Health Consultation

HURRICANE RESPONSE SAMPLING ASSESSMENT FOR
MADISONVILLE CREOSOTE WORKS

MADISONVILLE, ST. TAMMANY PARISH, LOUISIANA

EPA FACILITY ID: LAD981522998

OCTOBER 11, 2006

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

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Prepared By:

Louisiana Department of Health and Hospitals
Office of Public Health
Section of Environmental Epidemiology and Toxicology
Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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List of Acronyms

ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CREG	cancer risk evaluation guide
DNAPL	dense non-aqueous phase liquids
EPA	Environmental Protection Agency
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
mg/kg/day	milligrams per kilogram per day
NPL	National Priorities Listing
OPH	Office of Public Health
RFD	reference dose
SEET	Section of Environmental Epidemiology and Toxicology
ug/L	micrograms per liter

Summary and Statement of Issues

The August 29, 2005 landfall of Hurricane Katrina and the September 24, 2005 landfall of Hurricane Rita resulted in extensive flooding throughout southern Louisiana. Following the hurricanes, a number of National Priorities Listing (NPL) sites throughout southern Louisiana were visited and sampled. The objectives of these events were to identify any damage that these sites suffered from the hurricanes, to determine whether the remedial actions at these sites remained effective, and to determine whether any contaminant levels had increased at the sites following hurricane-related flooding.

The United States Environmental Protection Agency (US EPA), in coordination with the Louisiana Department of Environmental Quality (LDEQ), sampled groundwater from two monitoring wells at the Madisonville Creosote Works site. Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) has developed the following health consultation to review these groundwater samples. The primary goals of this document are to determine whether any contaminants that would pose a public health hazard had leached from residual soils into the site's groundwater following Hurricane Katrina and to establish what further public health actions, if any, may be needed.

Background and Site History

Madisonville Creosote Works is located on State Highway 22, approximately 3 miles west of the city of Madisonville in St. Tammany Parish, Louisiana. The nearest residents live within one-tenth of a mile on both the east and west sides of the site. A hardwood forest to the north and northeast are undergoing development for a housing subdivision. No residents are known to live in the marsh to the south of the site [1].

The facility opened as a 29-acre wood preserving facility in the mid-1950's. Wood poles, ties, and lumber were impregnated with creosote under high temperature and pressure at the site. From the 1960's until 1984, creosote sludge and wastewater were treated, stored, and disposed of using surface impoundments, sprinkler evaporation, and ditches [2]. Under the direction of LDEQ, the storage ponds and process water ditches used at the site were closed as solid waste management units between 1984 and 1986. A post-closure maintenance and monitoring plan was required due to the presence of groundwater contamination [3]. The facility ceased its operations in July 1994.

In 1991, an investigation by LDEQ identified off-site creosote contamination in an unnamed stream behind the facility [1]. In September 1996, EPA initiated a Time Critical Removal Action of the process area, which included hazardous materials onsite and equipment that had been

integral to the operation and maintenance of the facility. The area was secured by a perimeter fence and buildings associated with the process area were demolished. Waste removed from the site by January 7, 1977 included 371 tons of tank sludge; 78,602 gallons of aqueous phase tank liquid; 8,000 gallons of non-aqueous phase tank liquid; 520 tons of contaminated concrete; 106 tons of contaminated piping and metal; 300 tons of wood chips, and 14 cubic yards of asbestos containing material.

In December 1996, Madison Creosote Works was added to the NPL. Site remediation began in January 1999. The remedial alternatives were chosen to achieve the following objectives:

- protect drinking water
- eliminate exposure to contaminated on-site soils
- reduce the possible threat of exposure to off-site soils and sediment

Remedial activities were completed in May 2000. These activities included low temperature thermal desorption for contaminated soils and sediment on and off-site and construction of a dense non-aqueous phase liquids (DNAPL) recovery trench. The DNAPL recovery system collects groundwater and processes it through a wastewater treatment plant [1].

Long-term groundwater monitoring has been instituted at the Madisonville Creosote Works site to ensure the effectiveness of the cleanup remedy [3]. Three shallow water-bearing units beneath the site together extend from 15 to 64 feet below ground surface (bgs). EPA studies have concluded that these shallow water-bearing units are unfit for domestic or industrial use because of slow recharge. Residential wells in the area all draw from aquifers below the three water-bearing units [1]. These deeper aquifers include the Shallow Aquifer (80-200 feet bgs; also known as the Upland Terrace Aquifer), the Upper Ponchatoula Aquifer (250 to 650 feet bgs), and the Lower Ponchatoula Aquifer (650 to 1,100 feet bgs) [4,5]. These aquifers receive very little recharge from the three upper water-bearing units [1]. Groundwater monitoring at the site can protect the domestic aquifers by monitoring for the potential migration of contaminants toward these deeper groundwater sources.

Extensive flooding and wind damage resulting from the August 29, 2005 landfall of Hurricane Katrina raised concerns about the state of the NPL sites located in Katrina-impacted areas of Louisiana. On September 27, 2005, the CH2MHILL environmental consulting company conducted a site inspection of the Madisonville Creosote Works site at EPA's request. The team was accompanied by representatives from EPA and LDEQ. The site visit was performed to determine whether the remedial actions in place at the site had been compromised by Hurricane Katrina. Appendix A includes photographs taken during the site visit. The site inspection team noted that 12 trees had fallen on the property, damaging part of the perimeter fence. No evidence of flooding was found at the site, but there was water in one of the monitoring well vaults [1].

Groundwater samples were collected from two monitoring wells at the site on October 1, 2005. These samples were analyzed to determine whether any contaminants from residual soils left

after excavation had migrated into the groundwater following the hurricane. Figure 1 shows the location of the two wells sampled at the site. Both of these wells are screened in the Shallow Aquifer (Upland Terrace) formation [6]. The results of the October 1 sampling event were compared to samples collected in December 2004 as part of the regular groundwater monitoring program. The results of this comparison found no increase in contaminants within the site groundwater. It was therefore determined that the remedy for the site had not been affected by the hurricane [7]. There should be no increased potential for exposure to site-related contaminants in the community around the Old Inger Oil Refinery.

Demographics

Approximately 500 people live within a 1-mile radius of the Madisonville Creosote Works site [3]. Census 2000 results reported a total population of 3,609 within the census block that encompassed the site. The largest ethnic group in this census block at that time was Caucasian (91.1%), followed by African-American (6%), and those identifying themselves as belonging to 2 or more races (1.1). Two point seven percent (2.7%) of the population identified themselves as Hispanic. Thirty-three point one percent (33.1%) of the population age 25 years or older in 2000 had earned at least a high school diploma. The median household income was $43,750.

Discussion

Data Used

A shallow groundwater sample was taken from each of two monitoring wells, MW-02 and RA-05, at the Madisonville Creosote Works site on October 1, 2005 [see Figure 1]. This sampling event was part of the EPA's characterization of post-hurricane conditions at NPL sites throughout southern Louisiana. The samples were analyzed for 66 semivolatile compounds.

Exposure Pathways

The two monitoring wells from which groundwater samples were taken at the Madisonville Creosote Works site are screened in the Upland Terrace formation, which provides a source of domestic water to some of the site's residential neighbors [6]. Within a 1-mile radius, a reported 20 domestic wells draw from the Upland Terrace formation [1]. Water from this aquifer may be consumed or used for bathing, irrigation, or other domestic purposes. Water observed during the site visit to have collected in the monitoring well vault would have been storm-related and not from the monitoring well, which is capped when not in use. This standing water would not serve as a medium in which contaminants could reach the residents around the site.

Adapted from: CH2M HILL, Inc. Hurricane Katrina Response: Madisonville Creosote Works Site, Louisiana, Site Inspection and Sampling Results. CH2M HILL Technical Memorandum 05-8257. 2005 Nov 4.

Evaluation Process

One semivolatile contaminant was detected in groundwater from the Madisonville Creosote Works site. Bis(2-ethylhexyl) phthalate was detected in monitoring well MW-02 at 7.32 ug/l. This concentration was screened against highly protective health-based comparison values. These values, which are derived from human and animal studies, are calculated with safety margins or uncertainty factors to account for variations in sensitivity within a human population and for differences between human and animal studies. These values are used for screening purposes only and do not determine whether adverse health effects will occur. Appendix B details the screening process and the assessment process that followed when bis(2-ethylhexyl) phthalate was found to exceed two of these screening values.

The highest oral dose of bis(2-ethylhexyl) phthalate possible at the Madisonville Creosote Works site would be a dose absorbed by an infant (0-1 year old). This dose of 7.30×10^{-4} mg/kg/day is more than 100 times lower than the reference dose (RfD), the estimated daily lifetime exposure to bis(2-ethylhexyl) phthalate that is not likely to cause adverse noncancer health effects in human populations [8]. The highest dermal exposure, calculated for a child 3-11 years old, also yields a dose (5.70×10^{-5} mg/kg/day) that is below the dermal reference dose and would therefore not be expected to cause adverse health effects.

Though bis(2-ethylhexyl) phthalate is classified by the EPA as a probable human carcinogen, the doses that would be absorbed by residents ingesting groundwater from this source over a lifetime are below those of concern for increased cancer risk. The maximum bis(2-ethylhexyl) phthalate cancer risk from groundwater ingestion from this site is 2.90×10^{-6}. This cancer risk is more than 10 times lower than the upper risk limit of 1.00×10^{-4} that would be predicted for a normal human population (see Appendix B). Ingestion of bis(2-ethylhexyl) phthalate from groundwater at the ASL site therefore should pose **no apparent public health hazard** to residents.

Child Health Considerations

A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Children are more susceptible to the toxic effects of contaminants than the general population because their bodies do not have mature detoxification mechanisms. Children are dependent on adults for access to housing and medical care, and for risk identification. Adults need as much information as possible to make informed decisions regarding their children's health.

The single sample of bis(2-ethylhexyl) phthalate detected in groundwater from the Madisonville Creosote Works was present in a concentration that would not cause adverse health effects to children. There is no apparent public health hazard involved for children who drink or bathe in water from the Upland Terrace aquifer under the Madisonville Creosote Works site.

Conclusions

The physical damage Hurricane Katrina caused at the Madisonville Creosote Works site did not compromise the remedy instituted to protect the public against site-related health hazards. A post-hurricane evaluation of site groundwater detected only one contaminant, bis(2-ethylhexyl) phthalate. Because the detected concentration of bis(2-ethylhexyl) phthalate is low, groundwater from the Madisonville Creosote Works site currently poses no apparent public health hazard to the community around the site.

Recommendations

There are no recommendations to be made at this time regarding the groundwater at the Madisonville Creosote Works site**.** LDHH/OPH/SEET will examine future Madisonville Creosote Works data as needed or requested.

Public Health Action Plan

The information produced within this health consultation should be disseminated to the community members and stakeholders within St. Tammany Parish, Louisiana.

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2. United States Environmental Protection Agency. NPL Site Narrative for Madisonville Creosote Works. Accessed 31 Aug 2006 at URL: http://www.epa.gov/superfund/sites/npl/nar1477.htm

3. CH2M HILL, Inc. Hurricane Katrina Response: Madisonville Creosote Works Site, Louisiana, Site Inspection and Sampling Results. CH2M HILL Technical Memorandum 05-8257. 2005 Nov 4.

4. United States Environmental Protection Agency, Region 6. First Five-Year Review Report for the D.L. Mud, Inc. Site, Abbeville, Vermilion Parish, Louisiana. Prepared by Tetra Tech EM Inc. Work Assignment No. 934-FR-FE-06ZZ. 2003 Sept.

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6. United States Environmental Protection Agency. Madisonville Creosote Works Remedial Action Completion Report, Volume 1 of 3. Work Assignment No. 926-RARA-06AJ. 2001 Sep 19.

7. United States Environmental Protection Agency. Hurricane Katrina Evaluation Report for Madisonville Creosote Works Superfund Site. St. Tanmmany Parish, Louisiana. 2005 Dec 14.

8. United States Environmental Protection Agency. Integrated Risk Information System: Di(2-ethylhexyl)phthalate. Accessed 15 Sep 2006 at URL: http://www.epa.gov/IRIS/subst/0014.htm

Certification

This Hurricane Response Sampling Assessment for the Madisonville Creosote Works Post-Hurricane Assessment public health consultation was prepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures at the time the health consultation was begun. The editorial review was conducted by the Cooperative Agreement Partner.

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Technical Project Officer, Division of Health Assessment and Consultation (DHAC)

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Alan W. Yarbrough
Cooperative Agreement Team Leader, DHAC, ATSDR

APPENDIX A: Madisonville Creosote Works Post-hurricane Site Inspection Photographs*

DSCN1209-MV_front gate.JPG 2005/09/27 13:54:48

DSCN1210-MV_front gate_left.JPG 2005/09/27 13:55:02

DSCN1211-MV_front gate_right.JPG 2005/09/27 13:55:15

DSCN1212-MV_tree down on fence.JPG 2005/09/27 13:55:38

DSCN1213-MV_tree down on fence near front gate.JPG 2005/09/27 1

DSCN1214-MV_tree down on fence.JPG 2005/09/27 13:55:56

DSCN1215-MV_inside Plant_no flooding.JPG 2005/09/27 13:58:02

DSCN1216-MV_inside Plant_no flooding.JPG 2005/09/27 13:58:09

* Adapted from CH2M HILL, Inc. Hurricane Katrina Response: Madisonville Creosote Works Site, Louisiana, Site Inspection and Sampling Results. CH2M HILL Technical Memorandum 05-8257. 2005 Nov 4.

DSCN1217-MV_inside Plant_no flooding.JPG 2005/09/27 13:58:15

DSCN1218-MV_inside Plant_no flooding.JPG 2005/09/27 13:58:40

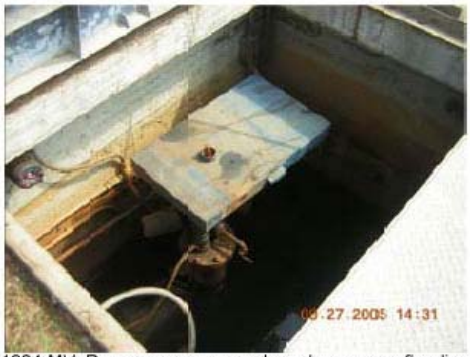
DSCN1219-MV_inside Plant_map of french drain layout.JPG 2005/09

DSCN1220-MV_Plant_no flooding.JPG 2005/09/27 14:26:18

DSCN1221-MV_Plant outbuilding_not roof damage.JPG 2005/09/27 1

DSCN1222-MV_Recovery sumps_no flooding.JPG 2005/09/27 14:29

DSCN1223-MV_Recovery sump_no flooding.JPG 2005/09/27 14:30:0



DSCN1224-MV_Recovery sump_may have been some flooding at hig

DSCN1225-MV_Recovery sump_may have been some flooding at higl

DSCN1226-MV_French drain access_note fire ants.JPG 2005/09/27

DSCN1227-MV_monitoring well.JPG 2005/09/27 14:39:08

DSCN1228-MV_view across site to water well in corner.JPG 2005/09/

DSCN1229-MV_monitoring well.JPG 2005/09/27 14:40:41

DSCN1230-MV_tree down on fence.JPG 2005/09/27 14:44:34

DSCN1231-MV_tree down on fence.JPG 2005/09/27 14:44:43

DSCN1232-MV_water well enclosure.JPG 2005/09/27 14:45:18

DSCN1233-MV_water well enclosure.JPG 2005/09/27 14:47:41

DSCN1234-MV_tree down.JPG 2005/09/27 14:53:51

DSCN1235-MV_view across site.JPG 2005/09/27 14:53:58

DSCN1236-MV_tree down.JPG 2005/09/27 14:54:05

APPENDIX B: Evaluation Process

Screening Process

Comparison values are initially used in a health assessment to determine which samples needed to be closely evaluated. Comparison values are media-specific concentrations of chemicals that are used by health assessors to select environmental contaminants for further evaluation. Comparison values are not used as predictors of adverse health effects.

The c*ancer risk evaluation guide* (CREG) was the comparison value used to evaluate bis(2-ethylhexyl) phthalate in groundwater from Madisonville Creosote Works. A CREG is an estimated contaminant concentration that would be expected to cause no more than one additional excess cancer in 1 million exposed persons over a lifetime. CREGs are calculated from the United States Environmental Protection Agency's (US EPA's) cancer slope factors (CSFs). Because bis(2-ethylhexyl) phthalate was present in a concentration exceeding its CREG of 3 ug/l, it was identified as a contaminant of concern (COCs) needing further assessment.

Noncancer Health Effects

An exposure dose was estimated for dermal exposure and consumption of Madisonville Creosote Works groundwater. The following equation was used to calculate the water dermal doses:

$$\text{Water Dermal Dose (mg/kg/day)} = \frac{\text{CW x PC x SA x ET x EF}}{\text{BW}} x\ \text{CF}$$

The following equation was used to calculate the water ingestion doses:

$$\text{Water Ingestion Dose (mg/kg/day)} = \frac{\text{CW x IR x EF x}}{\text{BW x}}$$

The calculated exposure doses were compared to the appropriate health guideline values. Health guideline values are doses below which adverse health effects are unlikely. These values are based on valid toxicological studies with appropriate safety factors built in to account for uncertainty such as that caused by differences in human sensitivities and animal to human differences. The *reference dose* (RfD) was the health guideline value used in the evaluation of Madisonville Creosote Works groundwater. An RFD is an estimated daily lifetime exposure to a hazardous substance that is not likely to cause adverse noncancer health effects to human populations. RfDs are developed by the EPA and may be found at http://www.epa.gov/iris.

Table B-1: Equation Variables for Dermal Dose from Madisonville Creosote Works groundwater, Louisiana, 2005.

Variable	Value used*
CW = Concentration in water	7.32 ug/L† for bis(2-ethylhexyl) phthalate
PC = Permeability Constant	$3.3E^{-2}$ for bis(2-ethylhexyl) phthalate
SA=Surface Area	7110 cm^2 for female, 3<6 years
ET = Exposure time	1 hour/day (estimated)
EF = Exposure frequency	365 days/year
CF = Conversion factor	1 liter/1,000 cm^3
BW = Body weight	30 kg for female or male, 3<12 years

* All values, excluding the contaminant concentration and the permeability constant, were retrieved using the ATSDR's Exposure Dose Calculator

†ug/L = micrograms per liter

Table B-2: Equation Variables for Groundwater Ingestion Dose, Madisonville Creosote Works, Louisiana, 2006.

Variable	Value used
CW = Concentration in water	7.32 ug/L† for bis(2-ethylhexyl) phthalate
IR_c = Ingestion rate child (1–10 years)	1 L/day
EF = Exposure frequency	365 days/year
BW = Body weight	10 kg for an infant 0-1 year old

* All values, excluding the contaminant concentration and the permeability constant, were retrieved using the ATSDR's Exposure Dose Calculator

†ug/L = micrograms per liter

Calculation of Carcinogenic Risk

Because of the uncertainties involved in estimating carcinogenic risk, ATSDR uses a weight-of-evidence approach in evaluating all relevant carcinogenic data, describing carcinogenic risk in words and numerical terms.[†] The estimated risk of developing cancer resulting from exposure to the contaminants within the water bodies was calculated by multiplying the exposure dose over a 70-year (lifetime) period by EPA's *cancer slope factor* (CSF: available at http://www.epa.gov/iris). The results estimate the worst-case maximum increase in the risk of developing cancer after exposure to the contaminant. This estimation is accurate within one order of magnitude; a calculated cancer risk of 2 excess cancers per 10,000 people might actually be 2 excess cancers per 1,000 people or 2 excess cancers per 100,000 people.

[†] Agency for Toxic Substances and Disease Registry. Cancer policy framework. Atlanta: US Department of Health and Human Services; 1993.