

## **NEW JERSEY GROUND WATER MONITORING PROGRAM 1997 – 2009**

(updated 10/09)

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### Background

As part of the EPA's ground water protection initiative, a network of monitoring wells was installed across central and southern New Jersey under the direction of the NJDEP/Pesticide Control Program (PCP). The wells are shallow (20-50 feet) and reach into subsurface aquifers. They are sampled annually to determine the presence of pesticides and direct the PCP to potential problem pesticides and areas.

Thirteen wells were originally installed for the ground water monitoring network in 1997. By the end of 2004, 29 wells were installed. No wells were added until 2009, when three new wells were included in the network, bringing the current total to 32. Twenty-nine are located in the southern part of New Jersey and cover Burlington, Camden, Gloucester, Atlantic, Cumberland and Salem counties. Three are located in the mid-section of the state, covering Middlesex and Monmouth counties.

Sites for the network of wells were selected according to 1) pesticide use by municipality according to the PCP's agricultural pesticide use surveys, 2) the location of state-owned roads, and 3) visual inspection of proposed sites to verify agricultural patterns and determine suitability for drilling. The New Jersey Agricultural Pesticide Use Surveys, completed every three years by growers for the PCP, is the primary factor in deciding the location of the ground water monitoring wells.

Wells were installed on state property to avoid requesting permission from an outside owner resulting in a delay of the sampling schedule. Wells were installed on road shoulders to provide ample area for well installation and sampling procedures. All wells were installed and developed in cooperation with NJDEP/NJGS (New Jersey Geological Survey).

### Field Sampling Procedures

All samples are collected by bailing. The DEP warehouse supplies decontaminated (and disposable) bailers and a new bailer is used for each well. Each sampling event includes evacuating the equivalent of three well volumes by bailing, then pulling a one liter container of water and recording temperature, pH, standard conductivity and dissolved oxygen content. The sample is then drawn and clean 950-ml amber glass bottles are filled and capped. Bottles are certified cleaned for semi-volatile and pesticide/PCB analyses to EPA analyte specifications.

Samples are held in chilled coolers during transport and immediately placed in refrigerators upon arrival at the laboratory. All samples are kept at 4°C prior to extraction.

Each well in the network is sampled at least once every two years. Due to a history of detections, or newness of construction, some wells are sampled multiple times during a year.

### Sample Results

Sampling started the November of 1997. By the end of 2009, 453 samples had been taken.

Acetochlor, alachlor, atrazine, cyanazine, metolachlor and simazine, all EPA classified ground water leachers, are among the 75 parameters (pesticides) routinely analyzed for using a gas chromatograph/mass spectrometer.

As of 2001, utilizing upgraded equipment, samples are also checked against a mass spectral library consisting of a larger list of 200+ non-targeted pesticides.

Beginning in 2005, a phenoxy-acid extraction procedure was developed, adding nineteen chlorinated (phenoxy-acid) herbicides to the well sample scan.

Water samples obtained from the PCP ground water monitoring well network are not considered drinking water samples. Nonetheless, detections are compared against the most stringent water reference levels available. These criteria are listed below:

- EPA Drinking Water Standards – the listed Maximum Contaminant Level Goal (MCLG) and/or the Maximum Contaminant Level (MCL), whichever is lowest.
- EPA Health Advisories (HA) – the listed Life-time level. The Ten-day level for a 10-kg child is used if a Life-time level is not available.
- NJAC 7:9-6 Ground Water Quality Standards – the New Jersey Interim Generic Criteria for Synthetic Organic Chemicals (SOCs).

Wells displaying a compound exceeding guideline levels will be targeted for possible investigative projects if detected levels persist from year to year.

Table 1. Compounds detected within the PCP's ground water monitoring well network, 1997-2009. Pesticide types are herbicides (H), insecticides or insecticides/miticides (I), and fungicides (F). The % of Standard column compares the highest level of a compound detected with the lowest established EPA or state standard.

<b>2009 Ground Water Monitoring Well Results</b>								
13 wells sampled, 16 samples, 8 wells with detections						Reference Levels (RL)		
Compound	Type	# of Detects	Mean Level Detected	Highest Level Detected	% of RL ( $\geq 5\%$ )	EPA DW Standard (MCL)	EPA HAL (Life-time)	NJ Interim Generic GW Quality SOC
Chlorthal-dimethyl	H	5	63 ug/l	300 ug/l	428%	-	70 ug/l	-
Metalaxyl	F	1	0.39 ug/l	0.39 ug/l	-	-	-	100 ug/l
Metolachlor	H	2	0.31 ug/l	0.63 ug/l	-	-	100 ug/l	-
Norflurazon	H	2	0.93 ug/l	1.30 ug/l	-	-	-	100 ug/l
Simazine	H	1	0.22 ug/l	0.22 ug/l	6%	4 ug/l	4 ug/l	-
Terbacil	H	2	0.69 ug/l	1.10 ug/l	-	-	90 ug/l	-

<b>2008 Ground Water Monitoring Well Results</b>								
19 wells sampled, 19 samples, 4 wells with detections						Reference Levels (RL)		
Compound	Type	# of Detects	Mean Level Detected	Highest Level Detected	% of RL ( $\geq 5\%$ )	EPA DW Standard (MCL)	EPA HAL (Life-time)	NJ Interim Generic GW Quality SOC
Bromacil	H	1	0.39 ug/l	0.39 ug/l	-	-	90 ug/l	-
Chlorthal-dimethyl	H	3	136 ug/l	400 ug/l	571%	-	70 ug/l	-
Metalaxyl	F	1	0.33 ug/l	0.33 ug/l	-	-	-	100 ug/l
Norflurazon	H	2	0.40 ug/l	0.44 ug/l	-	-	-	100 ug/l
Simazine	H	2	0.26 ug/l	0.27 ug/l	7%	4 ug/l	4 ug/l	-

<b>2007 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
20 wells sampled, 20 samples, 7 wells with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Bromacil	H	1	0.40 ug/l	0.40 ug/l	-	-	90 ug/l	-
Chlorthal-dimethyl	H	3	223 ug/l	654 ug/l	934%	-	70 ug/l	-
D-atrazine	H	1	0.22 ug/l	0.22 ug/l	-	-	-	100 ug/l
Heptachlor epoxide	I	1	0.20 ug/l	0.20 ug/l	100%	0.2 ug/l	-	-
Metalaxyl	F	1	0.59 ug/l	0.59 ug/l	-	-	-	100 ug/l
Metolachlor	H	1	0.25 ug/l	0.25 ug/l	-	-	100 ug/l	-
Norflurazon	H	1	0.45 ug/l	0.45 ug/l	-	-	-	100 ug/l
Simazine	H	3	0.28 ug/l	0.30 ug/l	8%	4 ug/l	4 ug/l	-
Terbacil	H	1	0.27 ug/l	0.27 ug/l	-	-	90 ug/l	-

<b>2006 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
15 wells sampled, 16 samples, 5 wells with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Azinphos-methyl	I	1	0.05 ug/l	0.50 ug/l	-	-	-	100 ug/l
Chlorthal-dimethyl	H	4	332 ug/l	695 ug/l	993%	-	70 ug/l	-
Metalaxyl	F	2	0.38 ug/l	0.43 ug/l	-	-	-	100 ug/l
Norflurazon	H	1	0.52 ug/l	0.52 ug/l	-	-	-	100 ug/l
Phosmet	I	1	0.24 ug/l	0.24 ug/l	-	-	-	100 ug/l
Simazine	H	1	0.38 ug/l	0.38 ug/l	-	4 ug/l	4 ug/l	-
Terbacil	H	1	0.24 ug/l	0.24 ug/l	-	-	90 ug/l	-

<b>2005 Ground Water Monitoring Well Results</b>								
29 wells sampled, 33 samples, 6 wells with detections						Reference Levels (RL)		
Compound	Type	# of Detects	Mean Level Detected	Highest Level Detected	% of RL (>=5%)	EPA DW Standard (MCL)	EPA HAL (Life-time)	NJ Interim Generic GW Quality SOC
Bentazon*	H	1	3.91 ug/l	3.91 ug/l	-	-	200 ug/l	-
Chlorthal-dimethyl*	H	6	262 ug/l	766 ug/l	1094%	-	70 ug/l	-
Metalaxyl	F	2	0.45 ug/l	0.51 ug/l	-	-	-	100 ug/l
Metolachlor	H	4	0.41 ug/l	0.67 ug/l	-	-	100 ug/l	-
Napropamide	H	1	0.25 ug/l	0.25 ug/l	-	-	-	100 ug/l
Norflurazon	H	1	0.40 ug/l	0.40 ug/l	-	-	-	100 ug/l
Simazine	H	3	0.46 ug/l	0.57 ug/l	14%	4 ug/l	4 ug/l	-

\* first year of phenoxy-acid analysis

<b>2004 Ground Water Monitoring Well Results</b>								
29 wells sampled, 37 samples, 8 wells with detections						Reference Levels (RL)		
Compound	Type	# of Detects	Mean Level Detected	Highest Level Detected	% of RL (>=5%)	EPA DW Standard (MCL)	EPA HAL (Life-time)	NJ Interim Generic GW Quality SOC
Atrazine	H	3	0.22 ug/l	0.31 ug/l	10%	3 ug/l	-	-
Bromacil	H	2	0.33 ug/l	0.38 ug/l	-	-	90 ug/l	-
D-atrazine	H	4	0.40 ug/l	0.70 ug/l	-	-	-	100 ug/l
Metalaxyl	F	2	0.44 ug/l	0.45 ug/l	-	-	-	100 ug/l
Metolachlor	H	8	0.57 ug/l	1.70 ug/l	-	-	100 ug/l	-
Metribuzin	H	2	0.42 ug/l	0.54 ug/l	-	-	200 ug/l	-
Napropamide	H	1	0.31 ug/l	0.31 ug/l	-	-	-	100 ug/l
Simazine	H	4	0.35 ug/l	0.40 ug/l	10%	4 ug/l	4 ug/l	-

<b>2003 Ground Water Monitoring Well Results</b>								
29 wells sampled, 42 samples, 8 wells with detections						Reference Levels (RL)		
Compound	Type	# of Detects	Mean Level Detected	Highest Level Detected	% of RL (>=5%)	EPA DW Standard (MCL)	EPA HAL (Life-time)	NJ Interim Generic GW Quality SOC
Atrazine	H	1	0.22 ug/l	0.22 ug/l	7%	3 ug/l	-	-
Bromacil	H	3	1.04 ug/l	1.10 ug/l	-	-	90 ug/l	-
D-atrazine	H	1	0.33 ug/l	0.33 ug/l	-	-	-	100 ug/l
Metalaxyl	F	2	0.42 ug/l	0.45 ug/l	-	-	-	100 ug/l
Metolachlor	H	9	0.64 ug/l	1.40 ug/l	-	-	100 ug/l	-
Metribuzin	H	1	0.61 ug/l	0.61 ug/l	-	-	200 ug/l	-
Napropamide	H	1	0.31 ug/l	0.31 ug/l	-	-	-	100 ug/l
Norflurazon	H	1	0.61 ug/l	0.61 ug/l	-	-	-	100 ug/l
Prometon	H	1	0.22 ug/l	0.22 ug/l	-	-	100 ug/l	-
Simazine	H	5	0.58 ug/l	0.75 ug/l	19%	4 ug/l	4 ug/l	-
Terbacil	H	2	0.42 ug/l	0.47 ug/l	-	-	90 ug/l	-

<b>2002 Ground Water Monitoring Well Results</b>								
27 wells sampled, 45 samples, 9 wells with detections						Reference Levels (RL)		
Compound	Type	# of Detects	Mean Level Detected	Highest Level Detected	% of RL (>=5%)	EPA DW Standard (MCL)	EPA HAL (Life-time)	NJ Interim Generic GW Quality SOC
Alachlor	H	1	0.15 ug/l	0.15 ug/l	8%	2 ug/l	-	-
Atrazine	H	7	0.23 ug/l	0.29 ug/l	10%	3 ug/l	-	-
Bromacil	H	3	5.10 ug/l	5.80 ug/l	6%	-	90 ug/l	-
D-atrazine	H	1	0.64 ug/l	0.64 ug/l	-	-	-	100 ug/l
Metalaxyl	F	3	0.49 ug/l	0.61 ug/l	-	-	-	100 ug/l
Metolachlor	H	16	1.08 ug/l	6.10 ug/l	6%	-	100 ug/l	-
Metribuzin	H	1	0.34 ug/l	0.34 ug/l	-	-	200 ug/l	-
Simazine	H	7	0.66 ug/l	0.74 ug/l	19%	4 ug/l	4 ug/l	-
Terbacil	H	1	0.30 ug/l	0.30 ug/l	-	-	90 ug/l	-

<b>2001 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
22 wells sampled, 36 samples, 5 wells with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Atrazine	H	1	0.15 ug/l	0.15 ug/l	5%	3 ug/l	-	-
Bromacil	H	3	0.67 ug/l	0.72 ug/l	-	-	90 ug/l	-
D-atrazine	H	1	0.30 ug/l	0.30 ug/l	-	-	-	100 ug/l
Metolachlor	H	7	3.59 ug/l	7.94 ug/l	8%	-	100 ug/l	-
Norflurazon	H	1	0.28 ug/l	0.28 ug/l	-	-	-	100 ug/l
Simazine	H	5	0.78 ug/l	1.50 ug/l	38%	4 ug/l	4 ug/l	-

<b>2000 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
21 wells sampled, 29 samples, 2 wells with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Atrazine	H	2	0.25 ug/l	0.32 ug/l	11%	3 ug/l	-	-
Metolachlor	H	2	4.95 ug/l	8.00 ug/l	8%	-	100 ug/l	-
Simazine	H	2	0.73 ug/l	1.40 ug/l	35%	4 ug/l	4 ug/l	-

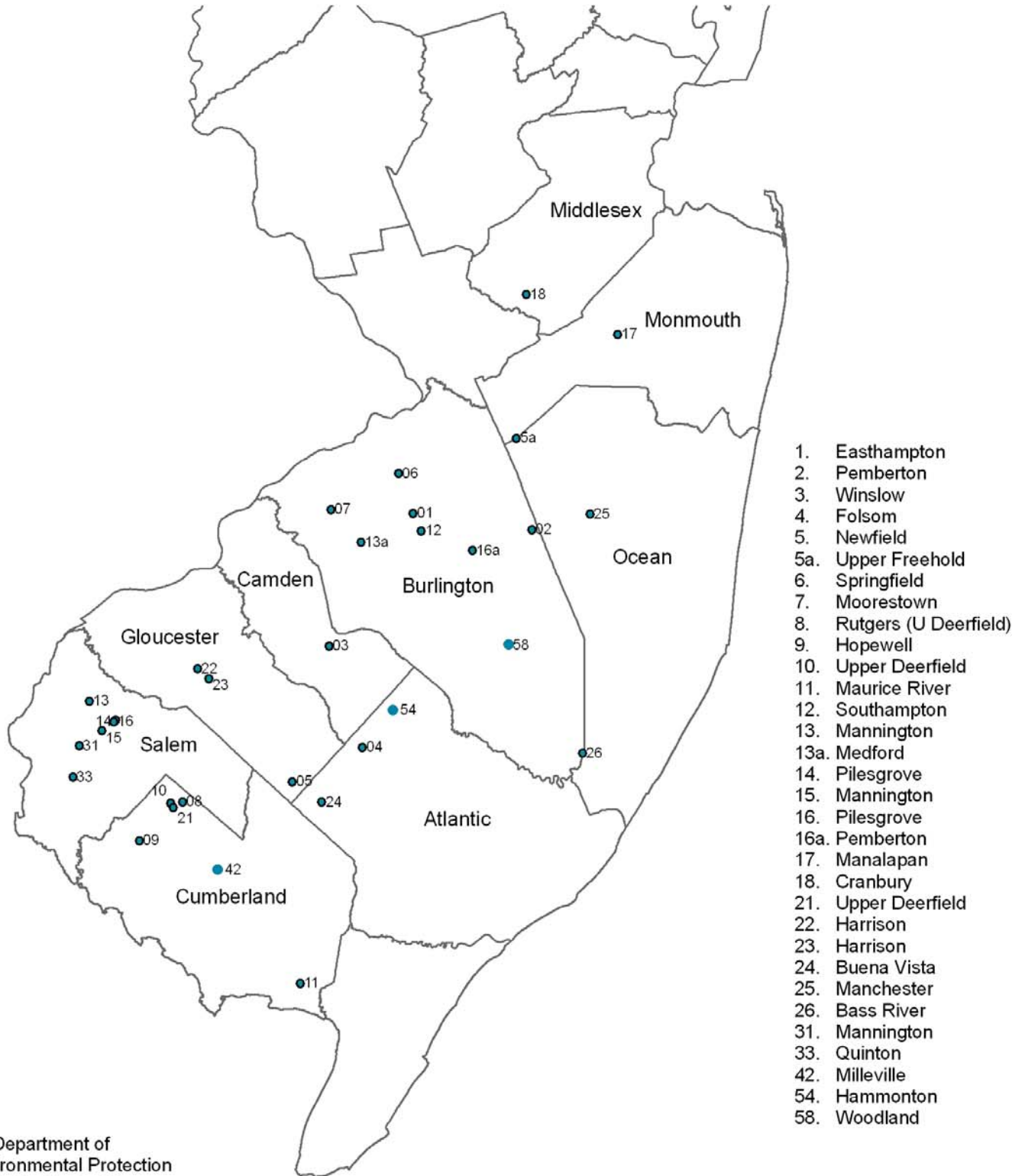
<b>1999 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
21 wells sampled, 74 samples, 4 wells with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Atrazine	H	2	0.09 ug/l	0.16 ug/l	5%	3 ug/l	-	-
Metolachlor	H	7	0.74 ug/l	1.65 ug/l	-	-	100 ug/l	-
Simazine	H	3	0.48 ug/l	0.68 ug/l	17%	4 ug/l	4 ug/l	-

<b>1998 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
13 wells sampled, 55 samples, 4 wells with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Acetochlor	H	1	0.31 ug/l	0.31 ug/l	6%	-	-	5 ug/l
Alachlor	H	1	0.05 ug/l	0.05 ug/l	-	2 ug/l	-	-
Atrazine	H	3	0.01 ug/l	0.03 ug/l	-	3 ug/l	-	-
Bromacil	H	1	1.40 ug/l	1.40 ug/l	-	-	90 ug/l	-
Metolachlor	H	5	0.55 ug/l	1.60 ug/l	-	-	100 ug/l	-
Simazine	H	5	0.91 ug/l	1.80 ug/l	45%	4 ug/l	4 ug/l	-

<b>1997 Ground Water Monitoring Well Results</b>						Reference Levels (RL)		
13 wells sampled, 13 samples*, 1 well with detections						EPA DW	EPA HAL	NJ Interim
Compound	Type	# of	Mean	Highest	% of	Standard	(Life-	Generic
		Detects	Level	Level	RL	(MCL)	time)	Quality
			Detected	Detected	(>=5%)			SOC
Simazine	H	1	1.35 ug/l	1.35 ug/l	34%	4 ug/l	4 ug/l	-

\* Well monitoring started at the end of 1997 once the thirteen new wells were developed. Each well was sampled once.

# LOCATIONS OF THE PESTICIDE CONTROL PROGRAM GROUND WATER MONITORING WELLS (June 2009)



1. Easthampton
2. Pemberton
3. Winslow
4. Folsom
5. Newfield
- 5a. Upper Freehold
6. Springfield
7. Moorestown
8. Rutgers (U Deerfield)
9. Hopewell
10. Upper Deerfield
11. Maurice River
12. Southampton
13. Mannington
- 13a. Medford
14. Pilesgrove
15. Mannington
16. Pilesgrove
- 16a. Pemberton
17. Manalapan
18. Cranbury
21. Upper Deerfield
22. Harrison
23. Harrison
24. Buena Vista
25. Manchester
26. Bass River
31. Mannington
33. Quinton
42. Milleville
54. Hammonton
58. Woodland