Summary of Monitoring Activity – 2013

Sampling Details

The Agricultural Chemicals & Groundwater Protection Program sampled the following networks in 2013: Weld County monitoring (MW), domestic (DW), and irrigation (IW) wells, San Luis Valley, and Front Range Urban. These networks are all dedicated networks that have been sampled multiple times. Results for 2013 are briefly compared to historical results in the *General Findings* along with any noteworthy discoveries. Table 1 summarizes the sampling logistics.

Network	# Wells In Network	# Samples Collected	Sampling Period	Lab Analyses Conducted
Weld County MWs	22	64	06/17/2013 - 10/16/2013	CDA (Pesticide & Anion)
Weld County DWs	13	11	08/28/2013 - 09/04/2013	CDA (Pesticide & Anion)
Weld County Iws	33	28	08/28/2013 - 09/04/2013	CDA (Anion)
Front Range Urban MWs	67	63	04/30/2013 - 07/10/2013	CDA (Pesticide & Anion)
San Luis Valley DWs	43	40	08/13/2013 - 08/21/2013	CDA (Pesticide & Anion)
TOTAL	178	206		
MWs stands for monitoring wells; **DWs** stands for domestic wells; **IWs** stands for irrigation wells.				

TABLE 1 SUMMARY OF MONITORING ACTIVITIES CONDUCTED IN 2013

As was done in 2012 with the Weld County MWs, additional sampling events were conducted on all wells in the network in addition to the program's normal sampling time for this network in June. These two extra sampling events were done partly to determine if any considerable variability was occurring in water quality during the growing season, and partly to fulfill some sampling needs as part of an ongoing investigation into what the isotope signature is of nitrate being consistently discovered in Weld County. The two additional sampling events took place in late-July and mid-October. Results on the isotope signature and within season nitrate variability are briefly discussed in *General Findings*.

The normal analysis suite for groundwater samples includes anion and 100+ pesticide compounds and nearly all samples undergo a complete analysis. Some exceptions for 2013 are that only nine of eleven Weld County DWs were run for the normal analysis suite and Weld County IWs were only analyzed for anions. The split samples collected from Weld County MWs for isotope analysis were sent to University of California at Davis for $^{15}N/^{18}O$ determination and to Tetratech in Fort Collins, CO for ^{11}B determination. Furthermore, the Soil, Plant, and Water Testing Laboratory at Colorado State University analyzed these split samples for boron concentrations. The analytes screened for at the CDA and CSU laboratories and their corresponding reporting limits are presented in Table 6 at the end of

this summary. As of February 2014 all the results for the isotope signatures have not been received and reviewed, so they are not discussed with any depth.

General Findings

Overall, the nitrate-nitrogen (NO_3-N) values discovered in all well networks (Table 2), compared with historical sampling data, are within what is expected of each respective network. In Weld County, NO_3-N median values for the MWs and DWs were within the long-term median range, but the IW median for 2013 was slightly higher than historical values. This could just be a result of the year to year variability that occurs in the IW network, but this has now occurred two years in a row. The NO_3-N median for Front Range Urban MWs was within the median range for data collected five times since 2005. The San Luis Valley DWs NO_3-N median was within the median range for data collected three times since 2009.

Nitrate-Nitrogen Findings by Network

Well Network	# Years Sampled	AT Median Range	Median	Range	# BDL	# ≥ STD
Weld County MWs	19	18.9 - 21.5	20.2	1.4 - 55.2	0	16
Weld County DWs	20	10.5 - 12.7	6.5	1.9 - 19.5	0	4
Weld County IWs	23	16.0 - 17.5	18.2	1.9 - 38.3	0	15
Front Range Urban MWs	5	3.8 - 7.2	4.2	BDL - 34.4	5	12
San Luis Valley DWs	3	1.4 - 2.3	1.6	BDL - 36.9	4	5

AT Median Range is the 95% confidence interval of the median for all years of data collection in the network; **Median** is the 2013 median for the network; **Range** is the range of values discovered in 2013 in the network; **# BDL** is the number of samples that were below thd detection limit in 2013; **# ≥ STD** is the number of samples with NO_3-N at or above the U.S. EPA Drinking Water Standard of 10.0 in 2013; All values are in units of mg L^{-1} or parts-per-million except # Years Sampled, #BDL and #≥STD.

TABLE 2 NITRATE-NITROGEN RESULTS FOR SAMPLES COLLECTED IN 2013 WITH COMPARISON TO LONG-TERM MEDIAN VALUES

Historically, more than 60% of all samples collected in Weld County, during their normally scheduled sampling times, have been above the U.S. EPA Maximum Contaminant Level (MCL) for NO_3-N of 10.0 mg L^{-1} or parts-per-million (ppm), but only 57% of samples were this way in 2013. Table 2 shows each network's NO_3-N median value and number of wells over the EPA MCL.

Table 3 shows results for the multiple sampling events conducted on Weld County MWs in 2013. In 2012, multiple sampling events were done on ten wells (well ID's above the dotted red line in Table 3) and at that time they showed significant temporal variability in NO_3-N concentration with no cluster or network-wide trends. For these same ten wells in 2013 there was again evidence that the concentration measured in June (the normally planned for annual sampling date) was not the greatest concentration in all cases and some measurements made in 2013 were above or below the long-term median ranges for the

individual wells. Data for the other 12 wells that were sampled multiple times in 2013 also demonstrated this characteristic. One well of interest is WL-M-007 which has historically reported some of the networks highest NO_3-N concentrations, but it appears since it hit 104 ppm in 2009, it has been consistently decreasing in concentration. This well has exhibited this type of temporal response in the past and while its data does not have a statistically significant trend defined, there may be a correlation to crop or irrigation management cycles on nearby irrigated fields.

Weld County MW Nitrate-Nitrogen: 2013 and Historical Concentrations

Well	AT Median Range	June-2012	June-2013	July-2013	October-2013
WL-M-003A	28.5 - 34.1	34.3	31.8	23.3	39.1
WL-M-008	17.5 - 25.8	58.8	38.0	55.1	49.5
WL-M-009	3.0 - 4.1	1.4	1.4	1.8	4.3
WL-M-011	11.2 - 21.5	4.8	11.3	13.7	12.1
WL-M-013	20.1 - 26.6	10.6	12.0	23.3	7.0
WL-M-022	8.9 - 17.2	22.3	9.1	5.7	18.8
WL-M-040	59.2 - 81.5	63.2	55.2	56.7	47.1
WL-M-401	2.6 - 4.2	3.2	2.3	2.8	3.6
WL-M-501	12.5 - 33.3	16.5	9.6	20.1	9.4
WL-M-901	6.8 - 13.7	11.6	19.8	17.9	4.5
WL-M-001	7.8 - 11.0	10.8	10.5	8.4	12.0
WL-M-002	24.6 - 39.4	22.1	21.7	28.0	26.7
WL-M-006A	24.5 - 28.9	15.7	21.5	29.6	29.7
WL-M-007	53.0 - 88.0	49.0	41.7	35.7	30.5
WL-M-010	7.7 - 14.2	4.7	6.6	2.7	12.1
WL-M-014	23.9 - 31.1	23.7	20.6	21.6	27.0
WL-M-015	15.8 - 21.8	22.3	24.5	DNS	DNS
WL-M-019	3.8 - 7.7	3.3	2.7	3.8	4.5
WL-M-023	29.2 - 47.6	29.0	29.4	32.7	29.9
WL-M-170	11.8 - 17.8	11.8	17.1	8.6	14.5
WL-M-180	20.9 - 42.2	19.5	22.3	22.5	22.5
WL-M-603	18.9 - 26.6	22.1	26.6	29.4	24.6

AT Median Range is the median range of nitrate-nitrogen discovered in the well for all years sampled. "DNS" means Did Not Sample. All values are in units of mg L^{-1} or parts-per-million except p-val.

TABLE 3 NITRATE-NITROGEN RESULTS FOR WELD COUNTY MONITORING WELLS SAMPLED MULTIPLE TIMES IN 2013 AS COMPARED TO LONG-TERM MEDIAN RANGE. ALL WELLS ABOVE THE DOTTED RED LINE WERE ALSO SAMPLED MULTIPLE TIMES DURING THE 2012 FIELD SEASON.

In 2012, well WL-M-040 spiked to 103 ppm NO_3-N in October, but the value in October of 2013 was more than half of that. The program will continue to conduct multiple sampling events on MWs in Weld County as necessary to continue increasing our understanding of the variability and magnitude of nitrate contamination in the South Platte aquifer.

The program is continuing to receive and analyze isotope data on samples collected from the three sampling events of Weld County MWs. Preliminary results show that the $^{15}N/^{18}O$ signature on nitrate in the alluvial groundwater is predominantly organic which suggests that either manure or domestic waste sources are impacting the aquifer to a greater degree than inorganic (synthetic fertilizer) sources. The results from ^{11}B isotopic analysis will assist in further delineating between manure and domestic waste sources. A more in depth presentation and discussion on this information will take place as part of the program's ongoing reassessment of Weld County groundwater nitrate trends and how they relate to program monitoring and outreach in the area.

The NO_3-N discoveries in the San Luis Valley again saw most of the wells near or above the EPA MCL in the Closed Basin part of the network around Center, CO. Overall the NO_3-N median concentration was similar to the prior two years but the maximum concentration of 37 ppm was almost ten ppm greater than the maximum in 2011; however, this detection was from a new well not sampled in either of previous two sampling events. The well with the maximum in 2011 contained 23.1 ppm NO_3-N in 2013, which was about five ppm less.

The Front Range Urban area has seen a NO_3-N median concentration at or near 4.1 ppm since sampling of the entire network (Fort Collins, Greeley, Denver-metro, and Colorado Springs) began in 2008. While 63 samples were collected in both 2010 and 2013, two new wells were sampled in 2013, but their detected concentrations did not result in a significant change in NO_3-N median. The 11 wells sampled in south and southeastern Colorado Springs have continued to exhibit the highest NO_3-N median at 9.9 ppm in 2013. The 95% confidence interval around this NO_3-N median is 3.2 to 14.3 ppm, while the median and 95% median confidence interval for the 34 wells in Denver-metro were 3.9 ppm and 2.1 to 4.8 ppm, respectively. In general, nitrate contamination is not a major concern, but as can be seen in Table 2, 12 samples (19% of the sample network) were at or above the EPA MCL.

There were a total of 240 detections of 26 different pesticide compounds in 2013. As can be seen in Table 5, the majority (79.6%) of detections were found in Weld County MWs. Remember that all of these wells were sampled three times (except WL-M-015) and this explains why so many detections came from Weld County MWs. However, over the three sampling events for these wells there were 64, 57, and 70 pesticide detections which show these wells consistently have detectable quantities of pesticide compounds. The normal June sampling event for the Weld County MWs showed more pesticide detections than in all three of the other networks sampled in 2013 – 10 detections Weld County DWs, 13 detections San Luis Valley DWs, and 26 detections Front Range Urban MWs.

The most frequently detected pesticides were metolachlor ESA and metolachlor OA (breakdown products of metolachlor – Tradename[1] Bicep). 62% of 240 detections in 2013 were of these two compounds, with metolachlor ESA having 20 more detections than metolachlor OA. This has tended to be the norm since 2009, especially in Weld County MWs. The single detection of metolachlor ESA in the Front Range Urban network is from a well that is installed on the fringe of agriculture and urban residential, so its occurrence is likely due to past or current agricultural activity in the area around the well. Metolachlor use in the San Luis Valley is common, so the detections of metolachlor breakdown products is not surprising and matches what has been discovered since 2009 in that network. Another pesticide detected by the U.S. Geologic Survey in prior years is metribuzin (Tradename Lexone or Sencor) but our program found no detections of it in 2013.

Somewhat alarming was the 19 detections of prometon (73% of all Front Range Urban detections) in the Front Range Urban MWs in 2013. About half of these detections were in MWs in the Fort Collins, CO area at concentrations ranging from 0.373 to 0.385 ppb which is significantly below the 40 ppb EPA Health Advisory Level (HAL). In a Weld County MW in 2012, it was surprising to find a detection of fenamiphos sulfone, a breakdown product of the banned pesticide fenamiphos (Tradename Nemacur), but in 2013 an actual detection of fenamiphos was discovered in Weld County at a concentration of 0.129 ppb which is below the EPA MCL of 0.7 ppb. This detection was not in the same well as the fenamiphos breakdown product found in 2012. There may be a lag-time response associated with this discovery but the program will be attentive to this pesticide in future sampling events.

2013 Pesticide Results for WL-M-022

	6/26/2013	7/29/2013	10/9/2013
Atrazine	41.30	1.51 (-96.3%)	0.14 (-99.6%)
Desethyl Atrazine	3.61	1.81 (-49.9%)	1.51 (-58.2%)
DAR (ratio)	0.09	1.2	10.8
Metolachlor	11.20	2.81 (-75.0%)	2.1 (-82.3%)
Metolachlor ESA	2.01	5.0	5.1
Metolachlor OA	1.11	1.7	1.4
Dicamba	9.80	BDL (-89.8%)	BDL

BDL means Below Detection Limit; Concentrations are in parts-per-billion (ppb)

TABLE 4 CONCENTRATIONS OF SELECT PESTICIDES OVER THREE SAMPLING EVENTS IN A SINGLE WELL IN THE WELD COUNTY MONITORING WELL NETWORK. VALUES IN PARENTHESIS ARE THE PERCENTAGE OF DECREASE IN CONCENTRATION FROM THE INITIAL CONCENTRATION ON 6/26/2013. THE DETECTION LIMIT OF DICAMBA IN 2013 WAS 1.0 PPB.

The last major discovery in 2013 was a detection of 41.3 ppb of atrazine (Tradename AATrex) in a Weld County MW (WL-M-022) just south of Platteville, CO. This concentration was 13X greater than the EPA MCL of 3.0 ppb for atrazine. This well was resampled about 30 days after its first sampling in late-June and the concentration had dropped to 1.51 ppb. The last sampling in mid-October showed a concentration of 0.14 ppb. Table 4 shows how the desethyl atrazine to atrazine ratio (DAR) varied over the three sampling events. A DAR less

[1] Tradenames are used as example for a product that contains a particular active ingredient or pesticide compound and do not indicate that the specific product has been studied and/or detected.

than 1.0 is highly indicative of point source contamination which likely means there was an atrazine spill somewhere up-gradient of WL-M-022. Other supporting evidence of this was high metolachlor concentrations over the three sampling events. Metolachlor is commonly mixed with atrazine in the product Dual. This well also showed a detection of 9.8 ppb of dicamba which can be mixed with atrazine in products like Banvel-k + Atrazine. Dicamba was not detected in any of the two latter samples. Investigation in the area did not clearly indicate any spill site. The rapid attenuation of the atrazine was surprising, but similar responses in metolachlor and dicamba concentrations suggests that the contamination was most likely flushed through by groundwater with high transmissivity or hydraulic conductivity. If the spilled product did contain atrazine, metolachlor and dicamba, it is interesting to note that metolachlor appeared to be the only pesticide that persisted after its initial 75% decrease. The fact that its breakdown products (metolachlor ESA and metolachlor OA) increased in concentration indicates that degradation of the parent compound was taking place.

Conclusion

The program did not find any alarming discoveries with regard to nitrate contamination in 2013. The concentrations found in Weld County are in line with the 20+ years of data which unfortunately doesn't indicate decreasing trends in nitrate concentrations. Preliminary results on nitrate isotopic signatures in Weld County alluvial groundwater suggest that the predominant source of nitrate may be manure. Whether the contamination is a result of stockpiling of manure on feedlots or a result of use as a soil amendment is still being investigated. Samples collected from the Front Range Urban network showed about $1/5^{th}$ of the wells at or above the U.S. EPA MCL of 10.0 ppm for NO_3-N but the network median of 4.1 ppm has not significantly changed since 2008. Similarly, the domestic well network sampled in the San Luis Valley has not seen significant change in NO_3-N median but continues to see wells over the EPA MCL in the Closed Basin area around Center, CO.

Overall the number of detections and types of pesticides is similar to past years with some exceptions. Metolachlor breakdown products continue to be the most frequently detected pesticide, especially in Weld County MWs. The Weld County MW network saw two major discoveries in 2013 with a detection of the banned pesticide fenamiphos and a detection of atrazine at 13X its EPA MCL of 3.0 ppb. Follow up samples from the well with the atrazine saw the concentration drop more than 95% to below the EPA MCL within 30 days. Also of interest was the increase in the number of prometon detections in the Front Range Urban network with approximately half of them coming from wells in Fort Collins, CO. Fortunately the detected concentrations are well below the EPA HAL of 40 ppb.

All of the data seen and/or discussed in this monitoring summary can be queried and downloaded from the program's online water quality database found at: http://www.erams.com/co_groundwater.

Pesticide Compounds Detected in Various Networks Sampled in 2013				
Pesticide Active Ingredient	**Network**	**# Detects**	**Conc. Range (Median)**	**Note**
Metolachlor ESA	Front Range Urban	1	0.77	No Drinking Water Standard
	Weld County Domestic	7	0.22 - 1.38 (0.59)	
	Weld County Monitoring	61	0.29 - 10.08 (2.16)	
	San Luis Valley Domestic	7	0.36 - 2.95 (1.13)	
Metolachlor OA	Weld County Domestic	1	0.53	No Drinking Water Standard
	Weld County Monitoring	50	0.25 - 4.37 (0.95)	
	San Luis Valley Domestic	5	0.26 - 2.64 (0.44)	
Metolachlor	Weld County Domestic	1	0.12	U.S. EPA Drinking Water HAL 700 ppb
	Weld County Monitoring	16	0.13 - 12.64 (1.72)	
Desethyl Atrazine	Front Range Urban	1	0.17	No Drinking Water Standard
	Weld County Monitoring	14	0.1 - 3.61 (0.26)	
Prometon	Front Range Urban	19	0.25 - 0.385 (0.374)	U.S. EPA Drinking Water HAL 40 ppb
	Weld County Monitoring	1	0.24	
Imazapyr	Front Range Urban	3	0.21 - 2.23	U.S. EPA HHBP Chronic 17500 ppb
	Weld County Monitoring	9	0.21 - 0.43 (0.29)	
Alachlor ESA	Weld County Monitoring	7	0.26 - 0.83 (0.64)	No Drinking Water Standard
Thiamethoxam	Weld County Monitoring	7	0.45 - 9.83 (1.12)	U.S. EPA HHBP Chronic 84 ppb
Atrazine	Weld County Monitoring	4	0.11 - 41.3 (0.83)	U.S. EPA Drinking Water MCL 3.0 ppb
Dimethenamid ESA	Weld County Monitoring	4	0.22 - 0.76 (0.55)	No Drinking Water Standard
Desisopropyl Atrazine	Weld County Monitoring	4	0.25 - 0.82 (0.55)	No Drinking Water Standard
Dimethenamid OA	Weld County Monitoring	2	0.19 - 0.42	No Drinking Water Standard
Dicamba	Weld County Monitoring	2	2.31 - 9.8	U.S. EPA Drinking Water HAL 4000 ppb
Bromacil	Weld County Monitoring	2	0.5 - 6.57	U.S. EPA Drinking Water HAL 70 ppb
Fenamiphos	Weld County Monitoring	1	0.13	U.S. EPA Drinking Water HAL 0.7 ppb
MCPP	San Luis Valley Domestic	1	0.78	U.S. EPA HHBP Chronic 280 ppb
Diuron	Weld County Monitoring	1	0.41	No Drinking Water Standard
Azoxystrobin	Weld County Monitoring	1	0.17	U.S. EPA HHBP Chronic 1260 ppb
Chlorsulfuron	Weld County Monitoring	1	0.65	U.S. EPA HHBP Chronic 1400 ppb
Imazamox	Weld County Domestic	1	0.22	No Drinking Water Standard
Imazapic	Front Range Urban	1	0.78	U.S. EPA HHBP Chronic 3500 ppb
Imidacloprid	Weld County Monitoring	1	0.34	U.S. EPA HHBP Chronic 399 ppb
Propazine	Weld County Monitoring	1	0.28	U.S. EPA Drinking Water HAL 10 ppb
Quinclorac	Front Range Urban	1	0.21	U.S. EPA HHBP Chronic 2660 ppb
Tebuthiuron	Weld County Monitoring	1	0.10	U.S. EPA Drinking Water HAL 500 ppb
Simazine	Weld County Monitoring	1	0.13	U.S. EPA Drinking Water MCL 4.0 ppb

Conc. Range/Median is the range of concentration the detected pesticide active ingredient was discovered at and for instances with more than three detections the median is shown in parentheses; all concentrations are in parts-per-billion (ppb); **HAL** is Health Advisory Level; **MCL** is Maximum Contaminant Level; **HHBP** is Human Health Benchmark for Pesticides

TABLE 5 CONCENTRATION RANGE AND MEDIAN FOR THE DIFFERENT PESTICIDE ACTIVE INGREDIENTS DISCOVERED IN THE NETWORKS SAMPLED IN 2013. MEDIAN IS CALCULATED ONLY FOR NETWORKS WITH A SUFFICIENT NUMBER OF DETECTS OF A PARTICULAR PESTICIDE.

Analytes Measured of Groundwater Samples† Collected in 2013							
Analyte Name	**Reporting Limit**	**Units**	**Laboratory**	**Analyte Name**	**Reporting Limit**	**Units**	**Laboratory**
2,4-D	0.2	ug/L	CDA Groundwater Lab	Metolachlor	0.1	ug/L	CDA Groundwater Lab
2,4-DB	0.2	ug/L	CDA Groundwater Lab	Metolachlor ESA	0.1	ug/L	CDA Groundwater Lab
2,4-DP	0.1	ug/L	CDA Groundwater Lab	Metolachlor OA	0.1	ug/L	CDA Groundwater Lab
3-Hydroxycarbofuran	0.5	ug/L	CDA Groundwater Lab	Metsulfuron methyl	0.2	ug/L	CDA Groundwater Lab
Acetochlor	0.1	ug/L	CDA Groundwater Lab	Nicosulfuron	0.5	ug/L	CDA Groundwater Lab
Acetochlor ESA	0.2	ug/L	CDA Groundwater Lab	Norflurazon desmethyl	0.5	ug/L	CDA Groundwater Lab
Acetochlor OA	0.1	ug/L	CDA Groundwater Lab	Oxamyl	0.5	ug/L	CDA Groundwater Lab
Acifluorfen	0.1	ug/L	CDA Groundwater Lab	Oxydemeton methyl	1.0	ug/L	CDA Groundwater Lab
Alachlor	0.1	ug/L	CDA Groundwater Lab	Picloram	0.5	ug/L	CDA Groundwater Lab
Alachlor ESA	0.2	ug/L	CDA Groundwater Lab	Propazine	0.1	ug/L	CDA Groundwater Lab
Alachlor OA	0.2	ug/L	CDA Groundwater Lab	Propoxur	0.1	ug/L	CDA Groundwater Lab
Aldicarb	0.2	ug/L	CDA Groundwater Lab	Prosulfuron	0.1	ug/L	CDA Groundwater Lab
Aldicarb sulfone	0.2	ug/L	CDA Groundwater Lab	Pyrimethanil	0.1	ug/L	CDA Groundwater Lab
Aldicarb sulfoxide	0.2	ug/L	CDA Groundwater Lab	Quinclorac	0.1	ug/L	CDA Groundwater Lab
Aminopyralid	0.1	ug/L	CDA Groundwater Lab	Simazine	0.1	ug/L	CDA Groundwater Lab
Atrazine	0.1	ug/L	CDA Groundwater Lab	Sulfentrazone	0.5	ug/L	CDA Groundwater Lab
Azoxystrobin	0.1	ug/L	CDA Groundwater Lab	Sulfometuron methyl	0.1	ug/L	CDA Groundwater Lab
Bentazon	0.5	ug/L	CDA Groundwater Lab	Sulfosulfuron	0.2	ug/L	CDA Groundwater Lab
Bromacil	0.5	ug/L	CDA Groundwater Lab	Tebuconazole	0.1	ug/L	CDA Groundwater Lab
Carbofuran	0.1	ug/L	CDA Groundwater Lab	Tebufenozide	0.1	ug/L	CDA Groundwater Lab
Chlorantraniliprole	0.1	ug/L	CDA Groundwater Lab	Tebuthiuron	0.1	ug/L	CDA Groundwater Lab
Chlorimuron ethyl	0.5	ug/L	CDA Groundwater Lab	Terbacil	0.5	ug/L	CDA Groundwater Lab
Chlorsulfuron	0.5	ug/L	CDA Groundwater Lab	Thiamethoxam	0.2	ug/L	CDA Groundwater Lab
Clopyralid	1.0	ug/L	CDA Groundwater Lab	Triadimefon	0.1	ug/L	CDA Groundwater Lab
Cyanazine	0.1	ug/L	CDA Groundwater Lab	Triallate	0.5	ug/L	CDA Groundwater Lab
Cyproconazole	0.1	ug/L	CDA Groundwater Lab	Triasulfuron	0.2	ug/L	CDA Groundwater Lab
Cyromazine	0.5	ug/L	CDA Groundwater Lab	Trichlorfon	0.2	ug/L	CDA Groundwater Lab
Desethyl Atrazine	0.2	ug/L	CDA Groundwater Lab	Triclopyr	0.5	ug/L	CDA Groundwater Lab
Desisopropyl Atrazine	0.1	ug/L	CDA Groundwater Lab	Triticonazole	0.1	ug/L	CDA Groundwater Lab
Dicamba	0.5	ug/L	CDA Groundwater Lab	Chlorothalonil	0.2	ug/L	CDA Groundwater Lab
Diflufenzopyr	0.1	ug/L	CDA Groundwater Lab	DCPA	0.2	ug/L	CDA Groundwater Lab
Dimethenamid	0.1	ug/L	CDA Groundwater Lab	Dichlobenil	0.2	ug/L	CDA Groundwater Lab
Dimethenamid ESA	0.1	ug/L	CDA Groundwater Lab	Dichlorvos	0.2	ug/L	CDA Groundwater Lab
Dimethenamid OA	0.1	ug/L	CDA Groundwater Lab	Disulfoton	0.2	ug/L	CDA Groundwater Lab
Dimethoate	0.1	ug/L	CDA Groundwater Lab	Disulfoton sulfone	0.2	ug/L	CDA Groundwater Lab
Dinotefuran	0.2	ug/L	CDA Groundwater Lab	Disulfoton sulfoxide	1.0	ug/L	CDA Groundwater Lab
Diuron	0.2	ug/L	CDA Groundwater Lab	Ethoprop	0.2	ug/L	CDA Groundwater Lab
Ethofumesate	0.2	ug/L	CDA Groundwater Lab	Fenamiphos	0.5	ug/L	CDA Groundwater Lab
Florasulam	0.1	ug/L	CDA Groundwater Lab	Fenamiphos sulfone	0.5	ug/L	CDA Groundwater Lab
Flufenacet	0.1	ug/L	CDA Groundwater Lab	Hexazinone	0.5	ug/L	CDA Groundwater Lab
Flumetsulam	0.1	ug/L	CDA Groundwater Lab	Lindane	0.2	ug/L	CDA Groundwater Lab
Halofenozide	0.1	ug/L	CDA Groundwater Lab	Linuron	0.5	ug/L	CDA Groundwater Lab
Halosulfuron methyl	0.2	ug/L	CDA Groundwater Lab	Malathion	0.2	ug/L	CDA Groundwater Lab
Hydroxy Atrazine	0.2	ug/L	CDA Groundwater Lab	Metalaxyl	0.2	ug/L	CDA Groundwater Lab
Imazamethabenz ester	0.1	ug/L	CDA Groundwater Lab	Metribuzin	0.2	ug/L	CDA Groundwater Lab
Imazamox	0.2	ug/L	CDA Groundwater Lab	Norflurazon	0.2	ug/L	CDA Groundwater Lab
Imazapic	0.1	ug/L	CDA Groundwater Lab	Prometon	0.2	ug/L	CDA Groundwater Lab
Imazapyr	0.2	ug/L	CDA Groundwater Lab	Vinclozolin	0.2	ug/L	CDA Groundwater Lab
Imazethapyr	0.2	ug/L	CDA Groundwater Lab	Br	0.05	mg/L	CDA Groundwater Lab
Imidacloprid	0.2	ug/L	CDA Groundwater Lab	Cl	0.05	mg/L	CDA Groundwater Lab
Isoxaflutole	0.1	ug/L	CDA Groundwater Lab	F	0.05	mg/L	CDA Groundwater Lab
Kresoxim methyl	0.2	ug/L	CDA Groundwater Lab	Nitrate-nitrogen	0.05	mg/L	CDA Groundwater Lab
MCPA	0.2	ug/L	CDA Groundwater Lab	Nitrite-nitrogen	0.05	mg/L	CDA Groundwater Lab
MCPP	0.2	ug/L	CDA Groundwater Lab	Ortho-P (Dissolved)	0.05	mg/L	CDA Groundwater Lab
Metconazole	0.1	ug/L	CDA Groundwater Lab	SO4	0.05	mg/L	CDA Groundwater Lab
Methomyl	0.2	ug/L	CDA Groundwater Lab	B	0.01	mg/L	CSU Soil, Plant and Water Lab

†, not all groundwater samples underwent analysis for all analytes listed in this table; **CDA** is Colorado Department of Agriculture; **CSU** is Colorado State University

TABLE 6 REPORTING LIMITS FOR ALL LABORATORY ANALYTES MEASURED IN 2013.