

Health Consultation

HURRICANE RESPONSE SAMPLING ASSESSMENT FOR FIVE EPA REGION 6 - LOUISIANA DELETED SUPERFUND SITES

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Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 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 or ATSDR's Cooperative Agreement Partners 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
Office of Public Health

Section of Environmental Epidemiology & Toxicology

Under a Cooperative Agreement with the U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Table of Contents

Table of Contents.....	iii
List of Acronyms.....	iv
Executive Summary.....	1
Background, Site Histories, Data Evaluation, and Exposure Pathways.....	2
Mallard Bay Landing Bulk Plant.....	2
Gulf Coast Vacuum Services.....	4
D.L. Mud, Inc.....	5
PAB Oil & Chemical Services, Inc.....	7
Ruston Foundry.....	8
Health Effects Evaluation.....	9
Child Health Considerations.....	10
Limitations.....	10
Conclusions	10
Recommendations	11
Public Health Action	11
Preparers of this Report	12
References	13
APPENDIX A: Site Maps and Sampling Locations	16
Map I: Mallard Bay Landing Bulk Plant	16
Map II: Gulf Coast Vacuum Services.....	17
Map III: D.L. Mud, Inc.	18
Map IV: PAB Oil and Chemical Services, Inc.	19
Map V: Ruston Foundry	20
APPENDIX B: Contaminants Exceeding Comparison Values (CVs)	21

List of Acronyms

ATSDR	Agency for Toxic Substances and Disease Registry
CH2M	CH2M Hill, Inc.
CREG	Cancer Risk Evaluation Guide
CV	Comparison Value
EMEG	Environmental Media Evaluation Guide
EPA	Environmental Protection Agency
GCVS	Gulf Coast Vacuum Services
IEUBK	Integrated Exposure Uptake Biokinetic Model
LDEQ	Louisiana Department of Environmental Quality
LDH	Louisiana Department of Health
NPL	National Priorities List
MRI	Mallard Resources, Inc.
OPH	Office of Public Health
PPB	Parts per Billion (ug/L)
PPM	Parts per Million (mg/L)
RI/FS	Remedial Investigation/Feasibility Study
RMEG	Reference Dose Media Evaluation Guide
ROD	Record of Decision
RSL	Regional Screening Level
SEET	Section of Environmental Epidemiology & Toxicology
SVOCs	Semi-Volatile Organic Compounds
VOCs	Volatile Organic Compounds

Executive Summary

INTRODUCTION On August 26, 2017, Hurricane Harvey made landfall on the Texas coast, bringing record-breaking flooding and storm-related damage. After re-entering the Gulf of Mexico and losing power, Tropical Storm Harvey made landfall on August 30, 2017, near the Louisiana-Texas coast. This resulted in more flooding throughout the Environmental Protection Agency (EPA) Region 6 area. Beginning on September 6, 2017, nine National Priorities List (NPL) sites or previously listed NPL sites throughout the state of Louisiana were sampled. The goals of this sampling were to ensure that no NPL or previously listed NPL sites were compromised due to flood waters or other storm-related events, to determine if remedial actions that may have already been taken were still effective, and to determine whether any contaminant levels had increased at the sites following the storm. These sampling events are part of a long-term assessment that is used to transition sites to normal cleanup operations, if needed.

Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Louisiana Department of Health/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDH/OPH/SEET) has developed the following health consultation to review soil and groundwater samples collected at five affected sites post-Hurricane Harvey. The five sites included in this report have been deleted from the EPA's National Priorities List. The samples were analyzed for site-related contaminants detailed in this report. The primary goal of this report is to determine whether any contaminants in the soil and/or groundwater would pose a public health hazard following Hurricane Harvey-related flooding and what further public health actions, if any, may be needed.

CONCLUSION The physical damage Hurricane Harvey caused at the five EPA Region 6 – Louisiana deleted Superfund sites did not compromise the remedies instituted to protect the public against site-related health hazards. A post-hurricane evaluation of the sites' groundwater and soil did reveal elevated levels of contaminants present at the sites - primarily heavy metals; however, the contaminants detected were consistent with historical sampling levels at each site.

BASIS FOR DECISION

The absence of a complete exposure pathway at the five sites ensures that the groundwater and soil at each site poses no apparent public health hazard to the surrounding communities.

NEXT STEPS

LDH/OPH/SEET will be available to assess any additional samples collected from the five sites or to reassess the current data following any changes in usage of or access to the sites. The information produced within this health consultation will be made available to community members and stakeholders in the following Louisiana parishes: Cameron, Vermilion, and Rapides.

FOR MORE INFORMATION

If you have further concerns about the sites discussed in this report, you can call SEET at 1-888-293-7020 or ATSDR at 1-800-CDC-INFO and ask for information about the five EPA Region 6 – Louisiana deleted Superfund sites assessed post-hurricane Harvey.

Background, Site Histories, Data Evaluation, and Exposure Pathways

Mallard Bay Landing Bulk Plant

Site Description

The Mallard Bay site, located in Grand Cheniere, LA, is a 10-acre, inactive crude oil refining and bulk storage facility [1]. The site is situated in the northeast corner of Cameron Parish, northeast of Grand Chenier; southwest of Gueydan; and south of Jennings. Mallard Resources, Inc. (MRI) operated a hazardous waste treatment facility, which included both storage and disposal of the waste. MRI also served as a hazardous waste generator of petroleum refining industry-listed waste products. The facility closed in 1987, and it was proposed/listed in 2000. The Mallard Bay site is no longer an NPL site as remediation and cleanup was completed in 2004. The site was removed from the NPL in 2005 and was deemed “available for reuse,” as contaminants are at or below residential levels [1].

Demographics

The Mallard Bay site is located in Cameron Parish, near Grand Cheniere. According to 2010 Census reports, there are no reported residences within a one-mile radius to this site. The regularly occupied building nearest the site is a building for the resident manager of the Jupiter

plant, which is located approximately 1,200 feet northeast of the facility; this was reported in 2005. The area surrounding the facility is utilized mainly for hunting and cattle ranching [2].

Data Sources & Evaluation

On September 13, 2017, two soil samples from the Mallard Bay site were collected for analysis, specifically for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals [3]. The samples were collected near the north and southeast borders, respectively (Appendix A). The environmental guideline comparison, which is the first step in evaluating NPL site data, concluded that arsenic was the only contaminant that exceeded ATSDR and/or other comparison values (CVs). The contaminant concentrations from both soil samples and the respective CVs can be found in Appendix B (Table 1). All other contaminants screened were below ATSDR and/or other comparison values. Data and contaminant levels from this site were consistent with background site levels from the Site Remedial Investigation Report from 2002 [4, 5]. Hurricane Harvey-related data for this site may be found online at https://response.epa.gov/site/site_profile.aspx?site_id=12353.

Exposure Pathways

Further evaluation of environmental and human factors was completed by LDH/OPH/SEET to determine if an adult and/or child would be exposed to contaminants in the sampled media from the EPA Region 6 – Louisiana Superfund sites sampled post-Hurricane Harvey. All exposure pathways involve five basic components: 1) a source of contamination, 2) transport through the environment, 3) a point of exposure, 4) a route of exposure, and 5) a potentially exposed population. ATSDR categorizes an exposure pathway as a completed or potential exposure pathway if the exposure pathway cannot be eliminated. Completed pathways require that all five elements exist and indicate that exposure to a contaminant has occurred in the past, is presently occurring, or will occur in the future. Potential pathways, however, indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present [6].

There is **no complete exposure pathway** at the Mallard Bay Landing site. The site was appropriately remediated and is considered “available for reuse” after the completed EPA NPL cleanup process. Post-hurricane sampling, although limited, did not reveal any elevation in site-related contaminants. Therefore, soil at the Mallard Bay site should pose no apparent public health hazard to the surrounding community at this time.

Gulf Coast Vacuum Services

Site Description

Gulf Coast Vacuum Services (GCVS) is a 12.8-acre site southwest of Abbeville, LA, in Vermilion Parish. The site is located 1.5 miles west of the Vermilion River, which runs through northern Lafayette, Abbeville, and into the Vermilion Bay. Once a vacuum truck and oilfield drilling mud plant, the site was in operation from 1969 to 1984. Activities related to previous drilling and waste storage practices contaminated soil, groundwater, and sediment with hazardous chemicals [7]. GCVS was listed as an NPL site in March 1989, and it was delisted in July 2001 after remediation and cleanup was completed. Currently, the site is in the operation and maintenance phase, which consists of annual monitoring of groundwater, 5-year assessments of remedial interventions (next review in 2018), and long-term protective measures being in place [7].

Demographics

The Gulf Coast Vacuum Services facility is located approximately 2.5 miles southwest of Abbeville, LA, in Vermilion Parish. Approximately 313 persons live within the one-mile radius surrounding the site: ninety-five percent (95%) identifying as Caucasian, three percent (3%) identifying as African-American, and one percent (1%) identifying as “some other race.” Nineteen percent (19%) of this population is considered “low income,” and seventeen percent (17%) of this population has less than a high school education [8].

Data Sources & Evaluation

On September 13, 2017, a single groundwater sample and a single soil sample were collected from the GCVS facility for analysis, specifically for SVOCs and metals [9, 10]. The environmental guideline comparison revealed that arsenic was above ATSDR comparison values in both soil and groundwater samples. Additionally, cadmium exceeded the ATSDR CV in the groundwater sample at this site. Contaminants detected and their respective CVs can be found in Appendix B (Table 2). No other contaminants were found at detectable levels and no specific health considerations were investigated [11, 12]. Data for this site may be found online at https://response.epa.gov/site/site_profile.aspx?site_id=12353.

Exposure Pathways

There is **no complete exposure pathway** at the Gulf Coast Vacuum Services site. The site was appropriately remediated and is currently in the operation and maintenance phase of the EPA NPL cleanup process. Additionally, the site is not being used for any industrial, commercial, or

residential purposes at this time. Post-hurricane sampling, although limited, did not reveal any elevation in site-related contaminants. Therefore, soil and ground water at the Gulf Coast Vacuum Services site should pose no apparent public health hazard to the surrounding community at this time.

D.L. Mud, Inc.

Site Description

The 12.8-acre D.L. Mud, Inc. Superfund Site is located on Parish Road P-7-31, 2.5 miles southwest of Abbeville, LA, and 1.5 miles west of the Vermillion River. The site lies adjacent to another NPL site - Gulf Coast Vacuum Services. The original 25.56-acre land mass was collectively known as the Galveston Houston Yard or the LeBoeuf Yard [13]. A vacuum truck and oilfield drilling mud plant that contained a barium sulfate-based drilling and mud blending facility operated on site from about 1969 to 1986. Historical operations and waste disposal practices resulted in contaminated soil and groundwater with hazardous chemicals.

EPA performed a Remedial Investigation/Feasibility Study (RI/FS) at the site from December 1990 - September 1992, and LDH/OPH/SEET completed a Preliminary Public Health Assessment in February 1992 using data available prior to completion of the RI/FS [14]. The EPA identified barium as the only chemical of concern for surface soils. An EPA Record of Decision (ROD) signed in September 1994 called for the excavation and offsite disposal of sludge and contaminated subsurface soil, as well as the implementation of institutional controls at the site. Remediation was completed in February 1999 with the installation of a six-foot chain link fence around the entire site in order to control access by trespassers [15]. This institutional control also addressed future occupational land use scenarios, as well as a potential residential pathway of concern - surface soil ingestion. Following construction of the site's remedy, EPA took the site off the Superfund Program's National Priorities List in March 2000.

The site is presently in the operation and maintenance phase of the Superfund process. Groundwater monitoring is being conducted annually, and the Potentially Responsible Party Group and EPA are currently collaborating on implementing the recommendations of the 2013 Third Five-Year Review to ensure long-term protectiveness of the remedy. The Fourth Five-Year Review is scheduled to being in early 2018 [13].

Demographics

An estimated 2,600 people live within 3 miles of the site. Census 2010 reported an approximate population of 310 individuals within a 1-mile radius of the D.L. Mud, Inc. site. The largest ethnic group surrounding the site at that time was Caucasian (95%), followed by African-American

(3%) for those individuals who reported one race. Another one percent (1%) of the population reported identifying with two or more races, and two percent (2%) of the population identified him/herself as Hispanic [16]. Approximately forty-four (44%) of the population age 25 years or older in 2008-2012 had earned at least a high school diploma. The largest percentage of households (39%) earned \$75,000+ based on household income in 1999 [17]. The largest city located near the D.L. Mud, Inc. site is Abbeville, LA, which sustains an approximate population of 12,221 in Vermillion Parish.

Data Sources and Evaluation

On September 13, 2017, the CH2M HILL, Inc. (CH2M) environmental consulting company conducted a site inspection of the D.L. Mud, Inc. site at EPA's request. The team was accompanied by representatives from EPA and Louisiana Department of Environmental Quality (LDEQ). The site visit was performed to determine whether remedial actions at the site had been compromised by Hurricane Harvey [18, 19]. One groundwater sample was collected from a monitoring well located at the north end of the site near the entrance gate (MW-G-8), and one soil sample was collected at the south end of the site. Both samples were collected and analyzed for barium and other metals.

Arsenic was detected in both the groundwater and soil at levels exceeding ATSDR comparison values (2.5 ppb and 7.6 ppm, respectively). The two samples also contained arsenic at levels exceeding the cancer risk evaluation guide (CREG) for both media. Additionally, the level of arsenic detected in the groundwater sample exceeded the chronic environmental media evaluation guide (EMEG) and reference dose media evaluation guide (RMEG) for a child.

Chromium was also detected in the groundwater sample above the EPA risk-based regional screening level at 1.5 ppb. Cadmium was detected in the groundwater sample at a level exceeding the recommended ATSDR CV and the chronic EMEG for a child. Barium was also detected in the soil sample at a level that exceeded the intermediate EMEG for a pica child; however, the amount detected was below the 1994 ROD cleanup level and is consistent with historical sampling results [20]. The values from both the soil and groundwater samples, as well as the respective comparison values can be found in Appendix B (Table 3). Additionally, the sampling data for this site is located online at https://response.epa.gov/site/site_profile.aspx?site_id=12353.

Exposure Pathways

Groundwater serves as the source for the public water supply in the area surrounding the D.L. Mud, Inc. site. Residents within a 3-mile radius of the site obtain drinking water from private wells, which also provide a water source for irrigation. These wells draw from the Chicot

Aquifer System, which underlies a large portion of southwest Louisiana and is the principal source of groundwater supply within the Abbeville area [20, 21].

The shallow groundwater from which the D.L. Mud, Inc. site sample was collected is considered inappropriate for domestic use because of its high turbidity from silt and clay [21]. The local population is unlikely to come into contact with contaminants present in this exposure medium unless the contaminants migrate into the domestic groundwater source. Long-term groundwater monitoring at the site currently shows no evidence of such migration. Therefore, there is **no current exposure pathway** between shallow groundwater contaminants at the site and the local population.

The local population is equally unlikely to come into contact with contaminants present in the soil collected from the D.L. Mud, Inc. site. Institutional controls set in place, including a locked gate and chain-link fence, prevent public access to the site. Levels of barium detected in the soil would only be harmful if a trespassing child ingested a large quantity of it, which is highly unlikely. Therefore, there is also **no current exposure pathway** between soil contaminants at the site and the local population.

PAB Oil & Chemical Services, Inc.

Site Description

PAB Oil & Chemical Service, Inc. (PAB) is a 16.7-acre site located in Vermilion Parish, LA, approximately three miles north of Abbeville. PAB served as a disposal facility for oilfield drilling mud and saltwater from 1978 to 1983 [22]. Investigations stemming from a local citizen's complaint led to the discovery of illegal discharges from drilling mud and fluids, process wastewater, workover fluids, and tank bottoms, which was outside of compliance of a 1980 LA amendment establishing requirements for such facilities. The site was listed as an NPL site in June 1989, and it was removed in January 2000 following remediation and cleanup [22]. PAB is currently in the operation and maintenance phase and the EPA conducts Five-Year Reviews to determine if remediation efforts are still protective of human health. The fourth Five-Year Review began in July 2017 and is ongoing.

Demographics

PAB Oil is located three miles north of Abbeville, in Vermilion Parish. Approximately 556 persons live in the one-mile radius surrounding the site, eighty-seven percent (87%) of them identifying as Caucasian, four percent (4%) identifying as African-American, and five percent (5%) identifying as Asian. In this population, thirteen percent (13%) are considered to be low-income persons, and nine percent (9%) have less than a high school education. [23]

Data Sources & Evaluation

On September 15, 2017, a single soil sample and two groundwater samples were collected from the PAB Oil site for analysis, specifically for VOCs, SVOCs, and metals [24]. Several VOCs, SVOCs, and metals were found above their respective reporting limits. Each of these contaminants was analyzed in the initial environmental guideline comparison step. Arsenic (soil sample) was the only contaminant that exceeded ATSDR and/or other agencies' CVs; these values can be found in Appendix B (Table 4). All other VOCs, SVOCs, and metals either did not meet or exceed CVs, or they were undetectable in the soil sample, meaning they were below the reportable limit and do not pose a threat to human health. All contaminants in both of the groundwater samples were “non-detects”, meaning that they were not found at levels that are acceptable to analyze and are not a threat to human health [25]. Data for this site may be found online at https://response.epa.gov/site/site_profile.aspx?site_id=12353.

Exposure Pathways

There is **no complete exposure pathway** at the PAB Oil & Chemical Services site. The site was cleaned up and was delisted as an NPL site following the appropriate remediation. Additionally, the site is not being used for any industrial, commercial, or residential purposes at this time. The site is available for reuse; however, the EPA did not have any available economic data related to on-site businesses as of December 2016. [22] Post-hurricane sampling, although limited, did not reveal any elevation in site-related contaminants. Therefore, ground water and soil at the PAB Oil & Chemical Services site should pose no apparent public health hazard to the surrounding community at this time.

Ruston Foundry

Site Description

Ruston Foundry and Machines Shops (Ruston Foundry) is a 6-acre site located in Alexandria, LA, a city within Rapides Parish. Ruston Foundry produced products from furniture to locomotive engines from 1908 until 1985 when the company closed down. Site activities, which included the manufacturing of metals, contaminated soil with hazardous chemicals [26]. The site was proposed to the National Priorities List in January 1999 and was listed shortly after in May 1999. Following remediation, the site was removed from the National Priorities List in July 2010 and was deemed “available for reuse”, as contaminants are at or below residential levels

Demographics

Approximately 6,442 persons live in the one-mile radius surrounding the site; eight percent (8%) of them identifying as Caucasian, eighty-nine percent (89%) identifying as African-American, and one percent (1%) identifying as Asian. In this population, seventy percent (70%) are considered to be low-income persons and twenty-seven percent (27%) have less than a high school education. There is an elementary school within a half-mile (0.5 miles) radius of the site and a recreational park is located approximately one-quarter of a mile (0.25 miles) south of the site [27].

Data Sources and Evaluation

On September 14, 2017, soil samples from the Ruston Foundry site were collected and analyzed for antimony and lead [28]. One sample was collected near the northern border of the site, while the other was collected near the southern border. The results of the analysis demonstrated that both contaminants were below the cleanup levels established in the ROD dated June 24, 2002 [29]. Likewise, the two chemicals did not exceed ATSDR or EPA comparison values and do not pose a threat to human health at this time. ATSDR and the EPA note that there is no established screening limit for lead because the EPA evaluates lead exposure through blood-lead modeling (Integrated Exposure-Uptake Biokinetic Model, or IEUBK). In a detailed directive released by the EPA, the recommended lead levels that are considered “safe” in residential soil are less than 400 mg/kg. In the samples collected at this site, the levels were well below 400 mg/kg [30]. The site remedy, which cleaned up the site to unlimited use/unrestricted exposure, is operating as intended. It is protective of human health and the environment [31]. Data for this site may be found online at https://response.epa.gov/site/site_profile.aspx?site_id=12353.

Exposure Pathways

There is **no complete exposure pathway** at the Ruston Foundry site. The site was cleaned up and was delisted as an NPL site following the appropriate remediation. As of December 2016, the site was not being used for any industrial, commercial, or residential purposes and was listed for “unlimited use” by the EPA. Post-hurricane sampling, although limited, did not reveal any elevation in site-related contaminants. Therefore, soil at the Ruston Foundry site should pose no apparent public health hazard to the surrounding community at this time.

Health Effects Evaluation

There are **no completed or potential exposure pathways** at the five EPA Region 6 – Louisiana deleted Superfund sites sampled post-Hurricane Harvey. While some contaminants (mainly metals) were detected above ATSDR CVs and EPA Regional Screening Limits (RSLs), all

Five EPA Region 6 – Louisiana Deleted Superfund Sites Post-Hurricane Assessment

contaminants present at the sites were within historical limits, based on the results of prior sampling events. Therefore, groundwater and soil at the five EPA Region 6 – Louisiana deleted Superfund sites should pose no apparent public health hazard for populations at or surrounding these sites.

Child Health Considerations

A child's lower body weight, higher intake rate, and typical behaviors results in a greater dose of hazardous substance per unit of body weight. If exposure levels of a contaminant are high enough during critical growth periods in a child's life, there is a significant possibility and hazard for permanent, adverse health effects. Children are also more susceptible to toxic effects of contaminants when compared to adults because their detoxification mechanisms (e.g. liver detoxification) have not fully matured. Children are also dependent on adults for access to housing and medical care, as well as risk identification. It is important, then, for adults to have as much accurate information as possible to make informed decisions regarding a child's health.

Children will not be exposed to groundwater or soil at the five EPA Region 6 – Louisiana deleted Superfund sites since there is no potential for a completed pathway of exposure at any of the facilities.

Limitations

One primary limitation was the restricted amount of data collected at each site. Funding and time constraints allowed for a maximum of only four media samples to be collected at each site. According to EPA Remedial Project Managers for each site, sampling locations were selected based on where environmental impacts could be readily detected. For example, a soil or groundwater sample may have been collected at a location where there was historically low contaminant levels. If these sampled locations had contaminants detected at screening levels higher than those previously recorded, this information would be important for EPA to fund more comprehensive post-Hurricane sampling events at these sites.

Conclusions

The physical damage Hurricane Harvey caused at the five EPA Region 6 – Louisiana deleted Superfund sites did not compromise the remedies instituted to protect the public against site-related health hazards. A post-hurricane evaluation of the sites' groundwater and soil did reveal elevated levels of contaminants present on site; however, the contaminants detected were consistent with historical sampling levels at each site. Furthermore, the absence of a complete exposure pathway at the five EPA Region 6 – Louisiana deleted Superfund sites ensures that the

groundwater and soil at each site poses no apparent public health hazard to the communities surrounding the site.

Recommendations

There are no further recommendations to be made at this time regarding the groundwater and soil at the five EPA Region 6 – Louisiana deleted Superfund sites discussed throughout this report. Furthermore, these five sites are no longer active on the Superfund NPL. Mallard Bay Landing Bulk Plant and Ruston Foundry have both been deemed “available for reuse,” while Gulf Coast Vacuum Services, D.L. Mud, Inc., and PAB Oil and Chemical Services, Inc. are currently in the operation and maintenance phase of the Superfund Process, during which EPA conducts Five-Year Reviews to ensure remediation efforts are protective of the public’s health.

This health consultation is novel, as it seeks to streamline official reporting of NPL/Superfund post-Hurricane site status to affected communities and stakeholders. LDH/OPH/SEET decided to combine reporting on these five sites because of their prior removal from the NPL.

LDH/OPH/SEET further recommends that more combined reporting be performed on removed NPL sites in order to expedite the dissemination of health consultations, public health assessments, and educational materials to support transparency throughout the Superfund process.

LDH/OPH/SEET would additionally like to stress the importance of reporting complaints to the state health department. Private citizen reporting will alert our agency to environmental hazards that may not be known and are vital to protecting the health of neighbors and other Louisiana residents.

Public Health Action

This report should be distributed to the appropriate communities, health officials, and stakeholders that have any involvement with these sites. This includes, but is not limited to, potentially responsible parties, individual citizens within proximity to the sites, community leaders, and health care providers. While current EPA actions are effective in remediating these sites and are protective of the public health of the surrounding communities, we recommend continued community involvement and reporting of any environmental health concerns to LDH/OPH/SEET.

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Five EPA Region 6 – Louisiana Deleted Superfund Sites Post-Hurricane Assessment

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APPENDIX A: Site Maps and Sampling Locations

Map I: Mallard Bay Landing Bulk Plant



Adapted from: CH2M HILL, Inc. Hurricane Harvey Site Assessment: Trip Report for Mallard Bay Landing Bulk Plant, Louisiana, Site Inspection and Sampling Results. CH2M Technical Memorandum Project No. 697243.SS.35. 6 Oct 2017.

Map II: Gulf Coast Vacuum Services



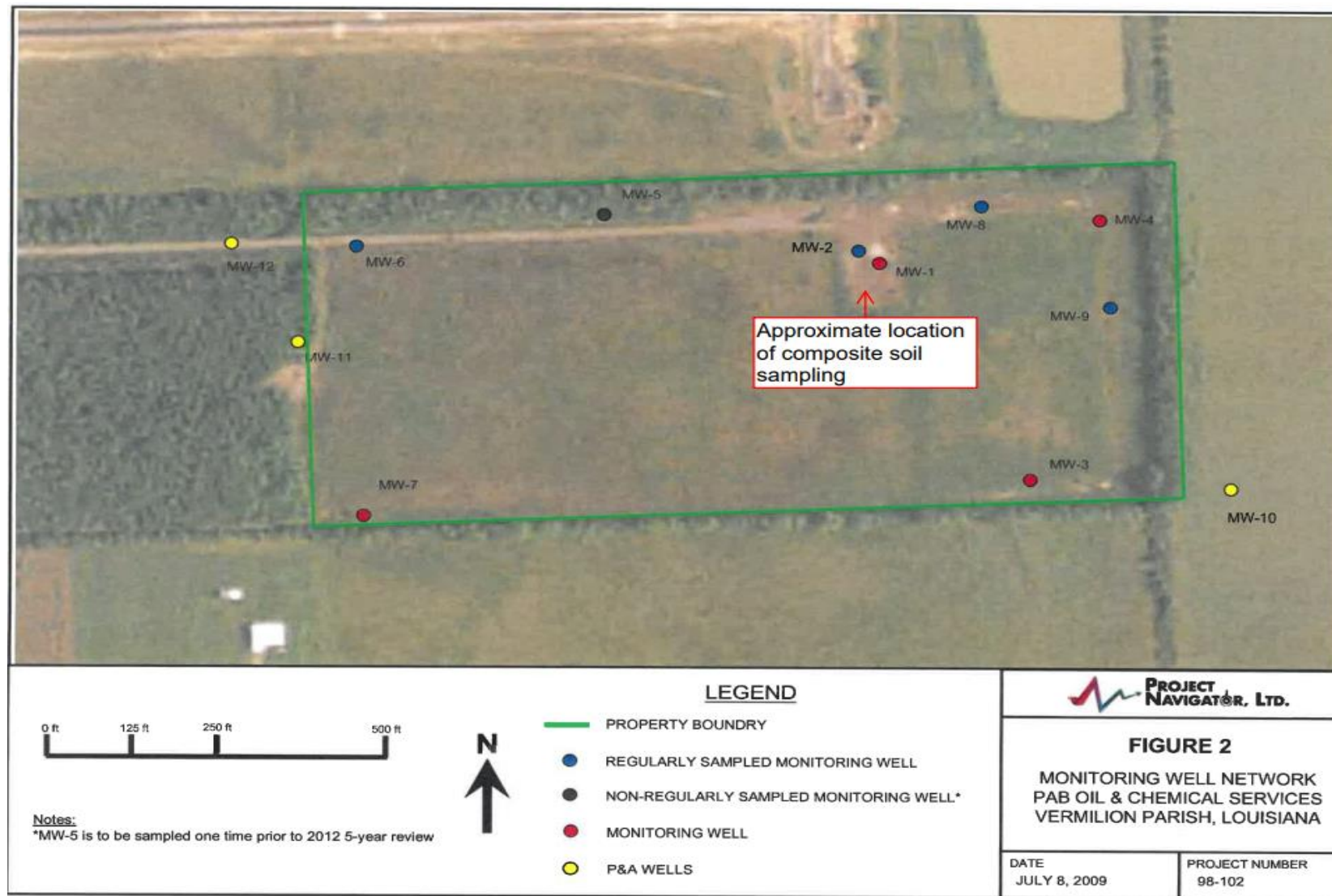
Adapted from: CH2M HILL, Inc. Hurricane Harvey Site Assessment: Trip Report for Gulf Coast Vacuum Services, Louisiana, Site Inspection and Sampling Results. CH2M Technical Memorandum Project No. 697243.SS.37. 3 Oct 2017.

Map III: D.L. Mud, Inc.



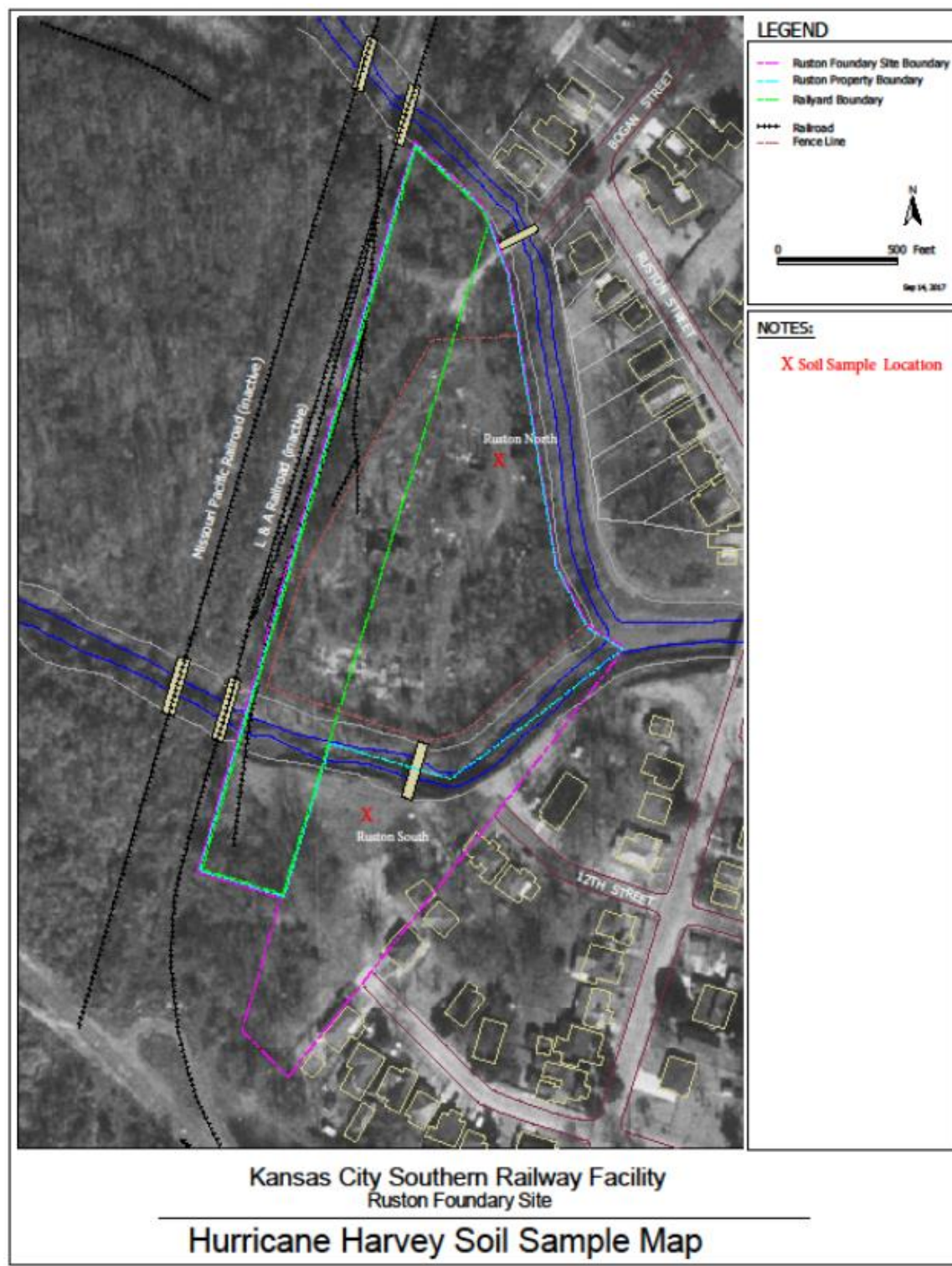
Adapted from: CH2M HILL, Inc. Hurricane Harvey Site Assessment: Trip Report for D.L. Mud, Inc., Louisiana, Site Inspection and Sampling Results. CH2M Technical Memorandum Project No. 697243.SS.38. 2 Oct 201

Map IV: PAB Oil and Chemical Services, Inc.



Adapted from: United States Environmental Protection Agency. Post-Hurricane Harvey Summary: PAB Oil & Chemical Services, Vermilion Parish, Abbeville, Louisiana. EPA ID# LAD980749139. 2017 Sept 15.

Map V: Ruston Foundry



Adapted from: United States Environmental Protection Agency. Hurricane Harvey Site Assessment: Trip Report for Ruston Foundry. EPA ID# LAD985185107. 2017 Oct 20.

APPENDIX B: Contaminants Exceeding Comparison Values (CVs)

Table I. Mallard Bay Landing

Sample 1 (soil)

Contaminant	Result [ppm]	CV Reference [ppm]
Arsenic	2.40	CREG (0.25)

Sample 2 (soil)

Contaminant	Result [ppm]	CV Reference [ppm]
Arsenic	2.10	CREG (0.25)

Table II. Gulf Coast Vacuum Services

Sample 1 (groundwater)

Contaminant	Result [ppb]	CV Reference [ppb]
Arsenic	1.10	CREG (0.016)
Cadmium	0.85	Chronic EMEG Child (0.70)

Sample 2 (soil)

Contaminant	Result [ppm]	CV Reference [ppm]
Arsenic	11.00	CREG (0.25)

Table III. D.L. Mud, Inc.

Sample 1 (soil)

Contaminant	Result [ppm]	CV Reference [ppm]
Arsenic	7.60	CREG (0.25)
Barium	6,500.00	Int EMEG Pica Child (1,100)

Sample 2 (groundwater)

Contaminant	Result [ppb]	CV Reference [ppb]
Arsenic	2.50	CREG (0.016)
Cadmium	0.85	Chronic EMEG Child (0.70)
Chromium	1.50	EPA Risk-based RSL (0.67)

Table IV. PAB Oil & Chemical Services, Inc.

Sample 1 (soil)

Contaminant	Result [ppm]	CV Reference [ppm]
Arsenic	4.10	CREG (0.25)

CV = comparison value

ppb = parts per billion (ug/L)

ppm = parts per million (mg/L)

CREG = cancer risk evaluation guide

EMEG = environmental media evaluation guide

RSL = regional screening limit

Note: Only values that exceeded respective CVs were included in these tables.