (MCL) ¹
Deisopropyl Atrazine	1 (33%)	0.025 ²
Desethyl Atrazine	2 (75%)	0.8 (0.039 - 0.8) ²
Picloram	1 (33%)	0.15	500 (MCL) ¹

¹MCL – EPA Maximum Contaminant Level.

²Breakdown product of Atrazine. No reference point available, MCL for Atrazine of 3 µg/L is used.

Atrazine, and the Atrazine degradates Deisopropyl Atrazine and Desethyl Atrazine have similar toxicological effects. When they are found in the same well, the detections can be combined together to determine health risk. The combined concentration of these pesticides should be below 3 µg/L to be under the reference point. Individually, Atrazine and Desethyl Atrazine are Level 2 detections, and the combined concentrations are right at the Level 3 concentration cutoff (Figure 10). The combined concentrations were in the Level 4 category in 2010 and have decreased since then (Figure 10).

Nez Perce County Atrazine and Degradates Time Series, Well 3100101
September 2001 to September 2014

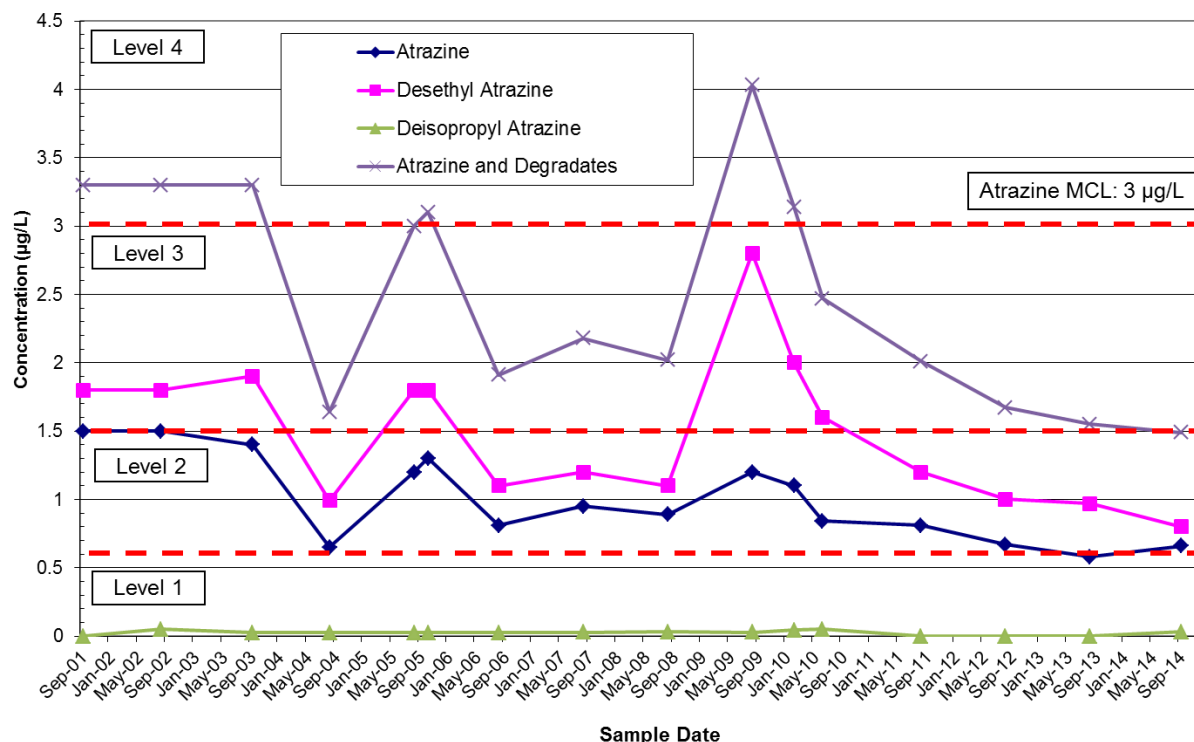


Figure 10. Time-series plot of Atrazine, Deisopropyl Atrazine and Desethyl Atrazine concentrations detected in well 3300101.

Idaho County Local Project

Three wells north of Greencreek were sampled for pesticides in 2014 as part of the Greencreek Triallate local project. These wells are also sampled as part of the Clearwater Plateau Regional Study. The well with the Triallate detection had a Level 4 detection (a detection above the reference point) of Triallate. Pentachlorophenol was also detected. ISDA has worked with the well owner for a number of years with various topics including having the pesticide registrant drill the owner a new well to hopefully provide improved well construction and water quality. The 2014 monitoring results for this well are presented in Table 11. The other wells sampled did not have any detections.

Table 11. Summary of 2014 Pesticide Results from the Greencreek Triallate PMP Project.

Pesticide	No. of Detections (% of wells sampled with detection)	Max, Range (µg/L) (Min. – Max.)	Reference Point (µg/L)
Triallate	1 (50%)	0.72	0.45 (FQPA DWLOC) ¹

¹FQPA DWLOC – Food Quality Protection Act Drinking Water Level of Concern.

The Triallate trend plot since July 2001 is displayed in Figure 11. The concentrations were not detected for two years after the new well was completed. Since 2004, the Triallate concentration increased to nearly 1 µg/L, then decreased to less than 0.8 µg/L in 2013, and then increased to 1 µg/L in 2014 (Figure 11). This is considered a Level 4 detection. It has not been concluded if these detections are due to a point or nonpoint contamination of the ground water located near the well. Triallate has not been detected in the other wells sampled along the same road.

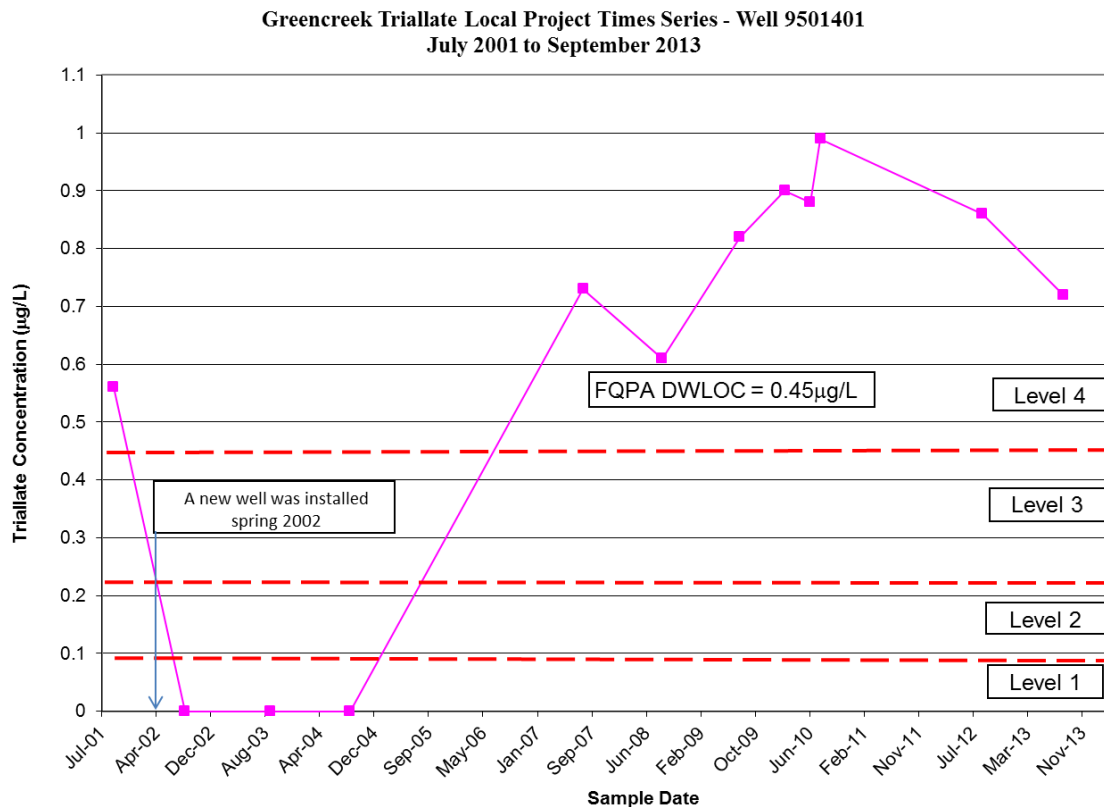


Figure 11. Time-series plot of Atrazine and Desethyl Atrazine concentrations detected in well 9501401.

Summary

The ISDA Ground Water Program implemented a wide variety of ground water monitoring projects and protection activities related to agriculture for the state of Idaho during 2014. There are numerous distinct and active ground water projects ongoing across the state, including regional monitoring projects, local monitoring projects and Pesticide Management Plan (PMP) response monitoring projects. ISDA follows the Idaho PMP Rule to determine response actions following detections.

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. The most frequent detections occur in the shallow alluvial and basalt aquifers in Ada, Cassia, Elmore, Fremont, Idaho, Minidoka, Nez Perce, Owyhee, Payette and Washington Counties. There were numerous wells with multiple low level detections of pesticides. However, most detections were less than 20% of health-based standards. A majority of wells in 2014 had detections of one or more pesticides. There are some pesticides that continue to be detected over 20% of a health-based reference point. ISDA is responding to those situations with education, use inspections and promotion of management techniques. There are concerns in certain areas where multiple low level pesticides are detected in individual wells. Some wells also have detections of active ingredients and breakdown products that may have similar, but unknown human health toxicological effects.

ISDA is conducting annual evaluations of pesticides to determine which pesticides are of greatest concern. ISDA utilizes the monitoring data, the pesticide evaluation process and the Idaho PMP Rule to determine response measures. ISDA utilizes the EPA POINTs data assessment process during the

implementation and education planning phases. Water quality and pesticide information was presented at nine educational workshops across the state to help inform the farming community of ground water quality concerns related to pesticides and efforts that can be used to protect overall ground water quality. In addition to the workshops, educational material related to pesticides and water quality was disseminated at two ground water quality open houses. Monitoring results are provided to the various state coordination committees and the Idaho Department of Water Resources for entry into the Environmental Data Management System.

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 followup and conduct local monitoring in 2015 and 2016. ISDA may initiate additional quarterly monitoring in certain project areas in 2015 and 2016. The Water Quality Program is changing laboratories in 2015 and will utilize the ISDA Idaho Food Quality Assurance Laboratory (IFQAL).

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 in the area. ISDA staff will present the information to the PMP Advisory Committee and implement the provisions of the Idaho PMP Rule.

Acknowledgments

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