MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Agricultural Chemical Groundwater Monitoring Program

2017
Annual Summary

MISSISSIPPI AGRICULTURAL CHEMICAL

GROUNDWATER MONITORING PROGRAM

SUMMARY AND RESULTS

2017

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF LAND & WATER RESOURCES

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INTRODUCTION

Over ninety percent of the population in Mississippi relies on groundwater for drinking water supply. Because of this dependence, there have been growing concerns that agricultural chemicals may be impacting and degrading the valuable groundwater resources in the state.

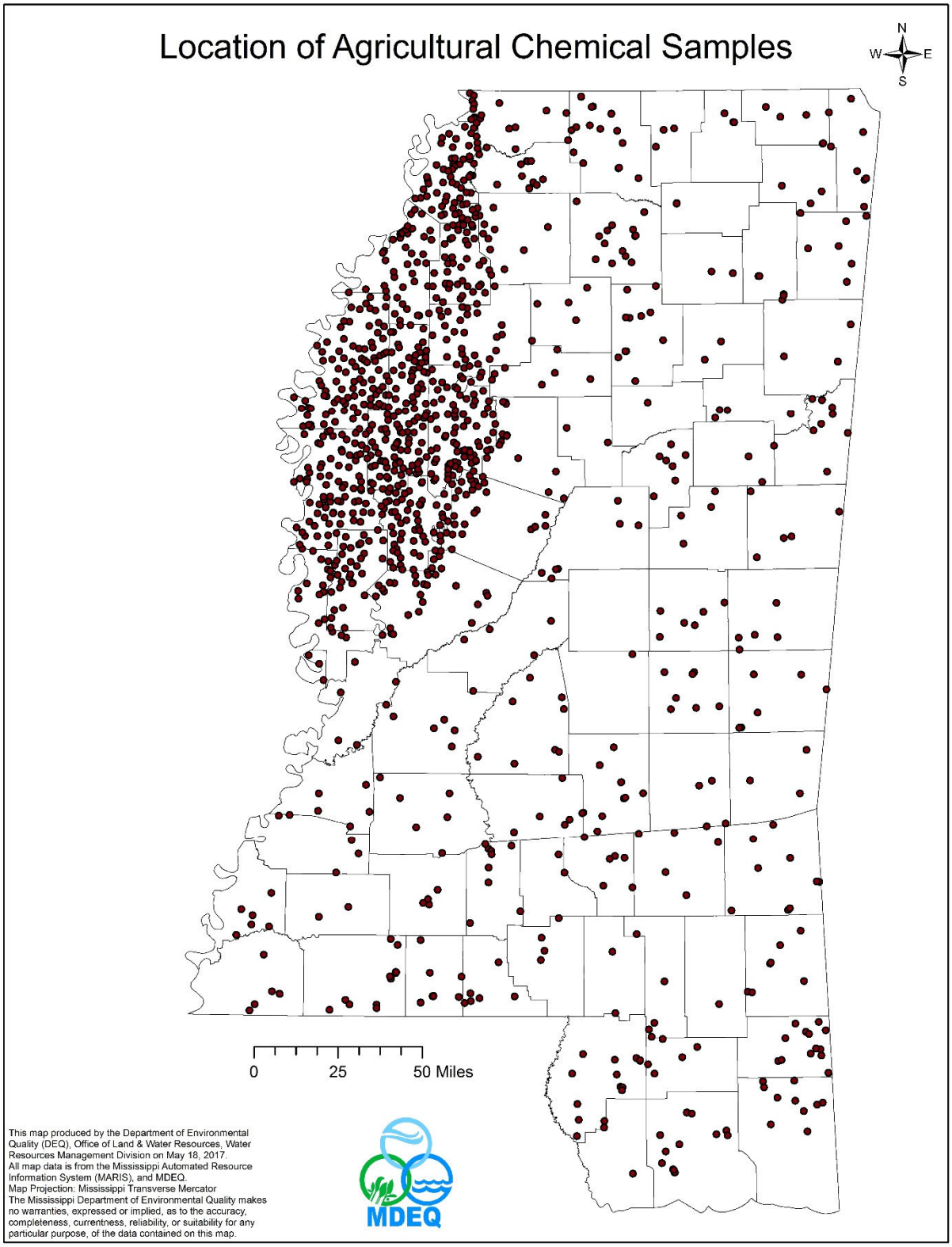
In order to better determine the potential impact of agricultural chemicals on groundwater, a proposal to develop an Agricultural Chemical Groundwater Monitoring Program (AgChem) was formulated in 1986. This proposal was initiated by several organizations including the Delta Council, Mississippi Farm Bureau, National Agricultural Chemicals Association and others. As a result of their efforts, Mississippi Senate Bill 2778 was passed and became effective July 1, 1987. In summary, this legislation required the MDEQ, formerly known as the Department of Natural Resources, to establish state groundwater standards and to monitor groundwater in the state. The legislation also allowed the Mississippi Department of Agriculture and Commerce to increase registration fees on pesticides and fertilizers to defray the cost of administering the program, and to take corrective action in the event it was determined that agricultural compounds are impacting groundwater resources in the state.

Initially, sampling was conducted on shallow drinking water wells located in areas of highest concentration of agricultural practices, before expanding into other areas of the state. In 1993, sampling was expanded to include other sources of water such as irrigation, fish culture and wildlife management wells. Flowing artesian wells and springs also provide valuable sampling locations as they originate primarily from shallow groundwater sources. Samples from these drinking water wells have been analyzed for more than 100 pesticides and metabolites.

In addition to drinking water supplies agricultural samples (irrigation, fish culture and wildlife management) have been collected. These samples have been taken from all 82 counties, including all 19 counties in the heavily agriculturalized Mississippi Delta. Water from these locations has been analyzed for the same pesticides and metabolites as drinking water samples. For the first 15 years of the program, many samples were tested for additional compounds, including 45 volatile organic compounds and 30 inorganic compounds, including residues, nutrients and metals. Beginning in January, 2005 arsenic was added to nitrates and phosphates for analyses. In a response to poultry growers' needs, inorganic compound analyses were resumed in 2012.

Results to date appear to indicate that the overall quality of Mississippi's groundwater supply is relatively unaffected by agricultural activities. Of the samples taken in 2017, none had detectable amounts of agricultural chemicals present in concentrations exceeding safe levels (Maximum Contaminant Levels or MCLs) established for drinking water by the U.S. Environmental Protection Agency (EPA). Of the approximately 30 inorganic constituents analyzed, iron, manganese, total nitrates, and arsenic were detected most often in 2016.

Location of Agricultural Chemical Samples



This map produced by the Department of Environmental Quality (DEQ), Office of Land & Water Resources, Water Resources Management Division on May 18, 2017.
All map data is from the Mississippi Automated Resource Information System (MARIS), and MDEQ.
Map Projection: Mississippi Transverse Mercator
The Mississippi Department of Environmental Quality makes no warranties, expressed or implied, as to the accuracy, completeness, currentness, reliability, or suitability for any particular purpose, of the data contained on this map.

MDEQ

METHODOLOGY

Since there are approximately 60,000 registered pesticide formulations containing one or more of some 700 different active ingredients, it would be prohibitively expensive to analyze for all these compounds. The strategy decided upon by the Mississippi Department of Agriculture and Commerce-Bureau of Plant Industry (MDAC-BPI) and MDEQ to minimize this dilemma was to select a target list of approximately 170 pesticides, metabolites, volatile organic compounds (VOCs), metals, minerals and other inorganics used in common agricultural practices. This approach was patterned after criteria established by the Environmental Protection Agency's (EPA) National Pesticide Survey. Also targeted were some chemicals not necessarily associated with agricultural practices, but of interest to the MDEQ in understanding water quality and characteristics of Mississippi's aquifers.

Targeted constituents were chosen based on the following general criteria:

- Physical and chemical properties of the pesticide
- Quantity applied in Mississippi
- Pesticides of interest identified in the EPA's National Pesticide Survey
- Data from federal, state and local agencies

Once the parameters were defined, statewide sampling began in earnest. At each AgChem sampling site, the location is precisely captured using a Global Positioning System (GPS) receiver. The sites are photographed and instantaneous data relating to the sample's pH, temperature and conductivity are recorded on site. These cursory water properties are used in conjunction with historical well drillers' logs (when available) to help determine the aquifer from which the sample was drawn.

2017 Summary and Results

Summary

For calendar year 2017, MDEQ sampled 66 wells and springs in support of the AgChem Program. This total sample number was up from 61 samples in 2016 and 39 samples in 2015.

Results

MDEQ staff collected 66 samples in support of the AgChem Program in 2016. The samples covered 11 counties, from 4 different aquifers, and included samples taken from irrigation, wildlife, drinking water, and monitoring wells.

Sample Conditions	Number
Total Samples 2017	66
Counties	11
Agricultural Wells	41
Drinking Water Wells	17
Other Uses	8
Aquifers	4

Section I. Organic Chemical Detects

2017 Organic Detects

There were no detects of organic chemicals exceeding the EPA maximum contaminant levels (MCL) in 2017. All chemical detects listed in the following table were either below mcl or there is no mcl established for that chemical at this time.

Compound	MCL	2017 Total Detects	2017 Detects Exceeding MCL in Agricultural Wells	2017 Detects Exceeding MCL in Drinking Water Wells
Atrazine	3 ug/L	7	0	0
Metolachlor	NA	5	NA	NA
Simazine	4 ug/L	2	0	0
Methoxyclor	40 ug/L	2	0	0
Acifluorfen	NA	2	NA	NA
Bentazon	NA	10	NA	NA
2,4 Dichlorophenoxyacetic Acid	70 ug/L	5	0	0
Dalapon	200 ug/L	1	0	0
Dicamba	NA	1	NA	NA
Dichloroprop	5 ug/L	2	0	0
Nitrophenol 4	NA	9	NA	NA
2,4,5-Trichlorophenoxyacetic Acid	NA	3	NA	NA
Propionic Acid (2,4,5-TP)	50 ug/L	5	0	0
Fluometuron	NA	1	NA	NA
Metribuzin Da	NA	3	NA	NA

Propanil	NA	2	NA	NA

Section II. Inorganic Chemical Detects

2017 Inorganic Detects

The primary inorganic compounds tested for in our water samples are as listed in the table below. Several compounds listed below were re-established as compounds of interest during 2012 due to their use in the poultry and/or root vegetable industries.

Compound	MCL	2017 Detects	2017 Detects Exceeding MCL in Agricultural Wells	2017 Detects Exceeding MCL in Drinking Water Wells
Arsenic	0.01 mg/L	32	0	0
Nitrates	10.0 mg/L	10	0	0
Ortho Phosphates	NA	16	NA	NA
Total Phosphates	50.0 mg/L	51	0	0
Iron	0.30 mg/L	59	47	1
Chromium	0.10 mg/L	8	0	0
Cadmium	0.005 mg/L	0	0	0
Manganese	0.05 mg/L	63	49	1

CONCLUSION

Based on results to date, there is no evidence that agricultural compounds are significantly impacting the quality of groundwater in Mississippi. The Mississippi Department of Environmental Quality's AgChem Program continues to receive support from federal, state, and regional authorities in support of its mission to protect the citizens of Mississippi by trying to determine if the agricultural use of pesticides, fertilizers and herbicides may be adversely affecting our groundwater quality. By responding to requests from concerned citizens and continuing to build upon two decades of base-line data, the MDEQ AgChem Program will continue activities related to the protection of the groundwater resources of Mississippi.