For Period
1989 - December 31, 2008

Mississippi Delta Agricultural Chemical Groundwater Monitoring Program

Mississippi Department of ENVIRONMENTAL QUALITY

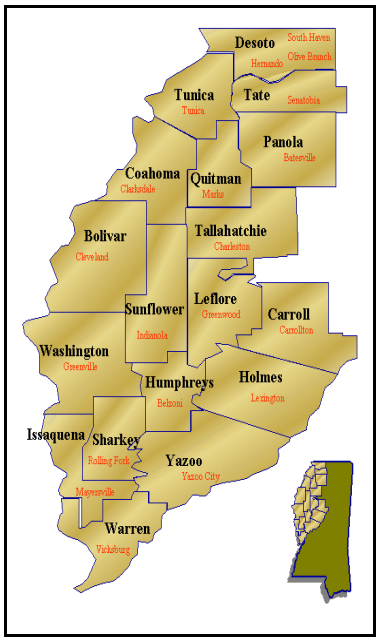
Office of Land & Water Resources

P.O. Box 2309 ■ Jackson, MS 39225 ■ 1.800.786.0661 ■ www.deq.state.ms.us

MDEQ strives to preserve and protect Mississippi's air, land, and water through fair and responsible regulation.

MISSISSIPPI AGRICULTURAL CHEMICAL GROUNDWATER MONITORING PROGRAM

MISSISSIPPI DELTA



SUMMARY OF RESULTS
MARCH 1, 1989 THROUGH DECEMBER 31, 2008

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF LAND & WATER RESOURCES

EXECUTIVE SUMMARY

In order to determine the potential impact of agricultural chemicals on groundwater, Mississippi Senate Bill 2778 was passed and became effective July 1, 1987. As a result of this legislation, the Mississippi Department of Environmental Quality (MDEQ) was assigned the tasks of establishing groundwater standards and monitoring groundwater for agricultural chemicals and other pollutants. The MDEQ established the Agricultural Chemical Groundwater Monitoring (AgChem) Program and initiated the collection of groundwater samples in March, 1989. Initially, sampling was conducted on shallow drinking water wells located in areas of highest pesticide usage before expanding into other regions of the state. Later, sampling was expanded to include other types of wells such as irrigation and fish culture wells in the highly agriculturalized Mississippi Delta.

It has been estimated that over 80% of the agricultural chemicals used in the state are applied in this geographic region commonly referred to as the Mississippi Delta. Thus, it is logical that the AgChem Groundwater Monitoring Program would conduct statewide monitoring, but concentrate as much as possible on this area. Of the 697 drinking water wells sampled statewide through December 31, 2008, one hundred and sixty-three have been located in 19 counties of the Delta. Samples from these 163 wells have been analyzed for approximately 100 pesticides and metabolites; 45 volatile organic compounds (VOC's); and 30 minerals, residues, nutrients, and metals. Additionally, a total of 762 irrigation and fish culture wells have been sampled in all of these 19 counties. It should be noted that a number of these 19 counties have only a fraction of their land area actually in the Delta (Grenada and Tate counties for example), and sampled drinking water wells in many cases are not located in the Delta. However, results from these predominately hill counties are included in this report for informational purposes.

Each AgChem sampling site is precisely located using a mapping grade Global Positioning System (GPS) receiver. The positional data and analytical data are input into a Geographic Information System (GIS) which allows a user to generate individual county, multi-county or statewide maps and analytical reports on all sampled wells.

Based on results to date, the overall quality of Mississippi's groundwater supply in the Delta seems to be relatively unaffected by agricultural activities. In fact, the levels of pesticides detected and percentage of wells with pesticide detects seem to be slightly lower in the Delta than in the remainder of the state. Of the 925 drinking water, irrigation, and fish culture wells sampled in the Delta, 900 of them, or 97.3%, had no detectable concentrations of agricultural chemicals. Of the 25 wells reported to have detectable levels of agricultural chemicals, only one was found to initially contain concentrations exceeding safe limits (Maximum Contaminant Levels or MCL's) established for drinking water by the U.S. Environmental Protection Agency (EPA). Resampling of this well at an aerial applicator site in Leflore County has indicated declining levels that are now within existing drinking water standards. It should also be noted this number of 25 wells with detects of agricultural chemicals possibly could be reduced even further:

a. Three wells with CURACRON detected were all located in one field and sampled on the same day. It was noted at time of sample collection that pesticide contamination from an external source not associated with groundwater could possibly occur. Resamples of these three wells taken at a later date did not detect the presence of CURACRON or any other pesticide, so it is probable this compound was never present in the groundwater.
b. One VOC (1,2-DICHLOROETHANE) included as pesticides in this report has seen only very limited use as a grain fungicide, and could arguably be excluded as an agricultural chemical.

Of the inorganic constituents analyzed for in the samples, total nitrates are most closely associated with agricultural practices. Only one of the 925 sampled wells initially exceeded the MCL for total nitrates, and multiple resampling of this well indicate levels within drinking water standards.

Other chemicals not normally associated with agriculture were detected in a slightly higher percentage of the wells. As with the pesticides however, the concentrations detected were generally found to be considerably lower than the safe levels established by EPA for drinking water.

Concurrent with the initiation of the AgChem Program, MDEQ has actively participated in the establishment of the Mississippi Pesticide Container Recycling Program. This program was established to provide a means for farmers to deliver their empty plastic pesticide containers to a central location where they are processed and eventually recycled. The program began in 1989 as a pilot program in Washington county, and in the first year approximately 24,000 pounds of plastic containers were collected and recycled. Since that time, the program has grown to include almost half of the state's 82 counties, with a total of over 10,000,000 pounds having been recycled through December 31, 2008. Of this total recycled, over 95% has come from the 19 counties included in the Mississippi Delta.

In addition to its role in monitoring groundwater and assisting in the Pesticide Container Recycling Program, the AgChem Program is actively participating in the other activities:

- Groundwater studies in cooperation with the Yazoo Mississippi Delta Joint Water Management District and the Natural Resources Conservation Service
- The Mississippi Waste Pesticide Collection and Disposal Program
- Surface water studies related to concerns and/or use of agricultural chemicals
- Educational presentations

The Department of Environmental Quality would again like to acknowledge and thank the following agencies for their involvement, assistance and support of the AgChem Program:

- Delta Council
- Mississippi Cooperative Extension Service
- Mississippi Department of Agriculture and Commerce, Bureau of Plant Industry
- Mississippi Farm Bureau Federation
- Mississippi State Chemical Laboratory
- Natural Resources Conservation Service
- Yazoo Mississippi Delta Joint Water Management District

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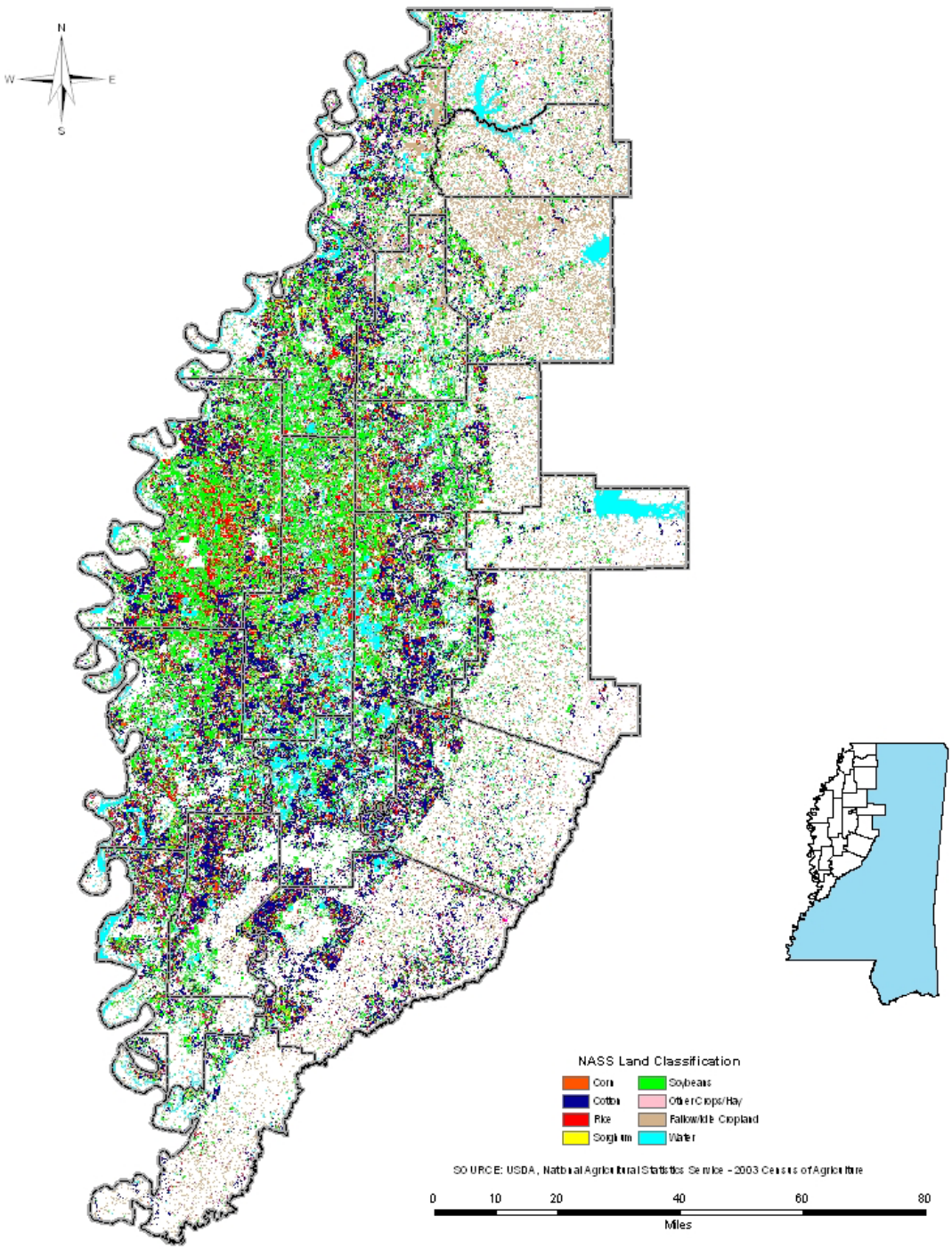
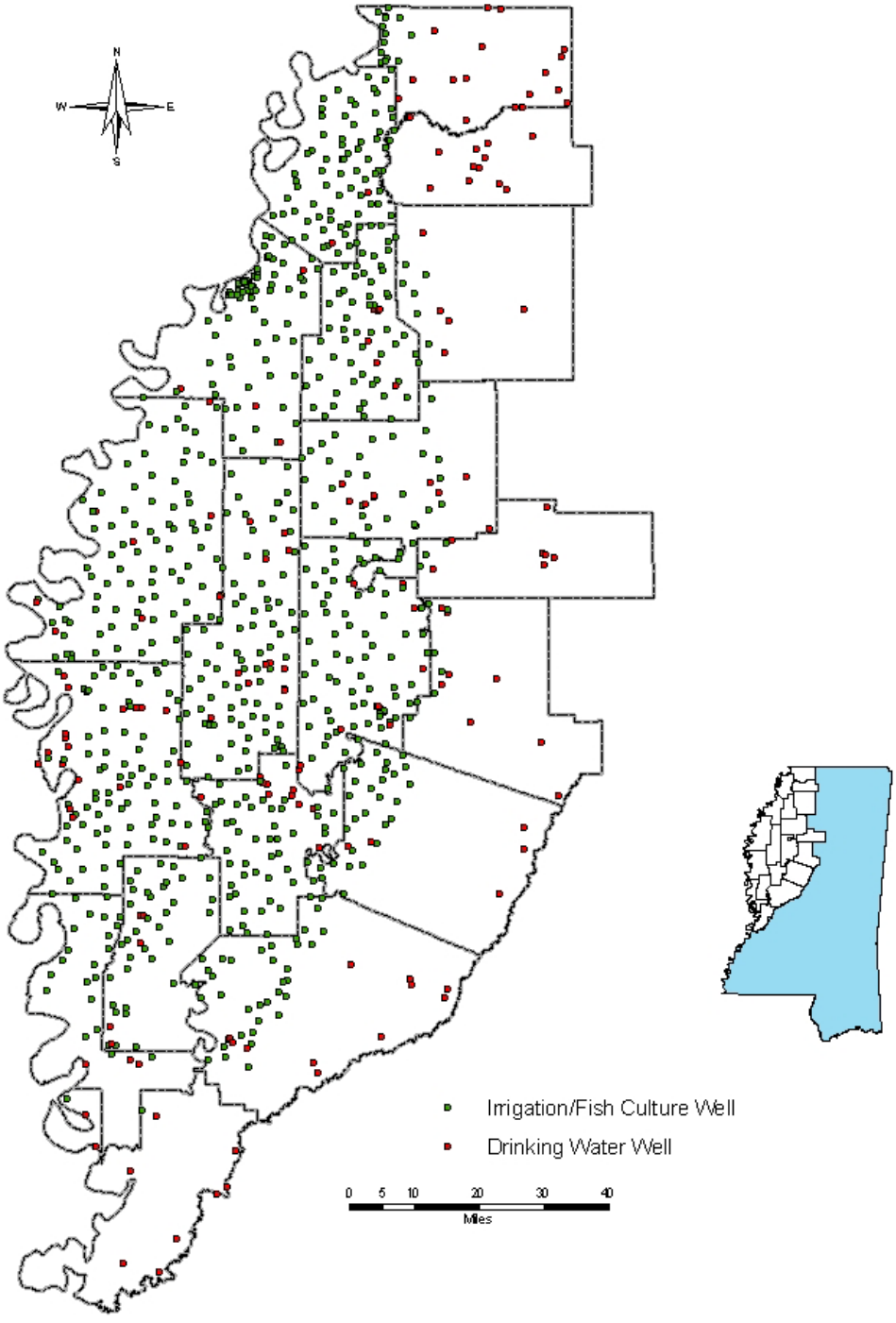
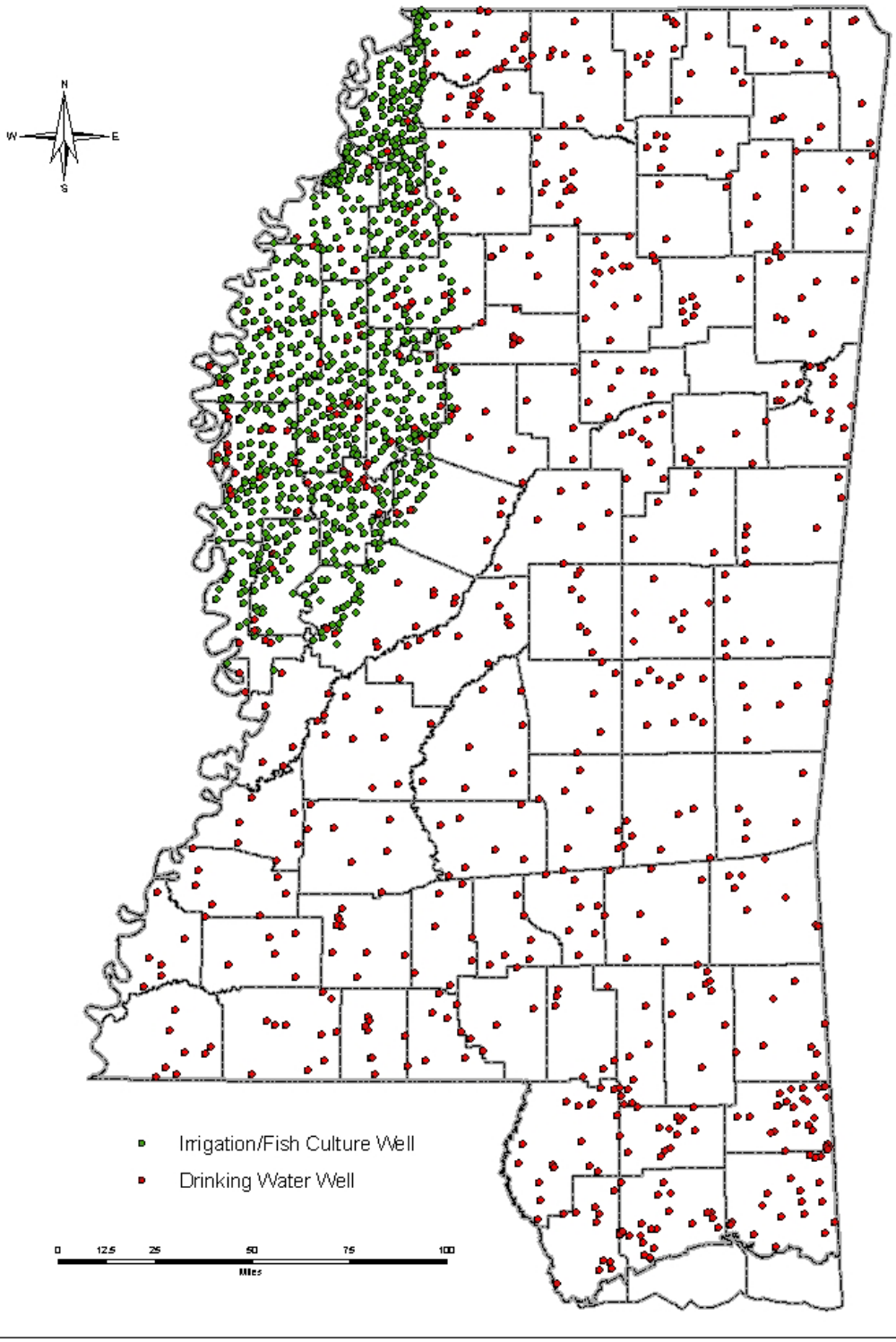


Figure 2 - Locations of Sampled Wells in the Delta



2(a)

Figure 3 - Locations of Sampled Wells



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SUMMARY AND PRESENTATION OF RESULTS

SUMMARY

This report presents the results of the Mississippi AgChem Groundwater Monitoring Program where groundwater samples in the Delta were analyzed for agricultural pesticide residues, other organic constituents, and inorganic compounds between March 1, 1989, and December 31, 2008. Most of the results were obtained during single sampling events and do not reflect repeated resampling of wells. However, resampling was conducted on wells where initial results indicated the presence of contaminants that exceeded allowable limits or in certain cases where resampling could provide additional information.

SECTION I-DRINKING WATER WELLS SUMMARY

Included in the reported results are data, including multiple resampling, of 163 drinking water wells/springs located in 19 counties of the Delta. Several of the samples were gathered from flowing springs or artesian sources. The remainder of the groundwater samples were collected from wells with a wide range of depths including some in excess of 350 feet. Approximately 60% of the samples were obtained from wells with depths less than 150 feet.

Sampling Depth	Number of Samples
Springs/Artesian	8
0 - 50 feet	15
51 – 100 feet	54
101 - 150 feet	20
151 - 200 feet	13
201 - 350 feet	5
> 350 feet	31
Unknown	17

The samples have been analyzed for approximately 100 pesticides and metabolites; 45 volatile organic compounds (VOC's); and 30 inorganic compounds including minerals, residues, nutrients and metals (see Table 1.). A total of 17 different organic compounds were detected in 64 of the 163 wells sampled. The wells showing detections were located in 18 of the 19 counties of the Mississippi Delta.

Pentachlorophenol was the most commonly detected organic compound, being indicated at extremely low levels in 54 (33%) of the 163 sampled wells. Of the other 16 organic compounds detected in this survey, one pesticide initially exceeded Maximum Contaminant Levels (MCL's). Resampling of the impacted well currently shows the level of this compound to be within acceptable drinking water limits.

Of the approximately 30 inorganic compounds analyzed for in each sample, total nitrates are the constituents most closely associated with agricultural practices. One of the sampled wells in the Delta initially exceeded the established MCL of 10 ppm for total nitrates. Resamples of this well indicated levels are presently within drinking water standards.

SECTION II-IRRIGATION AND FISH CULTURE WELLS SUMMARY

In addition to these drinking water wells, samples from 762 irrigation and fish culture wells have been collected in all nineteen counties of the Mississippi Delta. These samples initially were analyzed for approximately 100 pesticides, chlorides and total nitrates. However, beginning in January, 2005, arsenic was added to these inorganic compounds for analyses. Ten organic compounds have been detected at extremely low levels in 32 of the 762 sampled wells screened in the shallow Mississippi River alluvial aquifer. As with the drinking water wells, Pentachlorophenol was the most common contaminant, being detected in 16 of the sampled wells. Even though detected levels were extremely low, eight of the 16 wells containing Pentachlorophenol were randomly resampled approximately 2 months after the original sample. Interestingly, no Pentachlorophenol was detected in any of the resampled wells.

Other than Pentachlorophenol, nine pesticide constituents were detected in eighteen of the 762 wells sampled in the survey. All detected compounds were far below established drinking water standards or MCL=s. Total chlorides and nitrate/nitrite levels in all sampled irrigation and fish culture wells were extremely low, with the maximum total nitrate level being 0.93 ppm.

Although well depths have not been recorded, irrigation and fish culture wells in this shallow alluvial aquifer typically range from 80-125 feet in depth Thus, 100% of the wells in this study would be less than 150 feet deep.

PENTACHLOROPHENOL AND VOLATILE ORGANICS SUMMARY

As discussed above in Sections I and II, Pentachlorophenol was the most frequently detected compound, being indicated in 54 of the 163 drinking water wells and in 16 of the 762 irrigation wells sampled. For over 25 years Pentachlorophenol has been restricted to wood uses only (49 FR 28666 July 13, 1984; 51 FR 1334 January 10, 1986), and in this report is not considered as an agricultural chemical. However, this arguable exclusion does not lessen the importance of its presence in groundwater, and these detections are of great interest to the Mississippi Department of Environmental Quality. At the same time, it should also be noted that the lower level of detection established for Pentachlorophenol in this report is 100 times lower than the Minimum Reporting Limit used in the U.S. EPA National Pesticide Survey (NPS). This NPS Minimum Reporting Limit is 0.100 ppb, and if these guidelines were followed, all of the sampled wells in this study would have been reported as "none detected".

The exclusion of Pentachlorophenol along with volatile organic compounds (VOC's) not associated with agricultural practices results in a total of 16 pesticides detected in 25 wells in 14 counties. These 25 wells with pesticides represent less than 3% of the 925 total drinking water, irrigation, and fish culture wells sampled. None of the sampled wells presently contains any pesticide at concentrations above existing MCL's.

RESULTS

Brief descriptions and discussions of each pesticide and other compounds detected are provided below.

SECTION I - DRINKING WATER WELLS

The following chemicals were detected in one or more of the 163 drinking water wells and springs sampled in the Mississippi Delta:

1. ACIFLUORFEN

This selective herbicide used primarily in rice and soybeans was detected in one of the wells sampled in Issaquena County and one in Grenada County. The maximum detected level of this constituent was 0.80 ppb, with the Maximum Contaminant Level (MCL) for this compound being 9.00 ppb.

2. CHLOROFORM

The primary uses of this Volatile Organic Compound include dyes, toothpaste, disinfectants, and is often a by-product of water treatment. This constituent was detected in four wells located in three of the 19 counties. Indicated groundwater concentrations ranged from a minimum of 1.00 ppb to a maximum of 8.00 ppb which are far below the established 100.00 ppb MCL for this residue.

3. DIBROMOCHLOROMETHANE

This volatile organic compound is not considered an agricultural chemical, and was detected at a level of 1.60 ppb in Tate County. At the present time, there is no established MCL for this constituent.

4. DICAMBA

Used primarily on corn and non-crop areas as a herbicide, DICAMBA was detected in only one of the sampled wells in Yazoo County. The detected level was 0.032 ppb; the MCL for this constituent is 200.00 ppb.

5. 1,2-DICHLOROETHANE

This VOC is primarily used in solvents, degreasers and paint removers, but has seen limited use as a grain fumigant. It was detected at a level of 1.0 ppb in Tate County and the EPA has set the present MCL for this compound at 5.0 ppb.

6. 1,1-DICHLOROETHENE - (DCE)

DCE is a chemical intermediate used in the manufacture of polymers such as PVC and is not considered to be an agricultural chemical. A trace level of this VOC was detected in one well in Carroll County. The existing MCL for this compound has been established at 7.00 ppb.

7. CIS-1,2-DICHLOROETHENE

This compound, a captive intermediate in the manufacture of other chlorinated solvents, was detected in three wells in Desoto County and one well in Tunica County. The detected levels were 2.00 ppb in all wells; and the MCL for this compound is 70.00 ppb.

8. TRANS-1,2-DICHLOROETHENE

This VOC is also a captive intermediate in the manufacture of other chlorinated solvents. A concentration of 1.00 ppb was discovered in one well sampled in Tunica county. This detect corresponds with one of the four wells containing CIS-1,2-DICHLOROETHENE as discussed above. With the existing MCL for this compound set at 100.00 ppb, the detections are not overly significant. Currently there are no active registered agricultural products that contain CIS-1,2-DICHLOROETHENE or TRANS-1,2-DICHLOROETHENE.

9. 4,4-DDD - (TDE)

This metabolite of the insecticide DDT was detected in one well at a level of 0.17 ppb in Leflore County. Since the MCL for this compound is presently 0.10 ppb, resamples of this well have been conducted over a period of several years which now indicate a level of 0.080 ppb in the groundwater.

10. 4,4-DDE

This compound, also a breakdown metabolite of the insecticide DDT, was detected in one of the wells sampled during the monitoring survey. The detected level of 4,4-DDE in this well in Leflore County was 0.054 ppb; the present MCL for this constituent has been established at 0.10 ppb.

11. 4,4-DDT

This insecticide with widespread usage until suspended in the 1970's was detected in a single well. This well was the same one containing 4,4-DDD - (TDE) discussed above. Although the detected level of 0.060 ppb was below the MCL of 0.10 ppb for DDT, three resamples of this well were conducted. The detected level in the first resample was 0.050 ppb, 0.020 in the second resample and none was detected in the latest sample.

12. DINOSEB

DINOSEB is a general contact herbicide that was applied in the past before its use in was canceled in the U.S. This compound was detected at a level of 0.070 ppb in one well located in Yazoo County. The present MCL for this compound is 7.00 ppb.

13. METHYLENE CHLORIDE

This compound is primarily used as a solvent in laboratories, paints, degreasers, and cleaning fluids. The presence of METHYLENE CHLORIDE was indicated in 8 of the sampled wells in 4 different counties. Concentrations of residues in the groundwater ranged from a trace to 4.00 ppb which are below the established MCL of 5.00 ppb for this constituent. Currently there are no active registered agricultural products that contain this chemical.

14. PENTACHLOROPHENOL

PENTACHLOROPHENOL was originally introduced in 1936 as a wood preservative, and since 1984 has been restricted by law to this use only. This compound was reported in 54 of the sampled wells, and in 14 counties of the Delta. Residues in the groundwater ranged from a minimum of 0.001 ppb to a maximum of 0.029 ppb. all of which are much less than the MCL of 1.00 ppb set for this constituent. Although the high percentage of wells apparently containing PENTACHLOROPHENOL should be noted, it should again be emphasized that the lower level of detection established for this report is 100 times lower than the reporting limit used in the U.S. EPA National Pesticide Survey.

15. TOLUENE

The detection of TOLUENE was found in only one of the sampled wells in Sunflower County. The concentration detected in the well was 1.00 ppb which appears rather insignificant when compared to the MCL of 1000.00 ppb the EPA has set for this constituent. This compound is used as a gasoline additive and as a raw material in producing benzene and other organic solvents. Currently there are no active registered agricultural products containing TOLUENE.

16. TRICHLOROFLUOROMETHANE (TRIFLUOROCHLOROMETHANE)

This VOC was detected in one well at a trace level in Desoto County; the EPA has issued a Health Advisory for this constituent at concentrations exceeding 2000.00 ppb. TRICHLOROFLUOROMETANE is used as a refrigerant, solvent, fire extinguisher and chemical intermediate and is not considered an agricultural chemical.

17. O-XYLENE

A single well in the survey indicated one detection in Holmes County of O-XYLENE at a level of 1.00 ppb which is far below the established MCL of 10,000.00 ppb. In Mississippi, this compound is used primarily as a solvent for paints, adhesives, and components in other household and industrial products.

18. NITRATES/NITRITES

In addition to pesticides and other organic compounds, Nitrate/Nitrite levels in groundwater are important indicators of other potential contamination problems, and are therefore of interest to the Mississippi Agricultural Groundwater Monitoring Program. As part of this program, samples from the 163 sampled wells were analyzed for Total Nitrates. Concentrations of these compounds ranged from minimums below the lower level of detection to a maximum of 35.0 ppm in one well. Of the groundwater samples analyzed from these wells, only the one well at 35.0 ppm in Desoto County indicated a level of nitrates exceeding the MCL of 10.0 ppm. This well was resampled on two occasions, and both analyses fell within allowable limits.

SECTION II - IRRIGATION AND FISH CULTURE WELLS

The following chemicals were detected in one or more of the 762 irrigation and fish culture wells sampled in 19 counties of the Mississippi Delta:

1. BENTAZON (BENTAZONE)

BENTAZON is a postemergence selective herbicide used for control of broadleaf weeds in many agricultural crops including soybeans, rice and sorghum. The presence of this compound was detected in nine wells found in four counties. The detected levels in these wells ranged from 0.31 ppb to 0.71 ppb which are below the established Maximum Contaminant Level (MCL) of 20.00 ppb for this compound.

2. BROMACIL

BROMACIL is used for general weed and brush control, primarily in non-crop areas. This herbicide was detected at a trace level in one well in Sunflower County, with the MCL for this compound being 90.00 ppb.

3. CURACRON (PROFENOFOS)

This insecticide and acaracide used primarily on cotton was detected at extremely low levels in three wells located in a MSEA study area in Sunflower County. At the time of sample collection however, it was noted that contamination of samples from an external source was suspected. Resamples of all 3 wells were obtained, with no CURACRON detected in any of the wells. Thus, it is probable that CURACRON was never present in the groundwater. However, resampling of these wells will continue in order to verify results.

4. DIURON

This general purpose herbicide and algicide was detected at the low level of 0.67 ppb in one well located in Quitman County. Even though this level is far below the established health advisory of 10.00 ppb, a resample was conducted nine weeks after the initial sampling. No DIURON was detected in the resample.

5. MALATHION

This insecticide used on various row crops, vegetables and ornamentals was detected in one well in Holmes County. The detected level of this compound was 0.050 ppb, and the established MCL for this constituent is 200.00 ppb.

6. METRIBUZIN

This herbicide used primarily in soybeans, corn and non-crop areas was detected in two of the wells sampled. One detection was in Bolivar County and one in Washington County, with concentration levels in the wells ranging from a trace to 0.02 ppb. Although these levels are far below the MCL of 100.00 ppb, resampling of these two wells is continuing.

7. METOLACHLOR

This selective herbicide was found at an indicated level of 3.10 ppb in one well in Carroll County. The present MCL for this compound is 70.00 ppb.

8. PENDIMETHALIN

This compound which also is a selective herbicide was detected at a level of 0.02 ppb in one well in Sharkey County. There is presently no established MCL for this pesticide.

9. PENTACHLOROPHENOL

Only three of the eighteen counties sampled showed detections of PENTACHLOROPHENOL. Detection levels ranging from 0.01 to 0.03 ppb were indicated in 16 of the wells sampled. The EPA has set the MCL for this constituent at 1.00 ppb. Random resampling of eight of the 16 impacted wells conducted approximately two months after the initial samples were collected indicated no detection of PENTACHLOROPHENOL in any of the resamples.

10. ZORIAL (NORFLURAZON)

ZORIAL is a pre-emergence selective herbicide used on a variety of crops including cotton, and was detected at a level of 0.19 ppb in one well in Humphreys County. At the present time, there is no established MCL for this compound. The latest resampling of this well did not indicate the presence of ZORIAL.

11. NITRATE/NITRITE

Nitrate/Nitrite levels in all sampled wells were extremely low, with the highest detected level being 0.93 ppm. The present MCL for total nitrates (as nitrogen) is 10.00 ppm.

PESTICIDE CONTAINER RECYCLE PROGRAM

SUMMARY

In addition to simply monitoring groundwater, Senate Bill 2778 also mandated that another responsibility of the AgChem Program would be protection of the groundwater resources in Mississippi. An example of one of these activities is the Pesticide Container Recycle Program.

In Mississippi, it is conservatively estimated that approximately 2,000,000 plastic pesticide containers are used annually for agricultural purposes. In the past, these containers were disposed of by land filling or illegal burning, dumping and burying. These disposal methods have resulted in situations with high potential for environmental degradation.

In an attempt to provide an alternative method of disposal, the Mississippi Pesticide Container Recycle Program was initiated in 1989. During its first year of existence, a total of 24,000 pounds of plastic pesticide containers were recycled from Washington County. Since that time, the program has grown to include almost half of the state's 82 counties. Through December 31, 2008, a total of more than 10,000,000 pounds of plastic representing some 15,000,000 containers have been collected and recycled. All 19 counties of the Delta have participated in this program, and over 95% of the containers recycled have been from these counties. Based on the best estimates available at this time, it is calculated that over 60% of all plastic containers used annually in Mississippi are currently being recycled.

CONCLUSION

Based on results to date, there is no evidence that agricultural chemicals are significantly impacting the quality of groundwater in the state of Mississippi or in the Mississippi Delta. Only one of the sampled wells in the Delta contained a single pesticide that initially exceeded allowable drinking water standards. Resampling of this well at an aerial applicator site in Leflore county now indicate levels are within established MCL's.

Many of the other affected wells only showed detections of volatile organic compounds (VOC's). While these are of interest and are important to groundwater protection programs operating in the state, they are not associated with agriculture in Mississippi.

The Mississippi Department of Environmental Quality will continue its efforts to determine if the agricultural use of pesticides and fertilizers may be adversely affecting our groundwater quality. These efforts will focus on the continuation of groundwater monitoring throughout the state; compiling additional data bases; and implementing new programs for site specific studies in areas of highest pesticide usage. In addition, participation will continue in other activities related to the prevention of contamination and protection of the groundwater resources of Mississippi.

APPENDICES

TABLE 1. Laboratory Analyses Conducted on Drinking Water Wells

TABLE 2. Summary of Pesticides and Other Organic Compounds Detected

TABLE 3. Drinking Water Wells Sampled and Detections by County

TABLE 4. Irrigation & Fish Culture Wells Sampled and Detections by County

TABLE 1.
LABORATORY ANALYSES CONDUCTED

METHOD 1 - NITROGEN / PHOSPHORUS PESTICIDES

ALACHLOR
AMETRYN
ATRAZINE
BROMACIL
BUTYLATE
CARBOXIN
CHLORPYRIFOS
CYCLOATE
DIAZINON
DIPHENAMID
DISULFOTON
DISULFOTON SULFONE
DISULFOTON SULFOXIDE
EPN
FENAMIPHOS
HEXAZINONE
IPRODIONE
METHAZOLE
METHYL PARAOXON
METOLACHLOR
METRIBUZIN
MOLINATE
NORFLURAZON
PROFENOFOS
PROMETON
PRONAMIDE
PROPAZINE
SIMAZINE
TEBUTHIURON
TERBACIL
TERBUFOS
TRIBUFOS

METHOD 2 - CHLORINATED PESTICIDES

ALDRIN
BASALIN (FLUCHLORALIN)
CAPTAN
CHLORDANE - GAMMA
CHLORDANE - ALPHA
CHLOROTHALONIL
4, 4 - DDD
4, 4 - DDE
4, 4 - DDT
DACTHAL (DCPA)
DICOFOL
DIELDRIN
ENDOSULFAN
ENDOSULFAN II
ENDOSULFAN SULFATE
ENDRIN
HCH - ALPHA
HCH - BETA
HCH - GAMMA
HCH - DELTA
HEPTACHLOR
HEPTACHLOR EPOXIDE
HEXACHLOROBENZENE
METHOXYCHLOR
PCB'S
PCNB
PENDIMETHALIN
CIS - PERMETHRIN
TRANS - PERMETHRIN
TOXAPHENE
TRIFLURALIN

TABLE 1. (CONTINUED)

METHOD 3 - CHLORINATED ACIDS AND PHENOLS

ACIFLUORFEN
BENTAZON (BENTAZONE)
2, 4 - D
2, 4 - DB
DALAPON
DICAMBA
DICHLOROPROP
DINOSEB
4 - NITROPHENOL
PENTACHLOROPHENOL
PICLORAM
2, 4, 5 - T
2, 4, 5 - TP

METHOD 4 - HERBICIDES

ATRAZINE DEALKYLATED
BARBAN
CARBOFURAN PHENOL
CARBOFURAN PHENOL 3 - KETO
CYANAZINE
DIURON
FENAMIPHOS
FENAMIPHOS SULFONE
FENAMIPHOS SULFOXIDE
FLUOMETURON
LINURON
METRIBUZIN DA
METRIBUZIN DADK
METRIBUZIN DK
NEBURON
PRONAMIDE METABOLITE
PROPANIL
PROPHAM
SWEP

METHOD 5 - CARBAMATES

ALDICARB
ALDICARB SULFONE
ALDICARB SULFOXIDE
CARBARYL
CARBOFURAN
CARBOFURAN 3 - OH
METHOMYL
NAPTHOL - GAMMA
OXAMYL
PROPOXUR

TABLE 1. (CONTINUED)

METHOD 8 - VOLATILE ORGANICS

ACROLEIN
ACRYLONITRILE
BENZENE
BROMOBENZENE
BROMOCHLOROMETHANE
BROMODICHLOROMETHANE
BROMOFORM
BROMOMETHANE
CARBON TETRACHLORIDE
CHLOROBENZENE
CHLOROETHANE
2 - CHLOROETHYLVINYL ETHER
CHLOROFORM
CHLOROMETHANE
2 - CHLOROTOLUENE
4 - CHLOROTOLUENE
DIBROMOCHLOROMETHANE
1, 2 - DIBROMOETHANE
DIBROMOMETHANE
1, 2 - DICHLOROBENZENE
1, 3 - DICHLOROBENZENE
1, 4 - DICHLOROBENZENE
DICHLORODIFLUOROMETHANE
1, 1 - DICHLOROETHANE
1,2 - DICHLOROETHANE
1, 1 - DICHLOROETHENE
CIS - 1, 2 - DICHLOROETHENE
TRANS - 1, 2 - DICHLOROETHENE
1, 2 - DICHLOROPROPANE
1, 3 - DICHLOROPROPANE
2, 2 - DICHLOROPROPANE
1, 1 - DICHLOROPROPENE
CIS - 1, 3 - DICHLOROPROPENE
TRANS - 1, 3 - DICHLOROPROPENE
ETHYLBENZENE
METHYLENE CHLORIDE
STYRENE
1, 1, 1, 2 - TETRACHLOROETHANE
1, 1, 2, 2 - TETRACHLOROETHANE
TETRACHLOROETHENE
TOLUENE
TRICHLOROETHENE
TRICHLOROFLUOROMETHANE
1, 2, 3 - TRICHLOROPROPANE
VINYL CHLORIDE
O - XYLENE
M - XYLENE
P - XYLENE
MTBE

TABLE 1. (CONTINUED)

METHOD 9 - INORGANICS (MINERALS, RESIDUES, NUTRIENTS & METALS)	
CALCIUM, TOTAL	CHROMIUM
CHLORIDES, TOTAL	IRON
COLOR	ARSENIC
HARDNESS (CA, MG)	BARIUM
SULFATES	CADMIUM
TURBIDITY	LEAD
TOTAL KJELDAHL NITROGEN	MERCURY
AMMONIA NITROGEN	SILVER
NITRATE / NITRITE NITROGEN	SELENIUM
PHOSPHATES, TOTAL	BERYLLIUM
PHOSPHATES, ORTHO	FLUORIDE
TOTAL SOLIDS @ 180 C	NICKEL
TOTAL DISSOLVED SOLIDS @ 180 C	ANTIMONY
TOTAL SUSPENDED SOLIDS @ 180 C	THALLIUM
MANGANESE	COPPER
MAGNESIUM	ZINC
SODIUM	ALUMINUM
POTASSIUM	

TABLE 2.
SUMMARY OF PESTICIDES AND OTHER ORGANIC COMPOUNDS DETECTED
MISSISSIPPI DELTA REGION

	DETECTED CONTAMINANT	NUMBER OF WELLS WITH DETECTS	PERCENTAGE OF WELLS WITH DETECTS	WELLS WITH DETECTS <MCL	WELLS WITH DETECTS >MCL	LEVELS DETECTED (PPB) MIN. - MAX.	MCL (PPB)
	RESULTS ON 163 SAMPLED DRINKING WATER WELLS						
1	**ACIFLUORFEN**	2	1.23%	2	0	0.017 - 0.800	9.0
2	**CHLOROFORM**	4	2.45%	4	0	1.000 - 8.000	100.0
3	**4,4-TDD (TDE)***	1	0.61%	0	1	0.070 - 0.170	0.1
4	**4,4-DDE**	1	0.61%	1	0	0.054	0.1
5	**4,4-DDT**	1	0.61%	1	0	0.020 - 0.060	0.1
6	**DIBROMOCHLOROMETHANE**	1	0.61%	1	0	1.600	N/A
7	**DICAMBA**	1	0.61%	1	0	0.032	200.0
8	**1,2 - DICHLOROETHANE**	1	0.61%	1	0	1.000	5.0
9	**1,1-DICHLOROETHENE**	1	0.61%	1	0	TRACE	7.0
10	**CIS-1,2-DICHLOROETHENE**	4	2.45%	4	0	TRACE - 2.000	70.0
11	**TRANS-1,2-DICHLOROETHENE**	1	0.61%	1	0	1.000	100.0
12	**DINOSEB**	1	0.61%	1	0	0.070	7.0
13	**METHYLENE CHLORIDE**	8	4.91%	8	0	0.000 - 4.000	5.0
14	**PENTACHLOROPHENOL**	54	33.13%	54	0	0.001 - 0.029	1.0
15	**TOLUENE**	1	0.61%	1	0	1.000	1000.0
16	**TRICHLOROFLUOROMETHANE**	1	0.61%	1	0	TRACE	2000.0
17	**O-XYLENE**	1	0.61%	1	0	1.000	10,000.0
	RESULTS ON 762 SAMPLED IRRIGATION & FISH CULTURE WELLS						
1	**BENTAZON**	9	1.18%	9	0	0.31 - 0.71	20.0
2	**BROMACIL**	1	0.13%	1	0	TRACE	90.0
3	**CURACRON *** **	3	0.39%	3	0	0.73 - 1.60	N/A
4	**DIURON**	1	0.13%	1	0	0.67	10.0
5	**MALATHION**	1	0.13%	1	0	0.050	200.0
6	**METRIBUZIN**	2	0.26%	2	0	TRACE - 0.02	100.0
7	**METOLACHLOR**	1	0.13%	1	0	3.10	70.0
8	**PENDIMETHALIN**	1	0.13%	1	0	0.02	N/A
9	**PENTACHLOROPHENOL**	16	2.10%	16	0	0.00 - 0.03	1.0
10	**ZORIAL**	1	0.13%	1	0	0.19 - 0.21	N/A

* - INDICATES DETECTED CONSTITUENT WHICH INITIALLY EXCEEDED MAXIMUM CONTAMINANT LEVEL

** - INDICATES DETECTED CONSTITUENT EXCEEDING MAXIMUM CONTAMINANT LEVEL AFTER RESAMPLING

*** - EXTERNAL CONTAMINATION OF SAMPLES WAS SUSPECTED ON 3 WELLS WITH CURACRON DETECTS. ALL WERE RESAMPLED, WITH NO CURACRON DETECTED. RESAMPLING WILL CONTINUE TO VERIFY FINDINGS.

MCL - MAXIMUM CONTAMINANT LEVEL PPB - PARTS PER BILLION N/A - NOT APPLICABLE

NOTE: MINIMUM - MAXIMUM DETECTED LEVELS INCLUDE RESAMPLE RESULTS, SO MORE THAN ONE LEVEL MAY BE INDICATED FOR ONLY ONE WELL. A LEVEL OF 0.000 INDICATES NONE DETECTED IN RESAMPLE.

TABLE 3.

DRINKING WATER WELLS SAMPLED IN EACH COUNTY AND ORGANIC COMPOUNDS DETECTED IN EACH

MISSISSIPPI DELTA REGION

COUNTY CODE AND COUNTY	NUMBER OF WELLS SAMPLED	NUMBER OF WELLS WITH POSITIVE DETECTS	PESTICIDES AND OTHER ORGANIC COMPOUNDS DETECTED
011 BOLIVAR	8	3	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL
015 CARROLL	9	2	WELL NO. 1 - METHYLENE CHLORIDE, CHLOROFORM WELL NO. 2 - METHYLENE CHLORIDE, 1,1 - DICHLOROETHENE
027 COAHOMA	4	3	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL
033 DESOTO	18	3	WELL NO. 1 - CIS 1,2 - DICHLOROETHENE WELL NO. 2 - CIS 1,2 - DICHLOROETHENE, TRICHLOROFLUOROMETHANE WELL NO. 3 - CIS 1,2 - DICHLOROETHENE
043 GRENADA	7	1	WELL NO. 1 - ACIFLUORFEN
051 HOLMES	5	4	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL, CHLOROFORM WELL NO. 3 - PENTACHLOROPHENOL, CHLOROFORM, 0 - XYLENE WELL NO. 4 - PENTACHLOROPHENOL
053 HUMPHREYS	10	8	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL WELL NO. 4 - PENTACHLOROPHENOL WELL NO. 5 - PENTACHLOROPHENOL WELL NO. 6 - PENTACHLOROPHENOL, CHLOROFORM WELL NO. 7 - PENTACHLOROPHENOL WELL NO. 8 - PENTACHLOROPHENOL
055 ISSAQUENA	3	2	WELL NO. 1 - PENTACHLOROPHENOL, ACIFLUORFEN WELL NO. 2 - PENTACHLOROPHENOL
083 LEFLORE	9	5	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL, 4,4 - DDD, 4,4 - DDT WELL NO. 4 - PENTACHLOROPHENOL WELL NO. 5 - PENTACHLOROPHENOL, 4,4 - DDE
107 PANOLA	5	3	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL
119 QUITMAN	6	3	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL
125 SHARKEY	5	1	WELL NO. 1 - PENTACHLOROPHENOL

TABLE 3. (CONTINUED)

COUNTY CODE AND COUNTY	NUMBER OF WELLS SAMPLED	NUMBER OF WELLS WITH POSITIVE DETECTS	PESTICIDES AND OTHER ORGANIC COMPOUNDS DETECTED
133 SUNFLOWER	13	6	WELL NO. 1 - METHYLENE CHLORIDE WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL, METHYLENE CHLORIDE, TOLUENE WELL NO. 4 - PENTACHLOROPHENOL WELL NO. 5 - METHYLENE CHLORIDE WELL NO. 6 - PENTACHLOROPHENOL
135 TALLAHATCHIE	10	4	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL WELL NO. 4 - PENTACHLOROPHENOL
137 TATE	12	1	WELL NO. 1 - DIBROMOCHLOROMETHANE, 1,2 - DICHLOROETHANE
143 TUNICA	3	3	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL, CIS 1,2 - DICHLOROETHENE, TRANS 1,2 - DICHLOROETHENE WELL NO. 3 - PENTACHLOROPHENOL
149 WARREN	8	3	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - METHYLENE CHLORIDE
151 WASHINGTON	17	0	NONE
163 YAZOO	11	9	WELL NO. 1 - PENTACHLOROPHENOL, METHYLENE CHLORIDE, DICAMBA WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL WELL NO. 4 - PENTACHLOROPHENOL WELL NO. 5 - PENTACHLOROPHENOL WELL NO. 6 - PENTACHLOROPHENOL, DINOSEB WELL NO. 7 - PENTACHLOROPHENOL, METHYLENE CHLORIDE WELL NO. 8 - PENTACHLOROPHENOL WELL NO. 9 - PENTACHLOROPHENOL
TOTALS	**163**	**64**	

TABLE 4.
IRRIGATION AND FISH CULTURE WELLS SAMPLED AND DETECTIONS BY COUNTY

MISSISSIPPI DELTA REGION

COUNTY CODE AND COUNTY	NUMBER OF WELLS SAMPLED	TOTAL SAMPLES COLLECTED	NUMBER OF WELLS WITH POSITIVE DETECTS	PESTICIDES AND OTHER ORGANIC COMPOUNDS DETECTED
011 BOLIVAR	82	108	5	WELL NO. 1 - PENTACHLOROPHENOL, BENTAZON, METRIBUZIN WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL WELL NO. 4 - PENTACHLOROPHENOL, BENTAZON WELL NO. 5 - BENTAZON
015 CARROLL	7	7	1	WELL NO. 1 - METOLACHLOR
027 COAHOMA	78	130	0	NONE
033 DESOTO	14	15	2	WELL NO. 1 - BENTAZON WELL NO. 2 - BENTAZON
043 GRENADA	3	3	0	NONE
051 HOLMES	30	30	1	WELL NO. 1 - MALATHION
053 HUMPHREYS	49	51	1	WELL NO. 1 - ZORIAL
055 ISSAQUENA	21	23	2	WELL NO. 1 - BENTAZON WELL NO. 2 - BENTAZON
083 LEFLORE	64	64	0	NONE
107 PANOLA	8	8	0	NONE
119 QUITMAN	58	61	1	WELL NO. 1 - DIURON
125 SHARKEY	37	37	1	WELL NO. 1 - PENDIMETHALIN
133 SUNFLOWER	75	76	4	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL WELL NO. 4 - BROMACIL
135 TALLAHATCHIE	35	35	0	NONE
137 TATE	3	3	0	NONE
143 TUNICA	67	67	0	NONE
149 WARREN	2	2	0	NONE
151 WASHINGTON	79	98	11	WELL NO. 1 - PENTACHLOROPHENOL WELL NO. 2 - PENTACHLOROPHENOL WELL NO. 3 - PENTACHLOROPHENOL WELL NO. 4 - PENTACHLOROPHENOL WELL NO. 5 - PENTACHLOROPHENOL WELL NO. 6 - PENTACHLOROPHENOL WELL NO. 7 - PENTACHLOROPHENOL WELL NO. 8 - PENTACHLOROPHENOL WELL NO. 9 - PENTACHLOROPHENOL WELL NO. 10-BENTAZON, METRIBUZIN WELL NO. 11-BENTAZON

TABLE 4. (CONTINUED)

COUNTY CODE AND COUNTY	NUMBER OF WELLS SAMPLED	TOTAL SAMPLES COLLECTED	NUMBER OF WELLS WITH POSITIVE DETECTS	PESTICIDES AND OTHER ORGANIC COMPOUNDS DETECTED
163 YAZOO	36	36	0	NONE
MSEA SITES (3) - 2 IN SUNFLOWER & 1 IN LEFLORE CO.	14	17	3	WELL NO. 1 - CURACRON (See Note 1) WELL NO. 2 - CURACRON (See Note 1) WELL NO. 3 - CURACRON (See Note 1)
TOTALS	762	871	32	730 WELLS - NONE DETECTED 14 WELLS - PENTACHLOROPHENOL 1 WELL - PENTACHLOROPHENOL, BENTAZON, METRIBUZIN 1 WELL - PENTACHLOROPHENOL, BENTAZON 1 WELL - BENTAZON, METRIBUZIN 6 WELLS - BENTAZON 1 WELL - BROMACIL 3 WELLS - CURACRON (See Note 1) 1 WELL - DIURON 1 WELL - MALATHION 1 WELL - METOLACHLOR 1 WELL - PENDIMETHALIN 1 WELL - ZORIAL

Note 1:
THESE THREE IRRIGATION WELLS ARE ALL LOCATED IN ONE FIELD IN SUNFLOWER COUNTY. AT TIME OF SAMPLE COLLECTION, IT WAS NOTED THAT CONTAMINATION FROM AN EXTERNAL SOURCE WAS SUSPECTED. FOLLOW-UP RESAMPLES DID NOT DETECT CURACRON IN ANY OF THE THREE WELLS, SO IT IS VERY PROBABLE THAT NONE WAS EVER PRESENT IN THE GROUNDWATER.