

Health Consultation

Pesticide Contamination of Groundwater in Mississippi County Well # 3

COUNTY ROAD (CR) – 109

MILLIGAN RIDGE, MISSISSIPPI COUNTY, ARKANSAS 72419

MAY 16, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

Pesticide Contamination of Groundwater in Mississippi County Well # 3

COUNTY ROAD (CR) – 109

MILLIGAN RIDGE, MISSISSIPPI COUNTY, ARKANSAS 72419

Prepared by:

Arkansas Department of Health and Human Services
Division of Health
Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Atlanta, Georgia 30333

Pesticide Contamination - Mississippi County Well #3
Milligan Ridge, Arkansas

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Statement of Issues and Background

The Arkansas Division of Health (ADOH) has prepared this health consultation report in response to a request from the Arkansas State Plant Board's Pesticide Division (ASPB) to review sampling data. ADOH reviewed ASPB sampling data collected from June 2005 – February 2006. The purpose of the report is to evaluate environmental sampling data for an agricultural groundwater well identified as Mississippi County Well #3 to determine whether a public health hazard exists as a result of possible exposure to contaminants detected at the site. This report, prepared in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), summarizes ADOH's evaluation.

Pesticides at levels requiring further investigation were detected by the ASPB in the groundwater collected from Mississippi County Well #3 during a random sampling of agricultural groundwater wells in June 2005. The well is located 0.25 miles west of State Highway 158 on County Road (CR) 109 near the community of Milligan Ridge, Mississippi County, Arkansas (Appendix – Figure 1). The test results indicating the pesticides detected during each groundwater-sampling event are identified in **Table 1**.

Pesticide	Sampling Events			
	June 2005	August 2005	October 2005	February 2006
Dicrotophos	64.1*	ND†	ND	ND
Fluometuron	6.1	ND	ND	ND
Promethryn	ND	ND	0.8	ND
Thiamethoxam	ND	10,173	11,585	ND
Tribufos	30.1	7.1	6.5	ND

Note: Arkansas State Plant Board personnel collected and analyzed the groundwater samples for pesticides.
* Values are in micrograms per liter ($\mu\text{g/L}$).
† ND = Not Detected.

A site visit by ADOH/ATSDR cooperative agreement staff, accompanied by ASPB staff personnel was conducted on January 31, 2006. Information regarding the historical data for the well was sought from the Arkansas Water Well Construction Commission (i.e., year drilled, well depth, casing depth, etc.), but no well log had been recorded with their office. In August 2006, Arkansas Natural Resources Commission, Groundwater Protection/Management personnel provided information about the well drilling company that is known to be used by the site land owner. But again, no specific data was recorded for this particular well. However, anecdotal evidence provided by an ASPB staff member suggests that the well is 25-30 feet deep [1]. The well casing material is 2-inch diameter PVC extending 6-inches above the ground (Appendix – Figure 2). Average depth of the water table near the well site is 18-42 inches or 1.5-3.5 feet [2].

Population density for the surrounding area is 18.6 people per square mile [3]. The nearest home to the well is located approximately 50 yards south southwest. Buffalo

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Island Regional Water District (BIRWD) provides all the area community homes with their water needs. BIRWD purchases their water from any of four public water systems whose sources are groundwater (Monette Waterworks, Caraway Waterworks, Manila Waterworks, and/or Leachville Waterworks).

The land surrounding the well is used for growing cotton. The area has a slope of 0 to 1 percent, contributing to the “poorly drained” classification for the soil [2]. The current land lessee first began farming the property and using the well during the 2005 farm season. According to the lessee, water is drawn from the well by inserting into the well casing a flexible hose that is connected to an external gas operated water pump.

The water pump used by the lessee has a check valve to prevent back siphoning (the reverse flow of water from loss of pressure). The lessee has seen other area farm workers drawing water from the well but does not know if their water pump systems are equipped with a check valve. Therefore, back siphoning during the mixing of chemicals at the site has been suggested to be the source of the pesticides detected in the #3 well.

Discussion

Analytical results were evaluated for the pesticides that were detected in the Mississippi County Well #3 groundwater samples collected by ASPB during June 2005 – February 2006. The evaluation of potential exposure to the contaminants began with the comparison of the levels of pesticides detected to chemical-specific health-based comparison values developed by ATSDR and other government agencies. Comparison values are doses or substance concentrations set well below levels that are known or anticipated to result in adverse health effects. The detected level(s) of dicrotophos, thiamethoxam, and tribufos in the #3 well exceeded these comparison values thus requiring further evaluation (Table 1).

BIRWD provides the water needs of the community. A review has been completed of the sampling and analysis data from the BIRWD water system and the public water systems supplying BIRWD. At present there has not been a detection of pesticides that might suggest that the Mississippi County Well #3 is impacting the public water supply wells.

Past, current, and future exposure to pesticides in the #3 well is unlikely because of its remote location and design, along with requiring special equipment and knowledge to draw water from the well. Further, ADOH personnel were informed in April 2006 by ASPB that groundwater samples collected from the #3 well in 2006, no longer contained pesticides at levels that were detectable. Future land use is expected to remain unchanged.

Exposure to contaminants of concern is determined by examining human exposure pathways. An exposure pathway has five parts:

1. A source of contamination (e.g., chemical spill),
2. An environmental medium such as air, water, or soil that can hold or move the contamination,

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3. A point at which people come in contact with a contaminated medium (e.g., private well),
4. An exposure route, such as drinking water from a well, and
5. A population who could come in contact with the contaminants.

An exposure pathway is eliminated if at least one of the five parts is missing and will not occur in the future. For a completed pathway, all five parts must exist and exposure to a contaminant must have occurred, is occurring, or will occur. No point at which people come in contact with the contaminated medium (groundwater – #3 well) exists. Without a completed pathway, no public health hazard is present.

Community Health Concerns

During our investigation of the Mississippi County Well #3, no specific community health concerns were presented to ADOH. ADOH personnel did speak with the land lessee once in January 2006, and again in August 2006. The lessee stated that he had seen area farmers using the well in the past. ASPB requested the aid of ADOH in evaluating their groundwater sampling results of groundwater collected from the #3 well. The high levels of pesticides that were detected prompted their request. ASPB and ADOH wanted to ensure that residential exposure did not exist. ADOH provided technical assistance to the ASPB in the form of review of sampling data and letter(s) of findings in May 2006.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

The remote location of the well and the necessary equipment and knowledge to draw water from the Mississippi County Well #3 are barriers preventing exposure to area children.

Conclusions

ADOH reviewed the site information and concluded that *no* completed exposure pathway between the agricultural well and the area community exists. The agricultural use of the well poses *no public health hazard*.

Recommendations

No recommendations relating to the groundwater well are indicated at this time.

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Public Health Action Plan

The Public Health Action Plan implemented by ADOH with regards to the Mississippi County Well #3 located near the community of Milligan Ridge, Arkansas is as follows:

Completed Actions

- ADOH evaluated groundwater sample data collected and analyzed by ASPB personnel between June 2005 and February 2006.
- ADOH personnel accompanied by ASPB personnel conducted a site visit January 31, 2006.
- ADOH personnel spoke with the land lessee in January and August 2006.
- ADOH provided technical assistance to the ASPB in the form of review of sampling data and letter(s) of findings in May 2006.
- ADOH received information from the Arkansas Natural Resources Commission regarding historical well data in August 2006.
- ADOH updated and finalized the community needs assessment for the area in November 2006.

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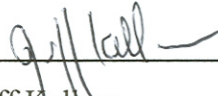
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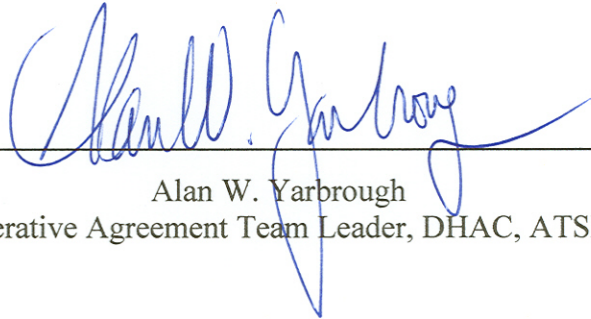
Certification

The Arkansas Division of Health prepared this health consultation for Mississippi County Well #3 near the community of Milligan Ridge, Arkansas under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedure existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner.



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The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.



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References

1. Site Visit Observation Form (January 31, 2006), Milligan Ridge – Mississippi County Agricultural/Monitoring Well #3 folder, Arkansas Division of Health's Epidemiology Branch, Environmental Section Records, Little Rock, AR.
2. U.S. Natural Resources Conservation Service. *Web Soil Survey*. Available at: <http://websoilsurvey.nrcs.usda.gov/app/>. Accessed July 28, 2006.
3. U.S. Environmental Protection Agency. *EnviroMapper StoreFront*. Available at: <http://www.epa.gov/enviro/html/em/>. Accessed August 3, 2006.

Appendix – Figures

**Pesticide Contamination - Mississippi County Well #3
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Figure 1. Mississippi County Groundwater Well #3

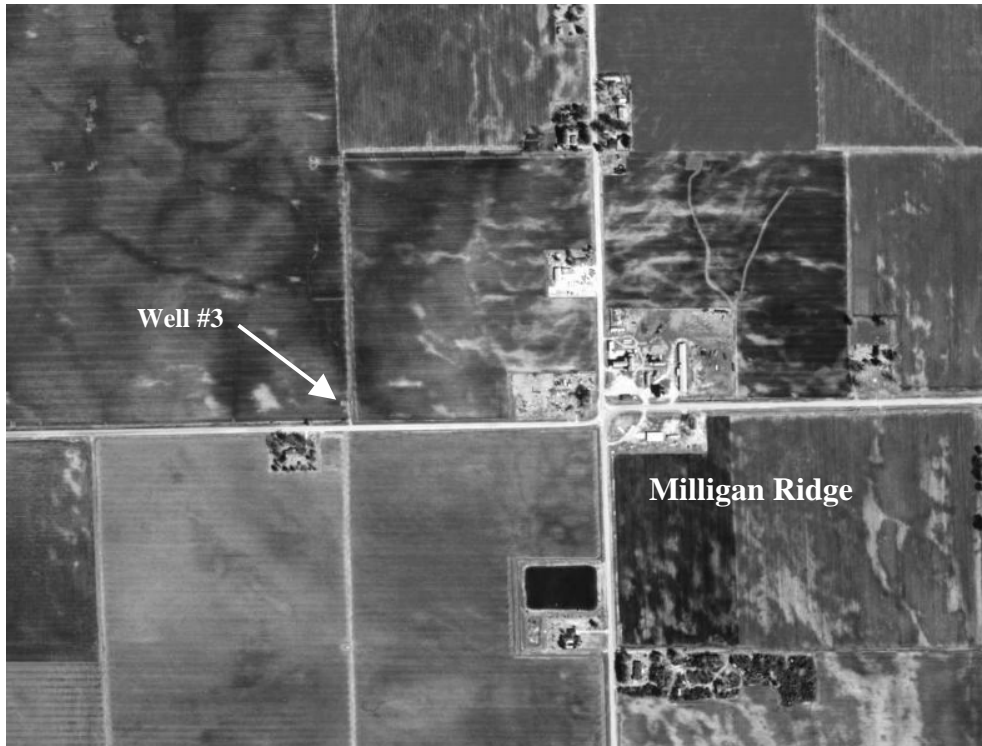


Figure 2. Well Casing of Mississippi County Well #3

