

Study 228: Monitoring the Concentrations of Detected Pesticides in Wells Located in Highly Sensitive Areas (Well Network Sampling)

Annual Update 2015

- **Introduction:**

This report summarizes the annual results of a monitoring project that documents pesticide concentrations in domestic wells located in the San Joaquin Valley of California. This study was initiated to monitor levels of herbicides in wells located in areas that are highly vulnerable to pesticide movement to ground water in order to determine efficacy of ground water protection regulations implemented in those areas. The wells were sampled annually from 1999 through 2015 (Garretson, 1999). Included here are the results of the 2015 sampling. A statistical analysis of data collected from 1999-2012 is reported in Troiano et al., 2013. This study is ongoing and updates of results are posted annually.

- **Study Area:** Fresno and Tulare Counties

- **Most Recent Sampling Period:** 4/8/15 – 5/26/15

- **Number of Wells Sampled:** 63

- **Pesticides, Pesticide Degradates, and Chemicals Monitored:**

1. Annual triazine screen – 11 analytes including: atrazine, bromacil, diuron, hexazinone, norflurazon, prometon, simazine, ACET, DACT, DEA, and DMN.
2. Multi Residue screen – 29 analytes by Liquid Chromatography Mass Spectrometry (LC/MS) including: atrazine, azinphos-methyl, azoxystrobin, bensulide, bromacil, carbaryl, carbofuran, diazinon, dimethenamide, dimethoate, diuron, ethofumesate, fenamiphos, fludioxonil, imidacloprid, linuron, mefenoxam/metalaxyl, methiocarb, metolachlor, metribuzin, napropamide, norflurazon, oryzalin, prometon, simazine, tebuthiuron, thiamethoxam, thiobencarb, and uniconazole.

- **Results for Annual Triazine Screen Monitoring and for Multi Residue Screen:**

Results for each well are included in Tables 1-2 and in the California Department of Pesticide Regulation well inventory database (CDPR, 2015). The California Department of Food and Agriculture, Center for Analytical Chemistry analyzed all samples according to analytical method EM 62.9 (CDFA, 2009) and Multi Residue screen analytical method EMON-SM-05-032 (CDFA, 2013). The reporting limit for each analyte is 0.05 ug/L. Chemistry results and quality control data are presented in Tables 3-5.

Positive finds (other than triazine screen analytes) from Multi Residue screen:

1. Imidacloprid
 - (a) 0.051 ug/L Well #26
 - (b) 0.065 ug/L Well #21
 - (c) 0.120 ug/L Well #22
 - (d) 0.218 ug/L Well #23
 - (e) 0.665 ug/L Well #18
 - (f) Trace Well #29

2. Oryzalin
 - (a) Trace Well #44

3. Mefenoxam/metalaxyl
 - (a) Trace Well #29

4. Metolachlor
 - (a) Trace Well #74

REFERENCES

CDFA, 2009. EM 62.9 Determination of Atrazine, Bromacil, Cyanazine, Diuron, Hexazinone, Metribuzin, Norflurazon, Prometon, Prometryn, Simazine, Deethyl Atrazine (DEA), Deisopropyl Atrazine (ACET), Diamino Chlorotraizine (DACT), Tebuthiuron and the metabolites Tebuthiuron-104, Tebuthiuron-106, Tebuthiuron-107 and Tebuthiuron-108 in Well Water and River Water By Liquid Chromatography- Atmospheric Pressure Chemical Ionization Mass Spectrometry (Revised 2009) Available at:

http://www.cdpr.ca.gov/docs/emon/pubs/anl_methds/emon-sm-62_9.pdf (verified May 15, 2017).

CDFA, 2013. EMON-SM-05-032 Determination of 44 Pesticides in Well Water by Liquid Chromatography Coupled to Linear Ion Trap Quadrupole and Gas Chromatography Coupled to Triple Quadrupole Mass Spectrometer. Available at:

http://www.cdpr.ca.gov/docs/emon/pubs/anl_methds/emon-sm-05-032.pdf (verified October 6, 2017).

CDPR. 2013. Well inventory data base. California Department of Pesticide Regulation, Sacramento, California. Available at:

http://www.cdpr.ca.gov/docs/emon/grndwtr/well_inventory_database/index.htm (verified July 12, 2017).

Garretson, C. 1999. Protocol for Monitoring the Concentration of Detected Pesticides in Wells Located in Highly Sensitive Areas. Study 182. Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, California. Available at: <http://www.cdpr.ca.gov/docs/emon/pubs/protocol/prot182.pdf> (verified May 15, 2017).

Troiano, J., C. Garretson, A. Dasilva, J. Marade, and T. Barry. 2013. Pesticide and Nitrate Trends in Domestic Wells where Pesticide Use Is Regulated in Fresno and Tulare Counties, California. J. Environ. Qual. doi:10.2134/jeq2013.06.0219 Available at:

http://www.cdpr.ca.gov/docs/emon/pubs/ehapref/pesticide_well_trends.pdf (verified May 15, 2017).

Table 1. Spring 2015 Triazine Screen Sampling Results in ug/L (ppb)

Sample Number	Well Number	Date Sampled	ACET	Atrazine	Bromacil	DACT	DEA	Diuron	DMN	Hexazinone	Norflurazon	Prometon	Simazine	Propazine	RL in ug/l
2601	1	5/19/15	0.065	ND	ND	0.063	ND	T	ND	ND	ND	ND	ND	85.0	0.05
2548	2	4/22/15	0.137	ND	ND	0.092	ND	T	ND	ND	ND	ND	0.068	84.0	0.05
2563	3	5/19/15	0.079	ND	ND	0.078	ND	ND	0.171	ND	T	ND	0.055	81.5	0.05
2562	4	5/19/15	0.350	T	2.110	0.547	T	T	0.184	ND	0.289	T	0.080	82.5	0.05
2608	5	4/15/15	0.489	ND	ND	0.760	T	ND	0.246	ND	ND	ND	0.092	78.0	0.05
2568	6	4/15/15	0.675	ND	ND	0.905	ND	T	ND	ND	ND	ND	0.083	83.0	0.05
2607	7	4/15/15	0.120	ND	ND	0.199	ND	ND	ND	ND	ND	ND	T	76.5	0.05
2571	8	4/15/15	0.288	ND	0.054	0.322	T	ND	ND	ND	ND	ND	0.097	84.5	0.05
2572	12	4/22/15	0.322	ND	0.281	0.255	ND	T	ND	ND	ND	ND	T	81.5	0.05
2597	13	5/19/15	0.130	ND	0.490	0.228	ND	T	0.091	ND	0.053	ND	T	83.0	0.05
2598	14	5/19/15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	87.5	0.05
2542	15	5/26/15	0.132	ND	ND	0.397	ND	T	0.288	ND	0.151	ND	0.074	86.5	0.05
2561	16	5/19/15	0.227	ND	ND	0.653	ND	0.062	0.648	ND	0.296	ND	0.076	82.0	0.05
2562	18	5/26/15	0.169	ND	ND	0.291	T	ND	T	ND	ND	ND	0.055	84.0	0.05
2538	19	4/28/15	0.150	ND	ND	0.171	ND	T	0.119	ND	T	ND	0.073	83.5	0.05
2574	20	4/28/15	0.070	ND	ND	T	ND	ND	ND	ND	ND	ND	T	76.5	0.05
2613	21	4/28/15	T	ND	ND	0.087	ND	ND	0.095	ND	ND	ND	ND	76.5	0.05
2611	22	4/27/15	0.234	ND	ND	0.921	ND	ND	T	ND	ND	ND	0.068	74.5	0.05
2578	23	4/27/15	0.261	ND	T	0.408	ND	T	0.168	ND	T	ND	0.072	80.0	0.05
2553	24	5/18/15	T	ND	ND	T	ND	ND	0.155	ND	T	ND	ND	78.5	0.05
2551	25	5/18/15	0.082	ND	ND	0.070	ND	ND	ND	ND	ND	ND	0.050	81.0	0.05
2591	26	5/18/15	0.071	ND	ND	0.093	ND	ND	0.100	ND	ND	ND	T	83.5	0.05
2586	28	5/4/15	T	ND	ND	0.067	ND	ND	ND	ND	ND	ND	T	83.0	0.05
2590	29	5/11/15	T	ND	ND	0.090	ND	ND	0.213	ND	ND	ND	ND	73.5	0.05
2589	30A	5/11/15	0.281	ND	ND	0.404	T	0.053	T	ND	ND	ND	0.080	73.5	0.05
2583	32	5/6/15	0.232	ND	ND	0.229	ND	ND	0.522	ND	0.330	ND	0.081	81.0	0.05
2544	35	5/6/15	0.107	ND	ND	0.103	ND	T	T	ND	ND	T	0.069	70.5	0.05
2539	36	5/5/15	T	ND	ND	T	ND	ND	ND	ND	ND	T	T	78.5	0.05
2545	37	5/5/15	0.157	ND	ND	0.142	ND	0.056	0.162	ND	0.109	ND	0.073	79.5	0.05
2587	43	4/27/15	0.202	ND	ND	0.131	ND	T	0.089	ND	0.119	ND	0.081	75.5	0.05
2614	44	4/27/15	0.093	ND	0.180	0.137	ND	T	ND	ND	ND	ND	T	78.0	0.05
2569	45	4/21/15	T	ND	ND	0.067	T	T	T	ND	ND	ND	ND	81.0	0.05
2582	47	4/21/15	0.521	ND	ND	1.090	0.061	T	ND	ND	ND	ND	T	82.5	0.05
2615	48	4/20/15	0.267	ND	0.164	0.453	ND	T	0.102	ND	T	ND	T	83.5	0.05
2576	49	4/21/15	0.973	ND	ND	2.460	T	ND	0.185	ND	T	ND	0.098	80.5	0.05
2547	50	5/4/15	T	ND	ND	ND	ND	ND	ND	ND	ND	ND	T	75.0	0.05
2581	51	5/4/15	0.090	ND	ND	0.138	ND	ND	T	ND	ND	ND	0.054	78.0	0.05
2580	52	4/29/15	0.151	ND	ND	0.219	ND	ND	0.092	ND	ND	ND	0.088	76.5	0.05
2579	53	4/29/15	T	ND	ND	0.073	ND	ND	ND	ND	ND	ND	T	79.0	0.05
2540	54	4/29/15	T	ND	ND	0.051	ND	ND	ND	ND	ND	0.108	T	79.5	0.05
2585	56	5/5/15	0.372	ND	ND	0.973	ND	ND	ND	ND	ND	ND	0.094	77.5	0.05
2546	57	5/5/15	0.154	ND	ND	0.325	ND	ND	T	ND	ND	ND	T	83.0	0.05
2541	58	4/20/15	T	ND	ND	T	ND	ND	ND	ND	ND	ND	0.075	90.0	0.05
2567	59A	4/20/15	0.195	ND	0.907	0.750	T	ND	0.100	ND	0.239	ND	ND	80.0	0.05

ND = None Detected (<0.05 ug/L)

T = Trace (found below detection limit at a level too low to be reliably quantified)

Table 1. cont'd. Spring 2015 Triazine Screen Sampling Results in ug/L (ppb)

Sample Number	Well Number	Date Sampled	ACET	Atrazine	Bromacil	DACT	DEA	Diuron	DMN	Hexazinone	Norflurazon	Prometon	Simazine	Propazine	RL in ug/l
2609	61	4/20/15	0.360	ND	0.846	1.110	T	T	ND	ND	ND	ND	0.064	75.0	0.05
2564	63A	4/14/15	ND	ND	ND	T	ND	ND	ND	ND	ND	ND	ND	85.0	0.05
2588	65	4/14/15	0.050	ND	ND	0.060	ND	ND	ND	ND	ND	ND	T	85.5	0.05
2606	68	4/14/15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	77.5	0.05
2549	69	4/14/15	0.707	ND	1.060	2.430	ND	T	ND	ND	ND	ND	T	80.0	0.05
2536	71	4/13/15	0.632	ND	1.120	1.190	ND	T	0.760	ND	0.399	ND	T	72.5	0.05
2565	72	4/13/15	0.695	ND	ND	1.380	T	ND	ND	ND	ND	ND	0.067	83.0	0.05
2605	73	4/13/15	0.176	ND	ND	1.240	T	ND	T	ND	ND	ND	ND	76.5	0.05
2566	74	4/13/15	0.628	ND	0.255	0.742	ND	T	T	ND	0.066	ND	0.091	85.0	0.05
2604	75	4/8/15	0.978	ND	0.338	0.752	ND	T	ND	ND	ND	ND	0.068	80.0	0.05
2610	79	4/8/15	0.124	ND	T	T	ND	0.453	ND	ND	T	ND	0.340	80.5	0.05
2543	80	4/8/15	0.620	ND	1.400	2.640	ND	T	ND	ND	ND	ND	T	74.5	0.05
2577	84	4/8/15	T	ND	0.238	0.101	ND	ND	ND	ND	ND	ND	ND	81.0	0.05
2570	86	4/8/15	1.150	ND	T	6.510	T	ND	T	ND	ND	ND	0.060	81.0	0.05
2612	89	4/22/15	0.060	ND	ND	0.077	ND	ND	T	ND	ND	ND	T	81.0	0.05
2550	90	5/11/15	0.151	0.058	T	0.178	0.181	0.058	ND	T	ND	ND	0.087	81.5	0.05
2573	92	4/28/15	0.326	ND	ND	0.281	ND	0.122	0.125	ND	0.079	ND	0.063	82.0	0.05
2554	94	4/21/15	0.762	ND	0.096	3.290	ND	T	0.265	ND	0.093	ND	T	79.0	0.05
2584	95	5/6/15	ND	ND	ND	T	ND	ND	ND	ND	ND	ND	T	80.5	0.05

ND = None Detected (<0.05 ug/L)

T = Trace (found below detection limit at a level too low to be reliably quantified)

Table 2. Results for 2015 Triazine Screen vs Multi Residue Screen in ug/L (ppb). The table includes the six analytes that are duplicated in the two screens plus any positive or trace finds for analytes that are only included in the Multi Residue screen.

DPR Sample Number	Well Number	Date Sampled	Atrazine	Bromacil	Diuron	Norflurazon	Prometon	Simazine	Imidacloprid	Mefenoxam/Metaxxy	Metolachlor	Oryzalin
M	1	5/19/15			T							
Tr	1	5/19/15			T							
M	2	4/22/15			T	T		0.074				
Tr	2	4/22/15			T			0.068				
M	3	5/19/15				T		0.060				
Tr	3	5/19/15				T		0.055				
M	4	5/19/15	T	3.380	0.050	0.328		0.076				
Tr	4	5/19/15	T	2.110	T	0.289	T	0.080				
M	5	4/15/15			T	T		0.098				
Tr	5	4/15/15						0.092				
M	6	4/15/15			T			0.082				
Tr	6	4/15/15			T			0.083				
M	7	4/15/15						T				
Tr	7	4/15/15						T				
M	8	4/15/15		0.060	0.054			0.094				
Tr	8	4/15/15		0.054				0.097				
M	12	4/22/15		0.434	T			T				
Tr	12	4/22/15		0.281	T			T				
M	13	5/19/15		0.511	T	0.057		T				
Tr	13	5/19/15		0.490	T	0.053		T				
M	14	5/19/15										
Tr	14	5/19/15										
M	15	5/26/15			T	0.157		0.064				
Tr	15	5/26/15			T	0.151		0.074				
M	16	5/19/15			0.078	0.368		0.082				
Tr	16	5/19/15			0.062	0.296		0.076				
M	18	5/26/15			T			0.055	0.665			
Tr	18	5/26/15						0.055				
M	19	4/28/15			T	T		0.060				
Tr	19	4/28/15			T	T		0.073				
M	20	4/28/15						T				
Tr	20	4/28/15						T				
M	21	4/28/15							0.065			
Tr	21	4/28/15										
M	22	4/27/15						0.077	0.120			
Tr	22	4/27/15						0.068				

Blank spaces = None Detected

Detection Limit = 0.05 ug/L

T = Trace (positive results below the detection limit, too low to reliably quantify)

M = Multi Residue screen

Tr = Triazine screen

Table 2. cont'd. Results for 2015 Triazine Screen vs Multi Residue Screen in ug/L (ppb). The table includes the six analytes that are duplicated in the two screens plus any positive or trace finds for analytes that are only included in the Multi Residue screen.

DPR Sample Number	Well Number	Date Sampled	Atrazine	Bromacil	Diuron	Norflurazon	Prometon	Simazine	Imidacloprid	Mefenoxam/Metolaxy	Metolachlor	Oryzalin
M	23	4/27/15		T	T	T		0.073	0.218			
Tr	23	4/27/15		T	T	T		0.072				
M	24	5/18/15				T						
Tr	24	5/18/15				T						
M	25	5/18/15						0.056				
Tr	25	5/18/15						0.050				
M	26	5/18/15						T	0.051			
Tr	26	5/18/15						T				
M	28	5/4/15						T				
Tr	28	5/4/15						T				
M	29	5/11/15				T			T	T		
Tr	29	5/11/15										
M	30	5/11/15			0.063	T		0.089				
Tr	30	5/11/15			0.053			0.080				
M	32	5/6/15				0.406		0.096				
Tr	32	5/6/15				0.330		0.081				
M	35	5/6/15			0.057	T	T	0.088				
Tr	35	5/6/15			T		T	0.069				
M	36	5/5/15						T				
Tr	36	5/5/15					T	T				
M	37	5/5/15			0.063	0.137		0.081				
Tr	37	5/5/15			0.056	0.109		0.073				
M	43	4/27/15			T	0.129		0.089				
Tr	43	4/27/15			T	0.119		0.081				
M	44	4/27/15		0.241	T			T				T
Tr	44	4/27/15		0.180	T			T				
M	45	4/21/15			T							
Tr	45	4/21/15			T							
M	47	4/21/15			T			T				
Tr	47	4/21/15			T			T				
M	48	4/20/15		0.214	T	T		T				
Tr	48	4/20/15		0.164	T	T		T				

Blank spaces = None Detected

Detection Limit = 0.05 ug/L

T = Trace (positive results below the detection limit, too low to reliably quantify)

M = Multi Residue screen

Tr = Triazine screen

Table 2. cont'd. Results for 2015 Triazine Screen vs Multi Residue Screen in ug/L (ppb). The table includes the six analytes that are duplicated in the two screens plus any positive or trace finds for analytes that are only included in the Multi Residue screen.

DPR Sample Number	Well Number	Date Sampled	Atrazine	Bromacil	Diuron	Norflurazon	Prometon	Simazine	Imidacloprid	Metenoxam/Metolaxy	Metolachlor	Oryzalin
M 49	49	4/21/15				T		0.107				
Tr 49	49	4/21/15				T		0.098				
M 50	50	5/4/15						T				
Tr 50	50	5/4/15						T				
M 51	51	5/4/15						0.063				
Tr 51	51	5/4/15						0.054				
M 52	52	4/29/15						0.113				
Tr 52	52	4/29/15						0.088				
M 53	53	4/29/15						T				
Tr 53	53	4/29/15						T				
M 54	54	4/29/15					0.136	0.052				
Tr 54	54	4/29/15					0.108	T				
M 56	56	5/5/15						0.113				
Tr 56	56	5/5/15						0.094				
M 57	57	5/5/15						T				
Tr 57	57	5/5/15						T				
M 58	58	4/20/15						0.072				
Tr 58	58	4/20/15						0.075				
M 59	59	4/20/15		1.390	T	0.287						
Tr 59	59	4/20/15		0.907		0.239						
M 63	63	4/14/15										
Tr 63	63	4/14/15										
M 65	65	4/14/15						T				
Tr 65	65	4/14/15						T				
M 68	68	4/14/15										
Tr 68	68	4/14/15										
M 69	69	4/14/15		1.440	T			T				
Tr 69	69	4/14/15		1.060	T			T				
M 71	71	4/13/15		1.710	T	0.520		T				
Tr 71	71	4/13/15		1.120	T	0.399		T				
M 72	72	4/13/15			T			0.063				
Tr 72	72	4/13/15						0.067				

Blank spaces = None Detected

Detection Limit = 0.05 ug/L

T = Trace (positive results below the detection limit, too low to reliably quantify)

M = Multi Residue screen

Tr = Triazine screen

Table 2. cont'd. Results for 2015 Triazine Screen vs Multi Residue Screen in ug/L (ppb). The table includes the six analytes that are duplicated in the two screens plus any positive or trace finds for analytes that are only included in the Multi Residue screen.

DPR Sample Number	Well Number	Date Sampled	Atrazine	Bromacil	Diuron	Norflurazon	Prometon	Simazine	Imidacloprid	Metenoxam/Metolaxy	Metolachlor	Oryzalin
M	73	4/13/15										
Tr	73	4/13/15										
M	74	4/13/15		0.339	T	0.079		0.089			T	
Tr	74	4/13/15		0.255	T	0.066		0.091				
M	75	4/8/15		0.563	T			0.071				
Tr	75	4/8/15		0.338	T			0.068				
M	79	4/8/15		0.051	0.59			0.338				
Tr	79	4/8/15		T	0.453	T		0.340				
M	80	4/8/15		1.950	T			T				
Tr	80	4/8/15		1.400	T			T				
M	84	4/8/15		0.394								
Tr	84	4/8/15		0.238								
M	86	4/8/15		0.050				0.060				
Tr	86	4/8/15		T				0.060				
M	89	4/22/15		T	T			T				
Tr	89	4/22/15						T				
M	90	5/11/15	0.053	T	0.06	T		0.076				
Tr	90	5/11/15	0.058	T	0.058			0.087				
M	92	4/28/15			0.15	0.092		0.063				
Tr	92	4/28/15			0.122	0.079		0.063				
M	94	4/21/15		0.132	T	0.111		0.053				
Tr	94	4/21/15		0.096	T	0.093		T				
M	95	5/6/15										
Tr	95	5/6/15						T				

Blank spaces = None Detected

Detection Limit = 0.05 ug/L

T = Trace (positive results below the detection limit, too low to reliably quantify)

M = Multi Residue screen

Tr = Triazine screen

Table 3. Quality Control – Triazine Screen Matrix Spike Percent Recoveries

Analytes: Triazine Screen
 Reporting Limit: 0.05ug/L
 Lab: CDFA
 QC Matrix: CDPR Ground water
 Method: EM62.9
 Spike Level: 0.200ug/L

Extraction Date	ACET	Atrazine	Bromacil	DACT	DEA	Diuron	DMN	Hexazinone	Norflurazon	Prometon	Simazine	Propazine
4/13/2015	93.0	83.0	88.0	97.5	93.0	85.0	84.0	91.5	84.5	89.0	86.5	82.0
	98.0	86.0	91.5	101	96.0	83.5	89.0	92.5	86.5	91.0	86.5	84.5
4/24/15	89.0	80.0	91.0	86.0	86.5	79.0	81.0	86.0	85.5	88.0	85.5	83.0
	90.5	79.5	88.5	85.0	89.0	80.0	81.0	86.0	84.5	87.0	85.0	82.5
4/30/2015	95.0	80.0	93.0	94.5	91.5	81.0	82.5	89.5	84.0	84.0	86.5	74.5
	104	89.5	100	102	98.5	93.5	91.0	95.5	92.5	94.5	98.0	85.0
5/5/2015	99.0	89.0	101	98.5	99.0	87.0	91.0	98.0	89.5	95.5	99.5	85.0
	103	90.5	102	101	96.5	85.5	92.5	98.0	89.0	92.0	95.5	84.0
5/11/2015	103	84.5	99.0	94.0	94.0	91.5	94.0	94.0	93.5	97.5	90.5	76.0
	97.0	82.0	94.5	96.5	99.5	91.5	90.5	93.5	84.5	89.0	85.0	74.5
5/26/2015	92.0	88.5	91.5	98.0	94.5	83.5	83.0	88.0	89.5	92.5	88.5	78.0
	93.0	89.0	92.5	99.5	94.5	90.5	91.0	93.5	89.5	92.5	88.5	79.5
6/1/2015	101	91.5	97.0	101	99.0	95.0	94.0	105.0	99.5	97.0	93.5	85.5
	97.0	91.0	95.0	103	95.0	91.0	92.0	94.0	94.0	97.0	93.0	82.5
Mean	96.8	86.0	94.6	97.0	94.8	87.0	88.3	93.2	89.0	91.9	90.1	81.2
SD	4.9	4.4	4.6	5.5	3.9	5.2	4.9	5.1	4.6	4.1	4.9	4.0
Observed Minimum	89.0	79.5	88.0	85.0	86.5	79.0	81.0	86.0	84.0	84.0	85.0	74.5
LCL	74.5	68.7	68.6	70.3	74.7	51.9	53.2	68.5	52.6	73.5	69.6	46.3
UCL	109	103	117	116	105	146	139	111	151	106	108	142
Observed Maximum	104	91.5	102	103	100	95.0	94.0	105	100	97.5	100	85.5

LCL = Lower Control Limit : Method Validation Mean minus 3 X SD

UCL = Upper Control Limit : Method Validation Mean plus 3 X SD

One matrix blank was run with each extraction set, no detections were found.

Table 4. Quality Control – Triazine Screen Blind Spike Percent Recoveries

Sample #	Extraction Date	Analysis	Analyte	Spike Level (ppb)	Result (ppb)	% Recovery	Control limit exceeded
2556	4/24/2015	TR	ACET	0.1	0.092	92.0%	No
			Simazine	0.25	0.207	82.8%	No
2557	5/26/2015	TR	Bromacil	0.15	0.116	77.3%	No
			Norflurazon	0.25	0.203	81.2%	No

Table 5. Quality Control – Multi Residue LC/MS Screen Matrix Spike Percent Recoveries

Analytes: Multi Residue LC/MS Screen QC Matrix: CDPR Ground water
 Reporting Limit: 0.05ug/L Method: EMON-SM-05-032
 Lab: CDFA Spike Level: 0.200ug/L

Extraction Date	Percent Recovery (%)																												
	Atrazine	Azinphos-methyl	Azoxystrobin	Bensulfide	Bromacil	Carbaryl	Carbofuran	Diazinon	Dimethenamide	Dimethoate	Diuron	Ethofumesate	Fenamiphos	Fludioxonil	Imidacloprid	Linuron	Mefenoxam/Metalaxy	Methiocarb	Metolachlor	Metribuzin	Napropamide	Norflurazon	Oryzalin	Prometon	Simazine	Tebuthiuron	Thiamethoxam	Thiobencarb	Uniconazole
4/14/2015	97	105	107	108	101	102	98	93	100	98	107	99	101	*	107	102	106	107	101	100	103	107	108	105	98	102	96	103	105
4/21/2015	106	112	116	114	102	117	106	106	108	102	110	104	101	*	112	110	109	111	108	104	105	109	113	112	104	109	105	110	107
4/27/2015	100	104	103	107	104	111	105	100	104	99	103	106	101	*	106	105	102	111	102	101	101	100	105	105	102	105	88	103	104
5/6/2015	91.5	102	99.0	105	93.0	108	96.5	99.0	96.0	99.5	98.0	94.5	98.0	*	102	95.5	99.0	96.5	94.5	96.0	100	101	101	99.0	90.5	97.0	99.0	96.5	103
5/12/2015	98.5	107	103	108	96.5	104	102	106	102	97.5	104	101	88.0	*	109	103	105	102	99.0	99.5	101	105	105	106	98.0	104	98.0	102	105
5/26/2015	90.5	97.0	99.0	102	92.0	103	93.0	89.5	90.5	74.5	97.0	89.0	94.0	*	86.0	96.5	94.0	105	91.5	90.5	93.0	95.5	97.5	98.0	88.0	92.5	105	93.0	96.5
6/1/2015	93.0	106	103	112	92.5	120	99.0	105	101	67.5	102	104	98.5	*	81.5	101	101	105	96.0	95.5	83.5	104	106	98.5	90.5	96.0	109	110	105
Mean	96.6	105	104	108	97.3	109	99.9	99.8	100	91.1	103	99.6	97.4		101	102	102	105	98.9	98.1	98.1	103	105	103	95.8	101	100	103	104
SD	5.5	4.6	5.9	4.0	5.0	7.1	4.7	6.5	5.6	13.9	4.6	6.1	4.8		11.9	5.0	5.0	5.1	5.5	4.4	7.4	4.6	4.9	5.1	6.2	5.8	7.0	6.3	3.4
Observed Minimum	90.5	97.0	99.0	102	92.0	102	93.0	89.5	90.5	67.5	97.0	89.0	88.0		81.5	95.5	94.0	96.5	91.5	90.5	83.5	95.5	97.5	98.0	88.0	92.5	88.0	93.0	96.5
LCL	73	51	74	62	75	64	76	62	71	73	77	46	73	62	71	76	75	68	68	76	77	79	80	80	75	70	65	75	79
UCL	115	151	126	130	109	144	115	116	118	116	115	133	118	123	118	113	120	140	134	111	116	114	113	118	111	130	107	114	117
Observed Maximum	106	112	116	114	104	120	106	106	108	102	110	106	101		112	110	109	111	108	104	105	109	113	112	104	109	109	110	107

LCL = Lower Control Limit : Method Validation Mean minus 3 X SD

UCL = Upper Control Limit : Method Validation Mean plus 3 X SD

One matrix blank was run with each extraction set, no detections were found.

* The response of fludioxonil varied during the analysis. No results were reported on the COCs due to the variability of response in the matrix spikes.