Five-Year Review Report

Third Five-Year Review Report

for the

Bayou Bonfouca Superfund site

Slidell, St. Tammany Parish, Louisiana

PREPARED BY:

Region 6
United States Environmental Protection Agency
Dallas, Texas

May 2006

THIRD FIVE-YEAR REVIEW
Bayou Bonfouca Superfund site
EPA ID# LAD980745632
Slidell, St. Tammany Parish, Louisiana

This memorandum documents the United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the Bayou Bonfouca Superfund site third five-year review under Section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), 42 United States Code (USC) §9621(c), as described in the attached Third Five-Year Review Report prepared by EPA with support from CH2M HILL, Inc.

Summary of Third Five-Year Review Findings

The third five-year review for the Bayou Bonfouca site was performed through a review of site documents and site-specific requirements, data collected and documented for the site during the third five-year review period, a site inspection performed on February 9, 2006, and interviews with relevant parties. Based on this review, the remedy completed at the Bayou Bonfouca site continues to be implemented as planned, and continues to be protective of human health and the environment in the short-term.

Remedial actions performed at the site were handled under two operable units (OUs). Remedial action for the first OU, the source control remedy, involved the excavation of soils and bayou sediments contaminated with polynuclear aromatic hydrocarbons (PAHs), incineration of these materials in an onsite incinerator, and disposal of the ash in an onsite landfill. Remedial action for the second OU is ongoing, and involves the extraction and treatment of ground water contaminated with dissolved phase PAHs and dense non-aqueous phase liquids (DNAPLs) associated with creosote contamination in the shallow artesian aquifer. On completion of the source control actions, the site was deeded to the City of Slidell for future use. The City currently uses portions of the site (those portions not designated for the landfill, ground water treatment plant, and the recovery well arrays) as a city maintenance yard, sewage control facility during flood events, and a park.

The remedial actions performed at the site have had a positive effect on the community and the environment. No deficiencies were noted during this five-year that currently impact the protectiveness of the remedy. To ensure long-term protectiveness, however, eight issues were identified.

1. At the time of the site inspection the ground water treatment system was operating at a reduced ground water/NAPL recovery rate because of damage sustained to plant systems by Hurricane Katrina. Repairs to the treatment system and the plant requiring replacement parts are pending.
2. Labeling on some treatment system components has faded or is no longer legible.
3. The property line fence north and west of the site that runs through the wooded area sustained damage from downed trees from Hurricane Katrina. The damaged fence could allow unauthorized access to the site.
4. A small sapling, approximately three feet high, is growing near one of the landfill vents. If it is allowed to continue growing, its root system could damage the landfill capping system.
5. There are no procedures set forth in the draft O&M plan to ensure regular inspections of the landfill cap and documentation of such inspections. All subsidence monuments on the landfill are surveyed monthly. These data are presented in the Monthly Operational report, submitted to LDEQ and EPA. At the time of the third five-year review site inspection, the landfill cap appeared to be well-maintained and in good condition; however, regular inspections and documentation of such inspections are appropriate to ensure it remains in good condition.
6. Even without the damage associated with the hurricanes, the treatment system operates at less than half of its designed capacity. Ground water/NAPL extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or above -4 feet MSL. Controlling water level drawdown is necessary to minimize the potential for land subsidence in the area. The average pumping rate from the extraction

system is around 15 gpm, which is less than one-half of the system's designed capacity of up to 50 gpm (**EPA, 2001b**). More aggressive extraction rates may allow for an increase in the amount of NAPL recovered. This would result in more rapid and increased removal of contaminant source materials and possibly shorten the duration of operation of the GWTS. This in turn could allow for the development of a more clear exit strategy and closure criteria.

7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.

8. Institutional controls have not been put into place for this site. Although not specifically required by the final ROD for the site, institutional controls will help to ensure the site remains protective in the long-term.

Actions Needed

To address the issues identified during the third five-year review, the following recommendations and follow-up actions have been identified for the Bayou Bonfouca site:

1. Recommended repairs to system components damaged by Hurricane Katrina should be completed as soon as possible in order to restore the treatment system to its required level of operation. At the time of the site inspection, recovery system pumps were operational; however, repairs requiring replacement parts are pending. Some of the well vaults that were submerged appear to have increased rates of corrosion.
2. Identification labels on some of the ground water treatment system components are either illegible or missing. Illegible or missing labels should be replaced.
3. The hurricane damaged sections property line fence should be repaired to restrict unauthorized entry to the site.
4. A small tree (2-3 feet tall) was growing near a vent at the top of the landfill. If allowed to continue growing, the root system could damage the landfill cap. This tree should be removed before damage to the cap occurs.
5. The extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or of above -4 feet MSL. This control level reduces the extraction rates below the capacity of the treatment system. An investigation should be conducted to determine if more aggressive pumping rates can be used without an increased risk of causing damaging subsidence. Increased pumping rates may result in increased NAPL recovery, potentially shortening the duration of operation of the GWTS.
6. Analytical data from ground water monitor well sampling included in the monthly operational reports should be compiled to facilitate ongoing review of the data. Quarterly ground water monitoring reports should be prepared and submitted to LDEQ and EPA as specified by the Revised, Final O&M Plan.
7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown". There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.

8. Although not specifically required by the final ROD for the site, institutional controls should be put into place ensure the site remains protective in the long-term. EPA believes that this can be accomplished through a deed notice and is currently working with LDEQ and the City of Slidell to implement such a notice.

Determinations

I have determined that the remedy for the Bayou Bonfouca Superfund site is protective of human health and the environment in the short term, and will remain so provided the action items identified in the Five Year Review Report are addressed as described above.

for Samuel E. Coleman, P.E.
Director, Superfund Division
U.S. Environmental Protection Agency, Region 6

Date

7/7/06

CONCURRENCES

THIRD FIVE-YEAR REVIEW
Bayou Bonfouca Superfund site
EPA ID# LAD980745632

By: _____ Date: 6-28-06
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Remedial Project Manager

By: _____ Date: 6-29-06
Sing Chia, U.S. EPA
Chief, Louisiana/Oklahoma Program Management Section

By: _____ Date: 7/7/06
Wren Stenger, U.S. EPA
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By: _____ Date: 6-29-06
James Turner, U.S. EPA
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By: _____ Date: 06/29/06
Mark Peycke, U.S. EPA
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By: _____ Date: 7/7/06
Pam Phillips, U.S. EPA
Deputy Director, Superfund Division

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Attachments

List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
BOD	Biological Oxygen Demand
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COD	Chemical Oxygen Demand
CWA	Clean Water Act
DNAPL	Dense Non-Aqueous Phase Liquids
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
GWTS	Ground Water Treatment System
LADOTD	Louisiana Department of Transportation and Development
LDAF	Louisiana Department of Agriculture and Forestry
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDRs	Land Disposal Restrictions
LDWF	Louisiana Department of Wildlife and Fisheries
LTRA	Long Term Remedial Action
MSL	Mean Sea Level
NAPL	Non-Aqueous Phase Liquids
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OSHA	United States Occupational Health and Safety Administration
OUs	Operable Units
PAHs	Polynuclear Aromatic Hydrocarbons
PER	Performance Evaluation Report
PNAs	Polynuclear Aromatic Hydrocarbons
PPE	Personal Protective Equipment
ppm	parts per million
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SIP	State Implementation Plan
SVOCs	Semi-volatile Organic Compounds
TBCs	To Be Considered
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TSDs	Transportation, Storage, and Disposal facilities
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers

Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or "Superfund"), 42 United States Code (USC) §9621(c), the third five-year review of the remedy in place at the Bayou Bonfouca Superfund site located in Slidell, St. Tammany Parish, Louisiana was completed in June 2006. The results of this five-year review indicate that the remedy completed to-date is currently protective of human health and the environment in the short term. Overall, the remedial actions performed appear to be functioning as designed, and the site has been maintained appropriately within the limitations imposed by damage associated with Hurricane Katrina. No deficiencies were noted that currently impact the protectiveness of the remedy, although several issues were identified that require further action to ensure the continued protectiveness of the remedy.

Remediation of the Bayou Bonfouca Superfund site was performed as Remedial Action (RA) for two operable units (OUs). The first OU, the source control remedy, involved the excavation of soils and bayou sediments contaminated with polynuclear aromatic hydrocarbons (PAHs), incineration of these materials in an onsite incinerator, and disposal of the ash in an onsite landfill. Activities associated with the source control portion of the remedial action were completed in 1995. The second OU involved the construction of a recovery and treatment system to extract and treat ground water contaminated with dissolved phase PAHs and DNAPLs associated with creosote contamination in the shallow artesian aquifer underlying the site. Contaminated ground water and DNAPL are extracted through three separate extraction arrays and conveyed through piping to an onsite ground water treatment facility, where the water and DNAPL are separated. The DNAPL is shipped offsite for disposal. The extracted ground water is treated to meet discharge criteria and discharged to Bayou Bonfouca. The construction portions of the remedy selected for the site have been fully implemented, and currently the site is operated as a Long Term Remedial Action (LTRA). LTRA at the site consists of the continued O&M of the ground water/DNAPL extraction system, the ground water monitoring system, and maintenance of the onsite landfill cap.

Under the statutory requirements of Section 121(c) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), P. L. 99-499, and the subordinate provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) 300.430(f)(4)(ii), performance of five-year reviews are required for sites where hazardous substances remain onsite above levels that allow for unlimited use and unrestricted exposure. Such are the factual circumstances at the Bayou Bonfouca site. The first five-year review at the Bayou Bonfouca site was completed in September 1996 and the second five-year review was completed in July 2001.

During the third five-year review period, O&M activities at the site have continued. O&M activities include operation of the free-phase creosote and ground water recovery system, operation of the ground water treatment system, offsite incineration of recovered free-phase creosote, discharge of the treated ground water to Bayou Bonfouca, ground water monitoring activities, subsidence monitoring program activities, maintenance of the site fence and fulfilling reporting requirements. Site O&M is conducted by the Louisiana Department of Environmental Quality (LDEQ) contractor McDonald Construction. At the time of the third five-year review site inspection, the site appeared to be operating appropriately and well maintained within the limitations imposed by damage associated with Hurricane Katrina. Through January 31, 2006, a total of 34,258,255 gallons of ground water have been extracted and a total of 71,037 gallons of creosote have been recovered.

During the third five-year review, eight issues were identified that do not currently affect the protectiveness of the remedy for the site. These issues are associated with the current status of the remedy and are not sufficient to warrant a finding of not protective, but are required to be addressed to provide further documentation that the remedy is protective and to ensure that the remedy remains protective for the long-term future.

1. At the time of the site inspection, the ground water treatment system was operating at a reduced ground water/NAPL recovery rate because of damage sustained to plant systems by Hurricane Katrina. Repairs requiring replacement parts have not been made pending review and approval by EPA and LDEQ.
2. Labeling on some treatment system components has faded or is no longer legible.
3. The property line fence north and west of the site that runs through the wooded area sustained damage from downed trees from Hurricane Katrina. The damaged fence could allow unauthorized access to the site.
4. A small sapling, approximately three feet high, is growing near one of the landfill vents. If it is allowed to continue growing, its root system could damage the landfill capping system.
5. There are no procedures set forth in the draft O&M plan to ensure regular inspections of the landfill cap and documentation of such inspections. All subsidence monuments on the landfill are surveyed monthly. These data are presented in the Monthly Operational report, submitted to LDEQ and EPA. At the time of the third five-year review site inspection, the landfill cap appeared to be well-maintained and in good condition; however, regular inspections and documentation of such inspections are appropriate to ensure it remains in good condition.
6. Even without the damage associated with the hurricanes, the treatment system operates at less than half of its designed capacity. Ground water/NAPL extraction rates for the three extraction arrays are

controlled to maintain ground water elevation at or above -4 feet MSL. Controlling water level drawdown is necessary to minimize the potential for land subsidence in the area. The average pumping rate from the extraction system is around 15 gpm, which is less than one-half of the system's designed capacity of up to 50 gpm (**EPA, 2001b**). More aggressive extraction rates may allow for an increase in the amount of NAPL recovered. This would result in more rapid and increased removal of contaminant source materials and possibly shorten the duration of operation of the GWTS. This in turn could allow for the development of a clear exit strategy and closure criteria.

7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.

8. Institutional controls have not been put into place for this site. Although not specifically required by the final ROD for the site, institutional controls will help to ensure the site remains protective in the long-term.

To address the issues identified during the third five-year review, the following recommendations and follow-up actions have been identified:

1. Recommended repairs to system components damaged by Hurricane Katrina (**CH2M HILL, 2006**) should be completed as soon as possible in order to restore the treatment system to its required level of operation. At the time of the site inspection, recovery system pumps were operational; however, repairs requiring replacement parts are pending. Some of the well vaults that were submerged appear to have increased rates of corrosion.
2. Identification labels on some of the ground water treatment system components are either illegible or missing. Illegible or missing labels should be replaced.
3. The hurricane damaged sections property line fence should be repaired to restrict unauthorized entry to the site.
4. A small tree (2-3 feet tall) was growing near a vent at the top of the landfill. If allowed to continue growing, the root system could damage the landfill cap. This tree should be removed before damage to the cap occurs.
5. The extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or of above -4 feet MSL. This control level reduces the extraction rates below the capacity of the

treatment system. An investigation should be conducted to determine if more aggressive pumping rates could be used without an increased risk of causing damaging subsidence. Increased pumping rates may result in increased NAPL recovery, potentially shortening the duration of operation of the GWTS.

6. Analytical data from ground water monitor well sampling included in the monthly operational reports should be compiled to facilitate ongoing review of the data. Quarterly ground water monitoring reports should be prepared and submitted to LDEQ and EPA as specified by the Revised, Final O&M Plan.
7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.
8. Although not specifically required by the final ROD for the site, institutional controls should be put into place ensure the site remains protective in the long-term. EPA believes that this can be accomplished through a deed notice and is currently working with LDEQ and the City of Slidell to implement such a notice.

Because the completed remedial action and O&M program for the Bayou Bonfouca site are considered protective for the short-term, the overall remedy for the site is considered protective of human health and the environment for the short-term. The selected remedy will continue to be protective if the recommendations and follow-up actions identified in this five-year review are addressed.

Five-Year Review Summary Form

SITE IDENTIFICATION

site name (from WasteLAN): Bayou Bonfouca Superfund site

EPA ID (from WasteLAN): LAD980745632

Region: EPA Region 6	**State:** Louisiana	**City/County:** Slidell/St. Tammany Parish

SITE STATUS

NPL Status: X Final ☐ Deleted ☐ Other (specify):

Remediation status (choose all that apply): ☐ Under Construction X Operating ☐ Complete

Multiple OUs? X Yes ☐ No | **Construction completion date:** March 2000

Has site been put into reuse? X Yes (partially) ☐ No

REVIEW STATUS

Reviewing agency: X EPA ☐ State ☐ Tribe ☐ Other Federal Agency:

Author: EPA Region 6, with support from RAC6 contractor CH2M HILL, Inc.

Review period: September 2001 through March 2006

Date(s) of site inspection: February 9, 2006

Type of review:
- X Statutory
- ☐ Policy
- ☐ Post-SARA
- ☐ Non-NPL Remedial Action site
- ☐ Regional Discretion
- ☐ Pre-SARA
- ☐ NPL-Removal only
- ☐ NPL State/Tribe-lead

Review number: ☐ 1 (first) ☐ 2 (second) X 3 (third) ☐ Other (specify):

Triggering action:
- ☐ Actual RA Onsite Construction
- ☐ Construction Completion
- ☐ Other (specify):
- ☐ Actual RA Start
- X Recommendation of Previous Five-Year Review Report

Triggering action date (from WasteLAN): September 2001

Due date (five years after triggering action date): September 2006

Five-Year Review Summary Form

Issues: The following issues were identified as a result of the third five-year review for the site. None of these deficiencies currently impact the protectiveness of the remedy.

1. At the time of the site inspection, the ground water treatment system was operating at a reduced ground water/NAPL recovery rate because of damage sustained to plant systems by Hurricane Katrina. Repairs requiring replacement parts are pending.
2. Labeling on some treatment system components has faded or is no longer legible.
3. The property line fence north and west of the site that runs through the wooded area sustained damage from downed trees from Hurricane Katrina. The damaged fence could allow unauthorized access to the site.
4. A small sapling, approximately three feet high, is growing near one of the landfill vents. If it is allowed to continue growing, its root system could damage the landfill capping system.
5. There are no procedures set forth in the draft O&M plan to ensure regular inspections of the landfill cap and documentation of such inspections. All subsidence monuments on the landfill are surveyed monthly. These data are presented in the Monthly Operational report, submitted to LDEQ and EPA. At the time of the third five-year review site inspection, the landfill cap appeared to be well-maintained and in good condition; however, regular inspections and documentation of such inspections are appropriate to ensure it remains in good condition.
6. Even without the damage associated with the hurricanes, the treatment system operates at less than half of its designed capacity. Ground water/NAPL extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or above -4 feet MSL. Controlling water level drawdown is necessary to minimize the potential for land subsidence in the area. The average pumping rate from the extraction system is around 15 gpm, which is less than one-half of the system's designed capacity of up to 50 gpm (EPA, 2001b). More aggressive extraction rates may allow for an increase in the amount of NAPL recovered. This would result in more rapid and increased removal of contaminant source materials and possibly shorten the duration of operation of the GWTS. This in turn could allow for the development of a clear exit strategy and closure criteria.
7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.
8. Institutional controls have not been put into place for this site. Although not specifically required by the final ROD for the site, institutional controls will help to ensure the site remains protective in the long-term.

These deficiencies do not currently affect the protectiveness of the remedy, but they should be formally addressed to provide documentation that the remedy continues to be protective.

Recommendations and Follow-Up Actions: the following recommendations and follow-up actions have been defined to address the issues described above:

1. Recommended repairs to system components damaged by Hurricane Katrina should be completed as soon as possible in order to restore the treatment system to its required level of operation. At the time of the site inspection, recovery system pumps were operational; however, repairs requiring replacement parts are pending. Some of the well vaults that were submerged appear to have increased rates of corrosion.
2. Identification labels on some of the ground water treatment system components are either illegible or missing. Illegible or missing labels should be replaced.
3. The hurricane damaged sections property line fence should be repaired to restrict unauthorized entry to the site.
4. A small tree (2-3 feet tall) was growing near a vent at the top of the landfill. If allowed to continue growing, the root system could damage the landfill cap. This tree should be removed before damage to the cap occurs.
5. The extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or of above -4 feet MSL. This control level reduces the extraction rates below the capacity of the treatment system. An investigation should be conducted to determine if more aggressive pumping rates can be used without an increased risk of causing damaging subsidence. Increased pumping rates may result in increased NAPL recovery, potentially shortening the duration of operation of the GWTS.
6. Analytical data from ground water monitor well sampling included in the monthly operational reports should be compiled to facilitate ongoing review of the data. Quarterly ground water monitoring reports should be prepared and submitted to LDEQ and EPA as specified by the Revised, Final O&M Plan.
7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act

Five-Year Review Summary Form

levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.

8. Although not specifically required by the final ROD for the site, institutional controls should be put into place ensure the site remains protective in the long-term. EPA believes that this can be accomplished through a deed notice and is currently working with LDEQ and the City of Slidell to implement such a notice.

Protectiveness Statement(s): The remedy implemented at the Bayou Bonfouca site is considered protective of human health and the environment in the short-term. The incinerated source control wastes are contained in the onsite RCRA Subtitle C compliant landfill. Access to the site is restricted by a fence, and the ground water treatment system operators are regularly onsite to ensure the system continues to operate and check site status. Affected ground water and DNAPL are extracted and treated through operation of a ground water treatment system. The treated ground water is discharged to Bayou Bonfouca, and the recovered DNAPL is sent offsite for disposal. The facility is able to operate within its designed parameters, and effluent discharges meet the surface water discharge requirements established for the site by the State of Louisiana. Continued O&M will ensure that the selected remedy continues to be protective.

Because the completed remedial action and O&M program for the Bayou Bonfouca site are considered protective for the short-term, the overall remedy for the site is considered protective of human health and the environment for the short-term. The selected remedy will continue to be protective if the recommendations and follow-up actions identified in this five-year review are addressed.

Other Comments: The site operators effectively implement and maintaining the system as designed and installed in spite of the limitations resulting from the damage associated with the 2005 hurricanes. Overall impressions from the interviews were that the various parties are pleased with the work done at the site, the improvements made since the last five-year review, and the people who worked to implement the remedial actions.

Third Five-Year Review Report
Bayou Bonfouca Superfund site

The United States Environmental Protection Agency (EPA) Region 6 has performed a five-year review of the remedial actions implemented at the Bayou Bonfouca Superfund site located in Slidell, St. Tammany Parish, Louisiana. This is the third five-year review for the site, and covers the period since the second five-year review was completed in July 2001. The purpose of a five-year review is to determine whether the remedy at a site remains protective of human health and the environment, and to document the methods, findings, and conclusions of the five-year review in a Five-Year Review Report. Five-Year Review Reports identify issues found during the review, if any, and make recommendations to address them. This Third Five-Year Review Report documents the results of the review for the Bayou Bonfouca site, performed in accordance with EPA guidance on five-year reviews. EPA RAC6 contractor CH2M HILL, Inc. provided support for conducting this review and the preparation of this Five-Year Review Report.

EPA guidance on conducting five-year reviews is provided by Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P, *Comprehensive Five-Year Review Guidance* (**EPA, 2001**) (replaces and supersedes all previous guidance on conducting five-year reviews). EPA and contractor personnel followed the guidance provided in this OSWER directive in conducting the five-year review performed for the Bayou Bonfouca site.

1.0 Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §9601 *et seq.* and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) 300 *et seq.*, call for five-year reviews of certain CERCLA remedial actions. EPA policy also calls for a five-year review of remedial actions in some other cases. The statutory requirement to conduct a five-year review was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA), P.L. 99-499. The EPA classifies each five-year review as either 'statutory' or 'policy' depending on whether it is being required by statute or is being conducted as a matter of policy. The third five-year review for the Bayou Bonfouca site is a statutory review.

As specified by CERCLA and the NCP, statutory reviews are required for sites where, after remedial actions are complete, hazardous substances, pollutants, or contaminants will remain onsite at levels that will not allow for unlimited use or unrestricted exposure. Statutory reviews are required at such sites if the Record of

Decision (ROD) was signed on or after the effective date of SARA. CERCLA §121(c), as amended by 42 USC §9621(c), states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The implementing provisions of the NCP, as set forth in the CFR, state at 40 CFR §300.430(f)(4)(ii):

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The five-year review for the Bayou Bonfouca site is required by statute because the first ROD for the site was signed on March 31, 1987, after the effective date of SARA, and because hazardous substances, pollutants, or contaminants remain onsite above levels that allow for unlimited use and unrestricted exposure.

This is the third five-year review for the Bayou Bonfouca site. The first review was completed in September 1996, and the second review was completed in July 2001. The triggering action for this statutory review is the completion of the previous five year review, dated July 2001.

2.0 Site Chronology

A chronology of significant site-related events and dates is included in **Table 1**, provided at the end of the report text. Sources of this information are listed in **Attachment 1** (Documents Reviewed).

3.0 Background

This section describes the physical setting of the site, including a description of the land use, resource use, and environmental setting. This section also describes the history of contamination associated with the site, the initial response actions taken at the site, and the basis for each of the initial response actions. Remedial actions performed subsequent to the initial response actions at the site are described in **Section 4**.

3.1 Physical Characteristics

The Bayou Bonfouca Superfund Site occupies 54 acres located near the north shore of Lake Ponchartrain in Slidell, St. Tammany Parish, Louisiana (**EPA, 1987**). The site is located south of West Hall Avenue and north of and adjacent to Bayou Bonfouca. The site is bordered on the west by a creek and wooded land, on the east by a drainage ditch and commercial property, and wooded land/residential areas to the north (across West Hall Avenue) and south (across the bayou). **Figure 1** provides an aerial view of the site and an illustration of the legal boundary of the property.

The main portion of the site is occupied by a landfill used for disposal of contaminated soil and residual ash from the incineration of creosote waste and excavated sediments. Creosote is a common wood preservative composed of over 300 polynuclear aromatic hydrocarbon (PAH) compounds. A ground water extraction and treatment system currently operates to recover free phase creosote from beneath the site, and to treat recovered ground water in an onsite treatment plant located on the west side of the landfill. This system recovers free-phase creosote and ground water from the subsurface through three recovery arrays located toward the southern portion of the site and across the bayou to the south (in a residential area). The City of Slidell uses the eastern portion of the site and the former site buildings as a maintenance facility and the southeastern portion of the site as a park.

Most of the site is situated within the one hundred year flood plain, and the ground elevation is about 9 feet above mean sea level. Bayou Bonfouca is a navigable waterway that flows south from the site about seven miles to Lake Pontchartrain (**EPA, 2001a**). The Bayou currently supports a mix of uses including recreational boating, fishing, residential properties, marinas and industrial properties, and is typical of the surface waters in the Lake Ponchartrain area (i.e., comprised of tidal, typically low salinity waters with adjacent cypress swamps (**EPA 2003**)).

The primary aquifer used by the town of Slidell is the Pontchatoula aquifer, which occurs about 1,500 feet below ground surface (**EPA, 1987**). Ground water in the immediate vicinity of the site occurs in perched water table aquifers in surficial sediments (2 to 9 feet thick), recharged through infiltration from rainfall, and occurs permanently in four other zones: (1) the upper cohesive unit (10 to 20 feet thick), (2) the Shallow Artesian Aquifer (9 to 16 feet thick), (3) the lower cohesive unit (8 to 28 feet thick) and (4) the Deep Artesian Aquifer (more than 10 feet thick). Materials range from lower permeability clay in the cohesive units to silt and medium-grained sands in the aquifers. Ground water flow occurs through the Shallow and Deep Artesian Aquifers toward the Bayou. The majority of the free and dissolved phase creosote found in the subsurface

occurs in the Shallow Artesian Aquifer, which has reported hydraulic conductivities ranging from approximately 1 to 20 feet per day (**EPA, 2001b**).

3.2 Land and Resource Use

At the time the final Record of Decision (ROD) was signed, the land use to the north was described as heavily wooded, to the east was described as commercial, and to the southwest was described as a residential subdivision (**EPA, 1987**). This land use was confirmed at the time of the third five-year review site inspection conducted in February 2006. Also observed during the site inspection were several houses and businesses along the road north of the site. Between the site and most of the commercial property to the east is a wooded area. The northeastern portion of the site has been redeveloped as a city maintenance facility, with some vacant land still present. At the time the ROD was signed, about 750 residents were reported to live within one mile of the site (**EPA, 1987**). The nearest drinking water well is reported to be located approximately 1/4 mile northeast of the site.

3.3 History of Contamination

Beginning in the late 1800s, the Bayou Bonfouca site was used for commercial wood-treating operations involving creosote. In 1882, a creosote plant began operating at the site. Over the years, the plant operated under several owners including the New Orleans and North Eastern Railroad, Southern Creosoting Company, Gulf States Creosoting, American Creosote Company, and American Creosote Works, with final ownership residing with the Braselman Corporation. During the plant's operation, numerous releases of creosote occurred. In the early 1970s, a fire occurred at the plant; during the fire, several large storage tanks were ruptured, causing creosote to flow onto the site and into the bayou (**EPA, 2001a**). Between 1970 and 1972, the plant was disassembled, leaving behind a few building shells and foundation slabs. Wood-treating operations at the site ceased at this time.

Wood treatment operations occurred at the site for a period of approximately 90 years. During this time, areas of the site were contaminated through spills, runoff, possibly discharges, and ultimately through the fire that ruptured several vessels in the early 1970s. Site investigations determined that the primary contamination present at the site was creosote.

3.4 Initial Response

In April 1976, the U. S. Coast Guard began an evaluation of Bayou Bonfouca by collecting samples and investigating pollution reports by residents. While collecting sediment samples, two divers suffered second degree chemical burns. In 1982, the U. S. Coast Guard released a report conducted through the University of New Orleans on the accumulation of aromatic compounds associated with the creosote within Bayou Bonfouca (**EPA 2003**). The site was included on the National Priorities List (NPL) in December 1982 (**EPA, 2001a**).

The EPA initiated Remedial Investigation/Feasibility Study (RI/FS) activities at the site in 1983. In 1984, the EPA decided to take an operable unit (OU) approach at the site; two OUs were designated, one for source control (surface contamination) and one for ground water. A Focused FS for the site was completed in May 1985; this FS addressed the surface contamination at the site. In July-August 1985, the site owner fenced the site under an EPA Administrative Order. To complete the determination of the extent of soil contamination associated with the site, a Supplemental Phase II RI was implemented and completed in March 1986. The Phase II FS was completed in June 1986 (**EPA, 2001a**).

The RIs for the site revealed that the principal pollutants found at the site were PAH compounds associated with creosote. The contaminants of concern are: benzo(a)pyrene, benzo(a)anthracene, benzo(b)flouranthene, benzo(k)flouranthene, indeno(1,2,3-cd)pyrene and chrysene. These constituents were identified in surface soils, onsite ground water, offsite ground water, and in bayou sediments. Dense Non-Aqueous Phase Liquids (DNAPLs) were also identified in the ground water beneath the southern portion of the site, beneath the east drainage ditch, and on the south side of the bayou under portions of the residential subdivision (**EPA, 2001a**).

A stretch of the bayou about one and one-half miles long was found to be biologically sterile due to creosote contamination in the sediments and the water column. The contamination was so severe that it had caused second degree burns to divers, injured or killed aquatic animals and waterfowl, and posed a significant recreational hazard. The areas of highest contamination were found within the onsite creosote deposits and in surface soils near the creosote waste deposits (**EPA, 1997**). It was estimated that a 4,000 feet length of the bayou was contaminated, with a maximum depth of contaminated sediments of 17 feet (**EPA 1990**). The estimated total volume of contaminated sediments was 150,000 cubic yards (CY).

3.5 Basis for Taking Action

The purpose of the response actions performed at the site were to protect public health and welfare and the environment from release or threatened releases of hazardous substances from the site. Remedial actions

taken at the site were deemed necessary based on the results of the RIs, the Baseline Human Health Risk Assessment (BHHRA), and the Ecological Risk Assessment (ERA).

The primary threats that the Bayou Bonfouca site posed to public health and safety were to persons using this section of the bayou for recreational activities and exposure to PAHs in residential soil through normal exposure routes. Exposure to contaminated soil, surface water, and sediment were calculated to result in excess cancer risks. These risks were higher than the EPA's recommended acceptable risk range of between 1 x 10^{-4} and 1 x 10^{-6}. Based on the BHHRA, the EPA concluded that a residential land use scenario was most appropriate for estimating risks posed by the site.

EPA later re-evaluated the action levels set for the site to ensure the risk assessments reflected more recent criteria concerning CERCLA cleanups **(EPA, 1990**), These analyses showed that the 1987 ROD action level of 100 ppm total polynuclear-aromatic-hydrocarbons (PAHs, or PNAs) for surface soils is equivalent to approximately 9 ppm carcinogenic PAHs. This level presents less than a $3x10^{-5}$ lifetime increased cancer risk to a person residing on the site all their life. In addition, the 1,300 ppm PAH action level for sediments was examined for recreational exposure and fish consumption and found to present a lifetime increased cancer risk of less that $1x10^{-4}$. Since both action levels conform to the acceptable health risk criteria contained the National Contingency Plan, they were not altered.

4.0 Remedial Actions

This section provides a description of the remedy objectives, selection, and implementation at the Bayou Bonfouca site. It also describes the process through which updates to the ground water remedy were designed and implemented, the ongoing operations and maintenance (O&M), and the progress made at the site in the period since completion of the second five-year review in July 2001. The Louisiana Department of Environmental Quality (LDEQ) manages the site O&M activities through its contractor McDonald Construction. The third five-year review specifically addressed actions taken at the Bayou Bonfouca site since completion of the second five-year review (**EPA, 2001a)**.

4.1 Remedy Objectives

The specific remedial objectives for the Bayou Bonfouca site for the Source Control OU were:

- Remove the threat of potential exposure to residents via direct contact with contaminated surface soils, creosote wastes, or contaminated sediments.
- Reduce or eliminate the potential for ingestion of carcinogens in surface soils and shellfish

The specific remedial objectives for the Bayou Bonfouca site for the Ground Water OU were:

- Reduce or eliminate the potential for exposure to carcinogens through ingestion of ground water
- Control migration of dissolved phase PAHs and DNAPL in the Shallow Artesian Aquifer

To achieve these remedial objectives, the final ROD established the following remediation goals for the site:

- Excavation and incineration of Bayou, creek, and channel sediments along with creosote waste deposits contaminated in excess of a concentration of 1,300 ppm PAHs. Residual incineration ash will be placed in the onsite RCRA landfill.
- Construction of a RCRA cap to contain onsite soils contaminated in excess of a concentration of 100 ppm total carcinogenic PAHs
- Extraction and treatment of ground water contaminated with dissolved phase PAHs and DNAPL. The target clean-up will be a health based 10^{-4} or 10^{-6} level (to be determined based on specific field data.)

4.2 Remedy Selection

Two RODs, one ROD Amendment, and one Explanation of Significant Differences (ESD) have been issued by EPA for the Bayou Bonfouca site. The Source Control OU ROD for the Bayou Bonfouca site was signed on August 15, 1985. This ROD addressed the threats posed to human health and aquatic life from contaminated bayou sediments, soils, and creosote waste piles.

The remedy described in the 1985 Source Control OU ROD for the site consisted of the following elements:

- Excavation of contaminated sediments from Bayou Bonfouca that exceeded the remediation goals or to a depth that would minimize the threat to aquatic life.
- Onsite incineration of creosote waste piles and contaminated sediments.
- Onsite containment under a cap of incinerator residue and contaminated surface soils containing PAH concentrations in excess of remediation goals (**EPA, 1985**).

The final ROD for the site, which incorporated the Source Control ROD, also addressed ground water contamination at the site. The final ROD was signed on March 31, 1987. The remedy described in the final ROD for the site consisted of the following elements:

- Excavation of contaminated bayou, Western Creek, and drainage ditch sediments.
- Onsite incineration of contaminated bayou, creek, and drainage ditch sediments in addition to onsite creosote waste deposits.
- Construction of a RCRA-compliant cap to cover onsite soils and residual ash from incineration of contaminated sediments.
- Installation of ground water extraction and treatment system.
- Site monitoring.

Remedial design investigations performed in 1988 indicated that the volume of contaminated bayou sediments had been underestimated. Previous investigations had indicated the presence of a clay layer, which was thought to be present at a maximum depth of five feet below the top of the bayou sediments. This clay layer was believed to act as a barrier against the vertical migration of contaminants. Previously drilled borings had been limited in their depth due to the possibility of drilling through this upper clay layer and introducing additional contamination into the shallow aquifer. Several of the borings drilled near the creosote plant in 1988 showed that this upper clay layer was not present throughout the site. In addition, borings drilled in the initial design investigation revealed that the contamination extended farther horizontally in the downgradient direction than had been believed (**EPA, 1990**).

As a result of these findings, the EPA signed an ESD on February 15, 1990. The ESD documented significant changes to the remedies selected by the RODs for the site based on the results of the remedial design investigation. The ESD concluded that an additional 103,500 cubic yards of sediment would need to be excavated from the bayou and incinerated. This changed the total volume of contaminated sediments from approximately 46,500 cubic yards, as stated in the ROD, to approximately 150,000 cubic yards. EPA also reevaluated the action levels of 100 ppm total PAHs for surface soils and 1,300 PAHs for sediments and found them to be acceptable. Initially, it was thought that the DNAPL contamination in ground water existed as one continuous plume. The initial remedial action to address this plume consisted of ground water and DNAPL extraction and treatment. Remedial design investigations concluded that the ground water contamination was present as 3 separate plumes (two onsite and one offsite) instead of one continuous plume, and that it was not feasible to re-inject treated ground water because of the geological properties of the aquifer. The ESD determined that the two onsite ground water plumes would be treated as one OU. Since direct contact between the shallow artesian aquifer and contaminated bayou sediments was identified, it was decided that the dredging of the sediments would need to be completed before the ground water plume in the residential neighborhood across the bayou would be addressed (**EPA, 1990**).

A ROD Amendment was signed on July 20, 1995, for the site in accordance with Section 104(d)(4) of CERCLA, which provided that the Bayou Bonfouca Site and the nearby Southern Shipbuilding Superfund Site would be treated as one site for the purpose of remedial action. This change allowed the incinerator at the site to be used for the incineration of Southern Shipbuilding waste.

4.3 Remedy Implementation

Excavation and incineration activities associated with the Source Control OU began in November 1993 and were completed eighteen months ahead of schedule on July 28, 1995. The incinerator was also used to incinerate wastes from the nearby Southern Shipbuilding Superfund site in accordance with the ROD Amendment (**EPA, 1997**). The incinerator was removed from the site in December 1996 after operations at the Southern Shipbuilding site were completed.

The EPA issued a Preliminary Closeout Report for the Bayou Bonfouca Source Control remedy (sediment excavation and incineration) on September 30, 1997 (**EPA, 2001a**). The remedial action for the Source Control OU resulted in the incineration of over 170,000 cubic yards of contaminated bayou sediments and creosote waste. The resultant ash and onsite contaminated soils were placed onsite in a Resource Conservation and Recovery Act (RCRA) compliant Subtitle C landfill (**EPA, 1990**).

The 1987 ROD specified the ground water remedy as extraction and treatment of contaminated ground water and DNAPL with re-injection of the treated ground water. Due to the findings of two remedial design investigations in 1988, it was determined that the ground water plume located offsite would not be addressed until the contaminated bayou sediments had been addressed. The ESD signed in 1990 concluded that the ground water contamination was present as three separate plumes instead of one continuous plume (**EPA, 1990**). On July 10, 1991, EPA began operation of the long term remedial action for ground water.

The pump and treat system is comprised of the following components:

- Extraction well arrays 1a, 2, and 3 (a total of 44 extraction wells).
- Treatment building.
- Collection system piping and underground conduits.
- Ground water and free phase treatment system (chelating agent, oil/water separator, solids removal filters, organic removal filter, associated tankage).
- Air compressor for plant and recovery pumps.
- Control system for recovery system and treatment system.

The original onsite ground water remediation system at the site included two networks of extraction wells, Array 1 and Array 2, installed in July 1991. The location of the Array 1 network was within the landfill location required for the source removal action. Array 1 wells were removed during the soils remedial action. Array 2, which consists of 22 wells, remains in place and is operating. After the 1997 investigation, it was recommended that another array of extraction wells be installed to take the place of Array 1. Array 1a, which consists of 12 wells, was installed in 2000, down gradient of the creosote plume that is beneath the onsite landfill. Array 3, which consists of 10 wells, was also installed to capture recoverable free phase creosote and dissolved phase contaminants in the offsite area across the bayou. All three well arrays pump from the shallow artesian aquifer (**EPA 2001b**).

The first five year review for the site recommended that the contaminated ground water and DNAPL continue to be recovered and treated and that further evaluation of the system's performance be conducted. The Performance Evaluation Report (PER) was completed in 1997. The PER identified several conditions that limited the current system's effectiveness. These limiting conditions included: 1) the original pumping equipment was near the end of its operational life and spare parts were no longer readily available, 2) there were not enough extraction and monitor wells to address adequately the creosote contamination, and 3) there was insufficient recharge into the aquifer taking place to offset the drawdown induced by pumping. The PER concluded that modifications to the system were necessary. It recommended that the current system be expanded and improved to capture creosote from underneath the onsite landfill and the offsite plume, a pilot study be performed to determine whether treated water could be used as a recharge source for the aquifer to enhance recovery, and that Array 2 be converted to a more efficient controller-less system. Finally, the PER recommended that the O&M program be revised and updated based on the experience gained through the previous 6 years of daily operations at the site (**CH2M HILL, 1997**).

The two original arrays that were installed were Array 1, constructed in the former plant operations area, and Array 2, constructed parallel to the former eastern drainage channel (**CH2M HILL, 1997**). Source area remediation at Array 1 was discontinued on May 1, 1993 when its pumping was stopped to make way for construction of the onsite landfill, but Array 2 remained in place and operational (**CH2M HILL, 1998a**). In the PER, it was concluded that construction of two additional arrays was needed to more efficiently capture DNAPL from the offsite plume (Array 3) and to potentially capture and prevent migration of DNAPL underneath the landfill (Array 1a). Array 1a included 12 new extraction wells located around the southwestern perimeter of the landfill. Array 3 included 10 new extraction wells and five additional monitor wells located offsite on private property in the residential neighborhood on the west side of the bayou (**IT, 2000d**). .

In June 1999, the Army Corps of Engineers (USACE) awarded IT/OHM a task order contract for the Phase 2 Modifications at the Bayou Bonfouca site, based on recommendations from the PER, Phase I Design Investigation Report, and Preliminary Design Submittal. The contract awarded IT/OHM the design, construction, LTRA, and shakedown phases of the project. The modifications specified in the task order have been completed and are described in more detail below (**IT, 2000d**).

Three different types of pumps that could have possibly been used in the Array 2 upgrades were pilot tested in the Phase I Design Investigation (**CH2M HILL, 1998a**). In September 1999, the extraction well pumps in Array 2 were replaced. At this time, new air regulators, check valves, and exhaust bleed valves were also installed. The installation of Array 1a along the landfill, Array 3, and the five new offsite monitor wells was completed in March 2000. A subsurface pipeline and leak detection system to service the new extraction wells was installed. An underground pipeline extending across Bayou Bonfouca, complete with a leak detection sensor, for fluid and air conveyance was also installed. Five existing monitor wells were abandoned by grouting the boreholes according to LDEQ guidelines. An automated monitoring system (AMS) was added to provide ground water elevation data to aid in the subsidence monitoring program. The purpose of the subsidence monitoring program is to minimize the potential for damaging subsidence caused by ground water extraction.

An automated Total Organic Carbon (TOC) monitoring system was put into use at the onsite wastewater treatment facility (**IT, 2000d**). The treatment plant structure and tanks were rehabilitated as suggested. An iron removal test was also performed at the site. It was found that a two-micron filter removed enough iron to produce discharge within the effluent standards. At the time of their December 2000 report, IT was awaiting approval from USACE to use filtration instead of their current iron removal method of injecting a chelating agent into the water to treat it. After evaluating the effectiveness of the oil/water separator once the new arrays had been added, it was found to be within the performance range (**IT, 2000d**).

The well installation and ground water treatment plant upgrades were completed (**EPA, 2000**). The wastewater treatment facility currently discharges to Bayou Bonfouca. This change was made to return the system back to the original design and discontinue discharge to the western drainage canal. The State of Louisiana assumed responsibility for O&M at the site in July 2001. O&M activities will be conducted by the State at the site for a minimum of 30 years, after which time the need for further O&M and monitoring will be evaluated (**EPA, 1997**).

4.4 Operations and Maintenance and Long-Term Monitoring

The ground water treatment system at Bayou Bonfouca involves a treatment train. Ground water and DNAPL are extracted from the shallow artesian aquifer and conveyed to the treatment facility through piping. Components of the treatment facility include an oil/water separator, filter feed tank, sand filters, oleophilic filters, granular activated carbon, post-aeration tank, backwash tank, recovered/skimmed oil tank, storm water sump, air compressors, air dryer system, and air blower. The goal of the recovery system is to recover as much DNAPL as possible from the shallow artesian aquifer while preventing land subsidence by limiting ground water drawdown as measured in the monitor wells. Land surface elevations are monitored and used to evaluate the effect of drawdown on settlement and to adjust pumping rates (**IT, 2000b**). The O&M Plan states that drawdown shall be limited to four feet below mean sea level (MSL). In accordance with this plan, if the water level in any monitor well is measured below -4 feet MSL, the extraction well closest to it is shut down and pumping rates adjusted to reduce drawdown (**IT, 2001**).

An addendum to the O&M Plan was completed in December 2002 (**MMG, 2002b**). The O&M Plan addendum addressed the O&M requirements associated with the addition of four new ground water monitor wells. Two new ground water monitor wells (MW-1 and MW-2) were installed onsite and two new ground water monitor wells (MW-4 and MW-5) were installed offsite (**MMG, 2002c**). Locations for these wells are shown on **Figure 2**. These new wells were installed to evaluate the effectiveness of the recovery system for capturing the plume of creosote contamination. A fifth location, MW-3, was abandoned.

Prior to installation of the new ground water monitor wells, four of the existing extraction wells were selected each month for sampling and analysis of Semi-Volatile Organic Compounds (SVOCs) (**IT, 2001**). This sampling was performed to evaluate the effectiveness of the recovery system at containing the creosote plume. Beginning in January 2003, sampling of the extraction wells for this purpose was replaced by sampling of the new ground water monitor wells.

The current ground water monitoring program involves quarterly sampling for SVOCs of the new ground water monitor wells. EPA and LDEQ also agreed that some of the perimeter piezometers would be sampled along with the new monitor wells to provide additional information on the containment of the contaminant plume (**MMG, 2001b**). The revised Final O&M Plan specified that the ground water monitoring program would involve quarterly monitoring. Monitoring activities were to include water level measurements, estimating purge volumes, purging the wells and collecting ground water samples for SVOC analysis. Quarterly reports describing all aspects of the monitoring program were to be submitted to LDEQ and EPA. Procedures for completing these tasks are described in the Revised Final O&M Plan (**MMG, 2001b**).

At the time of the third five-year review site inspection performed on February 9, 2006, McDonald Construction was the contractor responsible for day-to-day O&M at the site. Detailed O&M costs were not available, but the operator indicated during the site inspection that O&M costs had been averaging about $23,000 per month. These costs are less than the O&M costs reported in the second five-year review, which were stated to be between $30,000 and $40,000 per month (**EPA, 2001a**). The 1987 ROD estimated annual O&M cost to be $173,748 over the entire remediation period or $14,479 per month. The disparity between the ROD-estimated costs and actual monthly costs may be due to changes in the size of the GWTS (the original recovery system consisted of two extraction well arrays with a total of 34 wells; the current system consists of three extraction well arrays with a total of 44 extraction wells).

Significant unexpected O&M costs at the site were incurred as a result of damage caused by Hurricane Katrina in August 2005. Hurricane Katrina made landfall on the coast of Louisiana, near Slidell, on August 29, 2005, and caused severe damage from wind and flooding in southeastern Louisiana. As a result of Hurricane Katrina, it was estimated that flood levels reached 12 to 14 feet above MSL at the site. Flood waters reached a depth of approximately 1.5 feet in the treatment system control building. Flush-mount well vaults, flow transmitters, electric motors, electric wire, and communication wiring were submerged. Office furniture, file cabinets, bookcases, sample storage refrigerators, and the ice machine were damaged by the flood water or mold. The perimeter site fencing was damaged in places due to fallen trees. The ground water treatment system was shut down for approximately three weeks as a result of the hurricanes. Power was restored to the site on September 19, 2005. On September 24, 2005, Hurricane Rita made landfall near the Texas-Louisiana border, about 250 miles west of the site, and resulted in wind and flood damage in southwestern Louisiana; during this hurricane, flooding at the site was not as severe as with Hurricane Katrina, and the plant was not affected. The ground water treatment system was restarted on September 28, 2005, and continues to operate, although, at a reduced level of capacity. At the time of the five-year review site inspection, replacement parts for equipment damaged by the hurricanes were not yet available.

A detailed site review was performed following the hurricanes to determine what repairs were needed, and the cost of those repairs. The cost for making high and moderate priority repairs was estimated at $232,285, with a +50/-30 percent range of $162,600 to $348,400 (**CH2M HILL, 2006**).

Based on the detailed site review, the following were considered High Priority repairs (**CH2M HILL, 2006**):

- Drain all electrical and communications cable conduit and junction boxes below the high water mark

and purge with inert gas or equivalent to remove moisture and contaminants. Have a licensed electrician test the wire's insulation resistance, verify wire and connection integrity and replace as necessary

- Replace all electrical motors in the treatment plant that were submerged. A licensed electrician should inspect and test electrical motors that drive the two air compressors to verify their integrity and safety of operation. Replace the electric motor for the re-aeration blower.
- Service all water transfer pumps. This includes draining and flushing the oil/lubricant reservoir to remove water, installing fresh oil/lubricant, and lubricating all parts in accordance with the manufacturer's instructions.
- Drain and replace lubricants in the air compressors and re-aeration blower.
- Calibrate all flow meters and level sensors to ensure accurate measurements. Replace the flow element transmitters for Array 1a and 2 that were submerged.
- Pressure wash and purge all ten Array 3 vaults to remove contaminants. Replace each well's air pressure regulator, regulator enclosure and all tubing and fittings within the enclosure.
- Replace the electrical wall outlets in the control building that were submerged.

The following were considered Moderate Priority repairs:

- Repair wind damaged aluminum roof border and panels on east side of control building.
- Replace gypsum drywall, interior building insulation, and floor molding to a height of 4 feet to eliminate existing and future mold occurrences. Replace 4 ft by 8 ft ceiling panel in the mud room
- Replace office furniture, bathroom vanities, file cabinets, bookcases, sample storage refrigerators, and ice machine damaged by floodwater and mold.
- Replace outside equipment storage shed damaged by wind.
- Pump and /or blow out with compressed air, floodwater from all secondary containment piping and bayou pipeline crossing, and verify leak detection sensor integrity. Clean bayou crossing well vaults to remove contaminants and replace vaults damaged by extended water submergence.
- Inspect and repair the control building telephone wiring.
- Inspect and service the outside air conditioning unit and inside air handling unit. Check electrical connections for integrity.
- Repair or relocate the perimeter security fence.

4.5 Progress Since Initiation of Remedial Action

From June 1991 through January 31, 2006, 34,258,255gallons of ground water have been extracted and treated

and 71,037gallons of free phase creosote recovered (**MC, 2006**). Since initiation of remedial action, several additional investigations and refinements to the system have been performed (see also **Section 4.3**). The associated reports, including the Performance Evaluation Report for Shallow Artesian Aquifer Remediation, the Phase I Design Investigation Report, and the Preliminary Design Submittal, recommended additional modifications be made to the system to ensure that the requirements of the ROD and ESD were met (Phase 2 Modifications). In June 1999, the USACE awarded IT/OHM a task order contract for the design, construction, O&M, and shakedown phases of this project. The modifications specified in the task order have been completed (**IT, 2000d**).

The Phase I Design Investigation was completed in 1998; this investigation concluded that there was no indication of creosote under the landfill advancing toward the bayou, but that there was a potential for re-contamination of the bayou, as ground water containing dissolved phase PAHs is discharged to the bayou from both sides. This was concluded to be a possible threat to benthic organisms over a period of 5-10 years as the PAHs bind to soil particles in the water and build up in the sediments. The other major concern expressed in this report was that remediation of the offsite plume had not been initiated (**CH2M HILL, 1998a**).

According to the Preliminary Design Submittal, one of the requirements of the ESD was that the need for a slurry wall be considered at a later date. No further research into the benefits of this technology was conducted during the investigation, and the report recommended that this decision be deferred. This was due to the fact that slurry walls are very costly and are not very compatible with the goals of creosote recovery and ground water extraction at the site (**CH2M HILL, 1999a**).

The second five-year review completed in July 2001 recommended the following (see also **Section 5.0**):

- That the ground water monitoring program be updated to provide monitoring necessary to ensure migration within and /or from the shallow artesian aquifer to either Bayou Bonfouca or previously unaffected ground water continues to be controlled.
- That the ground water point of compliance requirement set forth in the ROD (cleanup to background or an Alternate Concentration Limit beyond the compliance boundary) be formally addressed.
- That regular landfill cap inspections and documentation of such inspections be built into the O&M Plan for the site (**EPA 2001a**).

Many modifications to the system were made in 1999 & 2000 to improve performance as a result of the update recommendations. These changes included the installation of Arrays 1a and Array 3 and upgrades to the wastewater treatment facility. These changes were made in accordance with suggestions of the PER, Phase

I Design Inventory Report, and the Preliminary design submittal (**IT, 2000d**). These changes appear to have improved the overall performance of the system.

5.0 Progress Since the Second Five-Year Review

The second five-year review of the Bayou Bonfouca site was completed in July 2001. The findings of the second five-year review, the status of recommendations and follow-up actions, the results of implemented actions, and the status of any other issues are described in the following sections.

5.1 Protectiveness Statements from Second Five-Year Review

The second five-year review found that the remedy for the source control operable unit had been completed and was protective of human health and the environment because the waste had been treated and waste that remained at the site had been contained under a landfill cap. In addition, the remedy for the ground water operable unit had been implemented and was believed to be protective based on the system that provides for ongoing pumping and treating of the ground water and DNAPL. Recommended follow-up actions were defined to verify and monitor the continued protectiveness of the remedy; these are described in **Section 5.2**. The second five-year review found that if the recommended actions were implemented, they would ensure the remedy remains protective of human health and the environment in the future.

5.2 Second Five-Year Review Recommendations and Follow-up Actions

The second five-year review recommended that the ground water monitoring program be updated to provide the monitoring necessary to ensure that migration within and/or from the shallow artesian aquifer to either Bayou Bonfouca or previously unaffected ground water continues to be controlled. In addition, it was recommended that the ground water point of compliance requirement set forth in the ROD (**EPA. 1987**) (cleanup to background or an Alternate Concentration Limit beyond the compliance boundary) be addressed. Finally, it was recommended that regular landfill cap inspections and documentation of such inspections be incorporated into the O&M Plan for the site (**EPA, 2001**).

EPA completed a remediation system evaluation in June 2001. The purpose of the remediation system evaluation process was:

- To evaluate the performance and effectiveness of the ground water treatment system;
- To identify potential cost savings that could be realized through changes in operation and/or technology;
- To assure that the remediation goals for the site were clear and realistic;

- To determine that an exit strategy was in place for the site; and,
- To verify adequate maintenance of Government owned property (**EPA, 2001b**).

The remediation evaluation report indicated that the treatment system was running smoothly, and the site was well operated and maintained. The remediation evaluation report made the following recommendations regarding the site:

- Improve the sampling program to help delineate the plume and evaluate the capture zone of the current extraction well arrays;
- Determine if surface water and sediments have harmful PAH concentrations;
- Potentially recycle recovered creosote to eliminate disposal costs;
- Eliminate laboratory samples taken monthly from extraction wells;
- Determine which extraction wells are the most productive NAPL producers;
- Analyze and summarize data in the monthly reports, clarifying the role of total organic carbon measurements;
- Investigate use of potentially higher extraction rates; and,
- Develop a clear exit strategy (**EPA, 2001b**).

Actions taken by EPA with regards to these recommendations are discussed in **Section 5.3** below.
In December 2001, EPA conducted an investigation of the Bayou Bonfouca site. The investigation focused on the collection and chemical analyses of site sediments and surface water, a benthic macroinvertebrate survey, and sediment toxicological evaluations (**EPA, 2003**).

The installation of four new ground water monitor wells was completed in September 2002 (**EPA, 2002**). Two of the new monitor wells were installed onsite and two of the new monitor wells were installed offsite. These wells were installed to evaluate the effectiveness of the recovery system in containing the contaminant plume. Quarterly reports are submitted to EPA and LDEQ presenting the results of the monitoring program.

Monthly surveys of onsite and offsite subsidence monitors are performed. Survey results are presented in the monthly operational reports. These reports are submitted to EPA and LDEQ.

5.3 Status of Recommended Actions

With the completion of the new ground water monitoring wells in September 2002, as of January2003 extraction wells are no longer sampled for the purpose of monitoring the effectiveness of the recovery system.

Based on discussions with the site operator during the five-year review site inspection, analytical results for ground water samples collected prior to Hurricane Katrina for the four new ground water monitor wells did not detect any PAH constituents above the laboratory limits. However, a ground water sample collected from an onsite well, MW-1, in October 2005, after the hurricane hit, revealed a total PAH concentration of 3946 µg/L and 5118 µg/L in a field duplicate. Confirmation sampling in December 2005 confirmed the presence of PAHs in MW-1, at a lower concentration. The presence of PAHs at this location most likely results from the temporary shutdown of the ground water treatment system between August 25 and September 28, 2005, due to Hurricane Katrina (**CH2M HILL, 2006**).

The results of the Sediment Remedy Re-Evaluation investigation indicate that the residual sediment creosote contamination is below the clean-up goal identified in the ROD. The range and concentration of individual creosote and creosote related compounds indicates that the remaining creosote is highly weathered and continues to be chemically transformed. This result suggests that the source has been removed and/or isolated from the bayou. The benthic survey results revealed that the bayou is now inhabited by macrobenths typical of bayou communities in Louisiana; and while the species present are mostly indicative of polluted or disturbed habitats, some pollution sensitive species were found, suggesting that the system is in a state of biological recovery. No significant toxicity was observed in the *Hyalella azteca* sediment tests related to creosote. This further supports the finding that Bayou Bonfouca is in a state of biological recovery within the area historically affected by wood-treating activities (**EPA, 2003**).

The current O&M plan requires monthly survey of all onsite and offsite survey monuments and subsidence monitoring wells. These data are used to evaluate ground surface settlements resulting from operation of the recovery system. If necessary, preventive measures can be evaluated and implemented to avoid excessive settlements that might cause damage to onsite and offsite structures or onsite capping systems.

6.0 Five-Year Review Process

This third five-year review for the Bayou Bonfouca site has been conducted in accordance with EPA's Comprehensive Five-Year Review Guidance dated June 2001 (**EPA, 2001c**). Interviews were conducted with relevant parties; a site inspection was conducted; and applicable data and documentation covering the period of the review were evaluated. The activities conducted as part of this review are described in the following sections.

6.1 Administrative Components

The five-year review for this site was initiated by the EPA when EPA contractor CH2M HILL, Inc, was tasked to perform the technical components of the review. A public notice announcing initiation of the five-year review was published in the ***Slidell Sentry-News***. The review team was led by the EPA Remedial Project Manager (RPM) for this site, Mr. Mike McAteer/EPA Region 6. The components of the review included community involvement, document review, data review, a site inspection, interviews, and development of this Five-Year Review Report, as described in the following paragraphs.

6.2 Community Involvement

A public notice announcing initiation of the third five-year review for the Bayou Bonfouca Superfund site was published in the ***Slidell Sentry-News*** on February 15, 2006. Upon signature, the Third Five-Year Review Report will be placed at the following information repositories for the site: Slidell Public Library, the Bayou Bonfouca site, the LDEQ office in Baton Rouge, Louisiana, and the EPA Region 6 office in Dallas, Texas. A notice will then be published in the ***Slidell Sentry-News*** to summarize the findings of the review and announce the availability of the report at the information repositories. Copies of the two public notices are provided in **Attachment 5** to this report.

6.3 Document Review

This five-year review included a review of relevant site documents, including decision documents, construction and implementation reports, operations reports and related monitoring data, and the Second Five-Year Review Report. Documents that were reviewed are listed in **Attachment 1**.

6.4 Data Review

Monthly operational reports submitted by McDonald Construction include data on the number of days the treatment system was operational, total gallons of extracted ground water, total gallons of storm water treated, total gallons of water treated and discharged, total pounds of carbon consumed, total number of sand filter back washes, average influent flow rate, total gallons of recovered creosote, total gallons of city water used, and the total amount of electricity used. The reports also contain information on drawdown in the monitor wells, ground water elevations, monthly subsidence monitoring, daily operations, and daily well inspections. The monthly reports reviewed also included sampling data for SVOCs and volatile organic compounds (VOCs), biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), total dissolved solids (TDS), total organic carbon (TOC), turbidity, oil and grease, and metals (**MC, 2006**). These data are collected from the inlet to the oil/water separator, inlet to the oleophilic filter, inlet to the carbon filter, effluent discharge and the ground water monitor wells (**MC, 2004**). Not all sample points are

analyzed for each of the above listed constituents. **Table 2** lists the most recent-included analytical results from sampling the ground water monitoring wells (December 2004).

Two of the monthly operational reports, for the months of December 2004 and February 2005, were reviewed as part of this five-year review. These reports document that the treatment system is operating as designed. Based on these two reports, the amount of free-phase creosote recovered monthly ranges between 300 and 600 gallons. Since remedial action started in June 1991 through January 31, 2006, the cumulative total of recovered DNAPL is 71,037 gallons. A total of 34,258,255 gallons of ground water had been extracted and treated during that time. Discharges from the wastewater treatment facility comply with the limits established by the LDEQ. Monitoring shows that settlement has not been a problem at the site. The reports show that individual wells within each array are operated on a rotational basis, with each well in operation every other day. Site O&M staff stated that this arrangement was necessary to maximize extraction rates while meeting the drawdown requirements necessary to prevent subsidence (**MC, 2004** and **2005**). Although the extraction arrays currently operate either even or odd wells, this arrangement may change based on changes in drawdown values.

Also reviewed for this five-year review were the results from samples collected for the hurricane assessment (**CH2M HILL, 2006**). The samples included ground water from wells MW-1 and MW-5, surface sediment (deposited from floodwaters), and aquatic sediment in the bayou. All samples were analyzed for SVOCs, and the sediment samples were analyzed for metals. Analytical results are listed in **Tables 3-7**. This sampling event is described in detail in the Technical Memorandum entitled *Hurricane Katrina Response, Site Inspection and Sampling Result, Bayou Bonfouca Superfund Site, Slidell, Louisiana* (February 2006).

6.5 Interviews

Interviews were conducted with the site O&M manager (Rick Tibbs/McDonald Construction), LDEQ (Rich Johnson/LDEQ) beginning on February 9, 2006. An Interview Record Form was also mailed to Martin Bruno/City of Slidell, and local community members Dr. Ignacious Thomas and Ms Lucy Tierney. Ms Lucy Tierney provided a completed interview form by mail. Interview Record Forms documenting the interviews are provided in **Attachment 2**.

Overall impressions from the interviews were that the various parties are pleased with the work done at the site, the improvements made since the last five-year review, and the people who worked to implement the remedial actions.

6.6 Site Inspection

An inspection was conducted at the site on February 9, 2006. The completed site inspection checklist is provided in **Attachment 3**. Photographs taken during the site visit are provided in **Attachment 4**. The site inspection included a tour of each extraction array, the wastewater treatment plant, and a walkover of the landfill.

Site access is restricted by a fence, and entry to the site is through a single gate located on the north end of the site (**Photographs 58 and 59**). The front gate was closed at the time of the site inspection. Another gate is located next to Bayou Bonfouca on the south side of the site. This gate is not connected to any roads, and it only allows access to the portion of the site next to the bayou. This gate was closed and locked at the time of the inspection. Aside from hurricane damage, the fence appeared well maintained. A warning sign was posted on the front and back gates, but no warning signs were observed along other portions of the fence. Trees downed during Hurricane Katrina heavily damaged sections of fence that run along the property line through the wooded area north and west of the site (**Photographs 9, 56, and 60**). Some hurricane-related debris had accumulated on the outside of the fence, between the fence and the Bayou (**Photographs 19, 20**).

Aside from hurricane-related damage, the ground water treatment system appeared to have been well-maintained (**Photographs 2, 3**). The system was operating at the time of the inspection; however, damage to some of the system components due to hurricane flooding has caused the system to operate at lower extraction rates. Repairs requiring replacement parts had not yet been made pending approval by EPA and LDEQ. The treatment system, located outside the control building, contained adequate secondary containment, and no leaks were noted during the inspection. A sump was present to collect any leaks and return the leaked material to the treatment system. The treatment system is completely automated, and can be monitored and operated remotely from the control building.

Each extraction array was located during the inspection (**Photographs 14-18, 31-38, 47-50**). The entire system can be monitored remotely from the control building, and it was stated that the offsite array (Array 3) is physically inspected daily. The well vaults for Array 1a and 3 are completed flush with ground surface. The vaults at Array 3 were not casually visible in the backyard at each residence. The wells for Array 2 are completed above ground surface. All well vaults were closed at the time of the inspection; however, some of the vaults were missing locks. Several of the vaults were opened and inspected. An odor could be detected when the well vaults were opened. No leaks were observed in the above-ground portions of the piping connected to Array 2. Odors could also be detected when standing near some of the wells at Array 2. One of

the exit points for the bayou-crossing pipeline was also inspected. Hurricane related flooding has caused damage to a number of the well vaults resulting in excessive corrosion to metal surfaces.

The surface of the landfill was also inspected as part of the site inspection (**Photographs 11-13, 43-46**). The cover of the landfill appeared to be in good condition. No signs of erosion, slumping, bulging, cracking, or settlement were noticed. The vegetation on the cover was well established, and only a few bare spots were noticed. A small sapling, approximately three feet tall, was growing near one of the landfill vent pipes (**Photograph 44).**

7.0 Technical Assessment

The five-year review must determine whether the remedy at a site is protective of human health and the environment. The EPA guidance describes three questions used to provide a framework for organizing and evaluating data and information and to ensure all relevant issues are considered when determining the protectiveness of a remedy. These questions are assessed for the site in the following paragraphs. At the end of the section is a summary of the technical assessment.

The remedy appears to be functioning as intended by the decision documents, and no new information has come to light that alter the assumptions made in selecting the remedy for the site. The incinerated source control wastes are contained by the onsite landfill. Access to the site is restricted by a fence. Affected ground water and DNAPL are being extracted, treated, and disposed through operation of the recovery and treatment system. Various components of the perimeter fence and the recovery and treatment system have been damaged by hurricane-related wind and flooding, but the system is still functional. Exposure of well vaults to flood water has caused corrosion in some the well vaults. At the time of the five-year review site inspection replacement parts for damaged portions of the treatment system were not available. As a result, the system is currently operating at lower extraction rates.

There have been no changes in chemical-, action-, or location-specific standards or requirements that would call into question the protectiveness of the actions that have been or continue to be conducted. The facility is able to operate within its designed parameters, and effluent discharges meet the surface water discharge requirements established for the site by the State of Louisiana.

The Final O&M plan for the site describes the O&M requirements for the ground water extraction and treatment system, but it does not include a requirement that formal periodic inspections of the landfill cap be conducted. However, the O&M Plan does require a monthly survey of onsite and offsite subsidence

monuments that includes landfill monuments. The results of these surveys are provided in the Monthly Operational Reports. The landfill currently appears to be in good condition and well-maintained, and the onsite personnel have obviously maintained the cap as required, however, requirements for regular inspections of the landfill cap by onsite personnel should be incorporated into the O&M Plan and the performance of such inspections documented. At a minimum, inspection of the landfill cap will also continue to occur every five years as part of the five-year review process.

In addition, the 1987 ROD specifies that RCRA requirements for monitoring of ground water at the point-of-compliance be met for this site. The point of compliance is defined as the facility property line, and as described by the ROD, the ground water beyond this point is required to be cleaned to background or an alternate concentration limit (ACL) -- the 1987 ROD indicates that the target cleanup level for ground water was not being set at that time because it was unknown at the time how feasible ground water extraction would be at this site (**EPA, 1987**). In terms of setting the point-of-compliance as the property boundary, it is known that the ground water/DNAPL contamination extends beyond the property boundary into the residential area offsite, to the southwest; this area is addressed by the extraction Array 3. As such, it is not practicable at this time to recommend implementation of a cleanup goal of background for all ground water beyond the property boundary; however, the intent of the ROD was to implement a remedy that would control migration. Another component of the ground water monitoring issue is that the remedy at the site is intended to prevent the further migration of DNAPL and dissolved phase contamination into the bayou. The Performance Evaluation Report documented that the potential existed for dissolved phase contamination to migrate to the bayou (**CH2M HILL, 1997**). This is addressed by the installation of onsite and offsite ground water monitoring wells and the inclusion of a ground water monitoring plan in the Revised Final Operation and Maintenance Plan Addendum (**MMG, 2002**).

The State of Louisiana Department of Health and Hospitals (LDHH), in conjunction with the LDEQ, routinely tests fish samples and issues fish consumption and swimming advisories to help ensure the safe enjoyment of Louisiana's water resources. The Louisiana Department of Wildlife and Fisheries (LDWF) and the Louisiana Department of Agriculture and Forestry (LDAF) are also consulted during the course of advisory development and dissemination. The following website provides detailed information regarding contaminant, mercury and swimming advisories (including those established for Bayou Bonfouca):

http://www.deq.louisiana.gov/portal/tabid/1631/Default.aspx

In December 1998, LDHH/OPH rescinded the November 1987 ban on fish consumption based on fillet samples taken between 1996 and 1997. The swimming and sediment contact advisory remains in effect based on the sediment samples collected in 1997.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The documents that detail the remedial decisions for the site are the EPA Superfund Record of Decision: Bayou Bonfouca March 31, 1987 and the EPA Superfund Explanation of Differences: Bayou Bonfouca, February 5, 1990. The site is now undergoing O&M. Based on the data review, site inspection, and interviews, it appears that the Bayou Bonfouca site remedy is functioning as intended by the ROD and ESD. Opportunities for optimization, early indicators of potential remedy problems, and institutional controls are described below.

Opportunities for Optimization. Ground water/NAPL extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or above -4 feet MSL. This requirement was put into place to minimize the potential for damaging subsidence in the area. The average pumping rate from the extraction system is around 15 gpm. This rate is less than one-half of the system's design capacity of up to 50 gpm. The treatment plant operates in a batch mode, treating ground water and free phase creosote at 25 gpm (**EPA, 2001b**). Benefits might be obtained through an additional investigation of the subsidence issue relative to increased pumping at the site. An investigation into subsidence induced by more aggressive pumping could be performed to determine if higher pumping rates can be employed at the site without creating a subsidence problem. In addition, increased pumping rates, versus NAPL recovery, would need to be investigated. More aggressive extraction rates may allow for an increase in the amount of NAPL recovered. Increased NAPL recovery would result in increased and quicker removal of contaminant source material in ground water and possibly shorten the duration of operation of the GWTS. This in turn could allow for the development of closure criteria and a clear exit strategy.

Early Indicators of Potential Remedy Problems. There were no observed indicators of potential problems that would impact the protectiveness of the remedy.

Institutional Controls. The RODs did not specify institutional controls as a requirement. See also **Section 8.0**.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics. Based on the standards review and the data review, no changes in exposure pathways, toxicity, or other contaminant characteristics were identified that affect the cleanup levels originally established for the site or affect the protectiveness of the remedy.

Changes in ARARs. Applicable or Relevant and Appropriate Requirements (ARARs) for this site were identified in the ROD dated March 31, 1987. This Five-Year Review included identification of and evaluation of changes in these ARARs to determine whether such changes may affect the protectiveness of the selected remedy.

The Bayou Bonfouca ROD identified the following ARARs as having an impact on the proposed remedy:

1. Requirements for intergovernmental review where alternatives require federal or state funds, or a cooperative agreement between state and federal agencies, as regulated at 40 CFR 29.

Contaminant-Specific Requirements:

1. Occupational Safety and Health Administration (OSHA) requirements for the protection of workers, as regulated under 29 CFR 1910.
2. Federal Standards for Toxic Pollutant Effluent, as regulated at 40 CFR 129

Action-Specific Requirements:

1. RCRA requirements for treatment, storage, and disposal facilities (TSDs), as regulated under 40 CFR 264 and 265.
2. RCRA manifesting requirements for the offsite transportation of hazardous wastes, as regulated under 40 CFR 262.
3. Permitting requirements for discharges of dredged or fill materials into waters of the United States, as regulated under 33 USC §1344.
4. Requirements for the emission of hazardous air pollutants during incineration, as regulated under the Clean Air Act (CAA) Section 112, the State Implementation Plan (SIP) for Louisiana, and the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) regulations, 40 CFR 61
5. Substantiative requirements for effluent discharges to Bayou Bonfouca, as regulated under the Clean Water Act (CWA) Section 402, and the National Pollutant Discharge Elimination System (NPDES) at

40 CFR 122 and 125, Subchapter N.

6. Requirements for the transportation of hazardous materials, as regulated under 49 CFR 170 to 179.
7. State of Louisiana hazardous waste regulations under Act 449 (EPA, 1987).

The following is an additional action specific-requirement not identified in the ROD that should be considered applicable to the site.

1. LDEQ and Louisiana Department of Transportation and Development (LADOTD) guidelines for *Construction of Geotechnical Boreholes and Ground water Monitoring Systems Handbook*, December 2000.

Location-Specific Requirements:

1. Requirements to evaluate the potential impacts to flood plains as regulated under the Executive Order on Floodplain Management, Executive Order No. 11988.
2. Requirements to evaluate and avoid adverse impacts to wetlands, as regulated under the Executive Order on the Protection of Wetlands, Executive Order No. 11990.
3. Requirement under the Fish and Wildlife Coordination Act for agency consultation prior to modifying any body of water.

The ROD does not specifically list RCRA requirements for ground water monitoring at TSDs as an ARAR, but in the discussion of ARARs in the ROD, the RCRA requirement for ground water monitoring at TSDs is discussed. The requirement for ground water monitoring is also mentioned in the discussion of the selected remedy in the ROD. The ROD specifically states that the 30 year requirement for ground water monitoring at closure is applicable to the site, and the ROD stipulates that the point-of-compliance is the site boundary (**EPA, 1987**). No new changes to these RCRA requirements have been made.

All remedial actions at the site are complete, except for the continued O&M of the ground water extraction and treatment system and the ground water monitoring system. The bayou is no longer being modified as part of actions taken at the site. Therefore, the requirements under Executive Order No. 11988 (flood plains), Executive Order No. 11990 (wetlands), the Fish and Wildlife Coordination Act, and the requirements for discharges of dredged or fill materials into waters of the United States at 33 USC §1344 no longer apply to the site remedy. In addition, incineration and excavation activities are no longer occurring at the site, and the requirements of the CAA and the NESHAPs regulations no longer apply to the remedy at the site.

The requirements for wastewater treatment and discharges, as regulated under the CWA and 40 CFR Parts 122, 125, and 129 are still applicable to the site. The State of Louisiana has set discharge limitations for wastewater discharges at the site, and no new substantiative changes in the regulations have occurred that would call into question the protectiveness of the remedy.

In addition, wastes are still generated at the site through O&M activities. The regulations for TSDs at 40 CFR 264 and 265 do still apply to the site remedy. In addition, the regulations pertaining to the transportation of these wastes at 40 CFR 262 and 49 CFR 170-179 still apply to the site remedy. No new substantiative changes to these regulations have occurred that would question the protectiveness of the remedy.

The OSHA requirements at 29 CFR 1910 are addressed by a site specific health and safety plan. This plan is written and updated to address any changes in OSHA standards that may impact working at the site.

The requirements of 40 CFR 29, requiring intergovernmental review where actions will require federal or state funds, or a cooperative agreement, still apply to the site remedy. This requirement does not directly impact the protectiveness of the remedy.

Although not included in the ROD, the Final O&M plan (**IT, 2001**) lists additional regulations that should be included as ARARs or "to be considered" (TBCs) for the site remedy. These additional regulations include:

TBCs:

Action-Specific Requirements:

1. Requirements of 40 CFR 261 for the classification of hazardous wastes. These regulations apply to wastes generated from the treatment of extracted ground water, residual wastes generated through O&M activities, and used personal protective equipment (PPE).
2. Tank management standards at 40 CFR 262 and 264. Tanks must be labeled as hazardous wastes, inspected daily, and managed in a manner such that releases and spills are collected within 24 hours of detection.
3. Land Disposal Restrictions (LDRs) at 40 CFR 268. Some of the wastes generated at the site are restricted from land disposal without meeting treatment standards. These wastes must meet the treatment standards, and offsite shipments of these wastes to a RCRA-permitted TSD must contain a notice that the wastes are restricted from land disposal without treatment.

4. EPA's offsite rule, as stated in the NCP at 40 CFR 300.440. This regulation stipulates that hazardous wastes generated from CERCLA cleanups must go to RCRA-permitted TSDs that are in compliance with RCRA and state rules and that do not have releases to the environment.

Interpretation, Changes, and Revisions to Guidance and Regulations.
The LDEQ and LADOTD borehole and well installation and abandonment guidelines contained in the *Construction of Geotechnical Boreholes and Ground water Monitoring Systems Handbook*, December 2000, are applicable to future installations and abandonment of wells at the site.

7.3 Question C: Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

Examples of other information that might call into question the protectiveness of the remedy include potential future land use changes in the vicinity of the site or other expected changes in site conditions or exposure pathways; no such information has come to light as part of this third five-year review for the site.

7.4 Summary of the Technical Assessment

The technical assessment, based on the data review, site inspection, technical evaluation, and interviews indicates the remedial actions selected for the Bayou Bonfouca site generally appear to have been implemented as intended by the decision documents. Based on the data collected during the Sediment Remedy Re-Evaluation (**EPA, 2003**), the bayou is in a state of biological recovery within the area historically affected by wood-treating activities.

Two new onsite and two new offsite ground water monitor wells were installed in September 2002 and incorporated into the ground water monitoring program. Data from these new wells is used to evaluate the effectiveness of the GWTS at capturing the plume of creosote contamination. Based on information provided by the plant operator during the site inspection, analytical data for these wells were non-detect for PAH constituents until Hurricane Katrina damaged and flooded the site. The system was shutdown for approximately three weeks following Hurricane Katrina, but was restarted as soon as power was restored to the site. One onsite and one offsite monitor well were sampled as part of the Hurricane Katrina Response site inspection (**CH2M HILL, 2006**). The ground water sample collected from the onsite well, MW-1, collected in October 2005, revealed a total PAH concentration of 3946 µg/L. A field duplicate sample contained a total PAH concentration of 5118 µg/L. Confirmation sampling in December 2005 confirmed the presence of PAHs in MW-1, but at a lower concentration. The presence of PAHs at this location most likely resulted from the temporary shutdown of the GWTS between August 29 and September 28, 2005 (**CH2M HILL, 2006**).

Prior to Hurricane Katrina, the facility appeared to be well maintained and to be operating efficiently. The site sustained significant flood damage due to Hurricane Katrina. At the time of the site inspection, debris and sediment had been removed from the treatment system containment area. The ground water treatment system is currently operational but at a lower capacity until repairs can be made. Repairs to the treatment system and the plant will be made upon review and approval by EPA and LDEQ.

Through January 31, 2006, a total of 34,258,255 gallons of ground water have been extracted and a total of 71,037 gallons of creosote have been recovered.

8.0 Institutional Controls

Institutional Controls (ICs) are generally defined as non-engineered instruments such as administrative and legal tools that do not involve construction or physically changing the site and that help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land and/or resource use (**EPA, 2005**). ICs can be used for many reasons including restriction of site use, modifying behavior, and providing information to people (**EPA, 2000**). ICs may include deed notices, easements, covenants, restrictions, or other conditions on deeds, and/or ground water and/or land use restriction documents (**EPA, 2001a**). The following paragraphs describe the ICs implemented at the site, the potential affect of future land use plans on ICs and any plans for changes to site contamination status.

8.1 Types of Institutional Controls In Place at the Site

The City of Slidell owns the property, and EPA is currently working with the City and LDEQ to implement a notice on the deed to prevent future use that would impact the capped area within the legal boundary of the site illustrated on **Figure 1**). The site is secured by a perimeter fence, which is a physical, and not an institutional, control. Also, the entrance to the Site is restricted by locked gates, and warning signs are visible on the access gates.

8.2 Effect of Future Land Use Plans on Institutional Controls

No future land uses has been established or are anticipated for the site that would require an adjustment to the ICs currently being put into place.

8.3 Plans for Changes to Site Contamination Status

No changes to the status of the contamination at the site are anticipated.

9.0 Issues

The LTRA O&M activities are ongoing at the site. Based on the data review, site inspection, interviews, and technology assessment, it appears the remedy has been implemented as planned and is operating as designed. The site appears to be well-maintained and operated effectively within the limitations imposed by the damage associated with Hurricane Katrina. To ensure continued protectiveness, the following issues are identified in the Third Five-Year Review Report for this site. These issues are associated with the current status of the remedy and are not sufficient to warrant a finding of not protective, but are required to be addressed to provide further documentation that the remedy is protective and to ensure that the remedy remains protective.

1. At the time of the site inspection, the ground water treatment system was operating at a reduced ground water/NAPL recovery rate because of damage sustained to plant systems by Hurricane Katrina. Repairs to the treatment system and the plant involving replacement parts have not been made pending review and approval by EPA and LDEQ.
2. Labeling on some treatment system components has faded or is no longer legible.
3. The property line fence north and west of the site that runs through the wooded area sustained damage from downed trees from Hurricane Katrina. The damaged fence could allow unauthorized access to the site.
4. A small sapling, approximately three feet high, is growing near one of the landfill vents. If it is allowed to continue growing, its root system could damage the landfill capping system.
5. There are no procedures set forth in the draft O&M plan to ensure regular inspections of the landfill cap and documentation of such inspections. All subsidence monuments on the landfill are surveyed monthly. These data are presented in the Monthly Operational report, submitted to LDEQ and EPA. At the time of the third five-year review site inspection, the landfill cap appeared to be well-maintained and in good condition; however, regular inspections and documentation of such inspections are appropriate to ensure it remains in good condition.
6. Even without the damage associated with the hurricanes, the treatment system operates at less than half of its designed capacity. Ground water/NAPL extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or above -4 feet MSL. Controlling water level drawdown is necessary to minimize the potential for land subsidence in the area. The average pumping rate from the extraction system is around 15 gpm, which is less than one-half of the system's designed capacity of up to 50 gpm (**EPA, 2001b**). More aggressive extraction rates may allow for an increase in the amount of NAPL recovered. This would result in more rapid and increased removal of contaminant source materials and possibly shorten the duration of operation of the GWTS. This in turn could allow for the development of a more clear exit strategy and closure criteria.

7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.
8. Institutional controls have not been put into place for this site. Although not specifically required by the final ROD for the site, institutional controls will help to ensure the site remains protective in the long-term.

10.0 Recommendations and Follow-up Actions

As described in the previous section, eight issues were identified during the third five-year review for this site. To address these issues, recommendations and follow-up actions have been defined; these are described below. A schedule for implementation is provided in **Table 8**.

1. Recommended repairs to system components damaged by Hurricane Katrina (**CH2M HILL, 2006**) should be completed as soon as possible in order to restore the treatment system to its required level of operation. At the time of the site inspection, recovery system pumps were operational; however, the majority of repairs requiring replacement parts are pending. Some of the well vaults that were submerged appear to have increased rates of corrosion.
2. Identification labels on some of the ground water treatment system components are either illegible or missing. Illegible or missing labels should be replaced.
3. The hurricane damaged sections property line fence should be repaired to restrict unauthorized entry to the site.
4. A small tree (2-3 feet tall) was growing near a vent at the top of the landfill. If allowed to continue growing, the root system could damage the landfill cap. This tree should be removed before damage to the cap occurs.
5. The extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or of above -4 feet MSL. This control level reduces the extraction rates below the capacity of the treatment system. An investigation should be conducted to determine if more aggressive pumping rates can be used without an increased risk of causing damaging subsidence. Increased pumping rates may result in increased NAPL recovery, potentially shortening the duration of operation of the GWTS.
6. Analytical data from ground water monitor well sampling included in the monthly operational reports should be compiled to facilitate ongoing review of the data. Quarterly ground water monitoring reports should be prepared and submitted to LDEQ and EPA as specified by the Revised, Final O&M Plan.

7. Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.
8. Although not specifically required by the final ROD for the site, institutional controls should be put into place ensure the site remains protective in the long-term. EPA believes that this can be accomplished through a deed notice and is currently working with LDEQ and the City of Slidell to implement such a notice.

11.0 Protectiveness Statement

The remedy implemented at the Bayou Bonfouca site is considered protective of human health and the environment in the short-term. The incinerated source control wastes are contained in the onsite RCRA Subtitle C compliant landfill. Access to the site is restricted by a fence, and the ground water treatment system operators are regularly onsite to ensure the system continues to operate and check site status. Affected ground water and DNAPL are extracted and treated through operation of a ground water treatment system. The treated ground water is discharged to Bayou Bonfouca, and the recovered DNAPL is sent offsite for disposal. The facility is able to operate within its designed parameters, and effluent discharges meet the surface water discharge requirements established for the site by the State of Louisiana. Continued O&M will ensure that the selected remedy continues to be protective.

Because the completed remedial action and O&M program for the Bayou Bonfouca site are considered protective for the short-term, the overall remedy for the site is considered protective of human health and the environment for the short-term. The selected remedy will continue to be protective if the recommendations and follow-up actions identified in this five-year review are addressed.

12.0 Next Review

The next five-year review, the fourth for the site, should be completed on or before September 2011 (twenty years after the triggering action date of September 1991).

Table 1
Chronology of Site Events
Bayou Bonfouca Superfund Site
St. Tammany Parish, Louisiana

Date	Event
1882	A creosote plant began operating at the site.
Early 1970s	There was a fire at the plant which ruptured several large storage tanks and caused a large quantity of creosote to flow across the site and into the bayou.
1970-1972	The plant was disassembled, leaving behind only a few building shells and foundation slabs.
1976	The Coast Guard undertook a study of the waterway.
1978	The Coast Guard, EPA, and the National Oceanic and Atmospheric Administration undertook a study of the waterway.
December 1982	The site was included on the NPL.
1983	The first Remedial Investigation/Feasibility Study begins.
1984	EPA decides to take an operable unit approach to the site, one operable unit for source control and one for groundwater.
July - August 1985	The PRP fenced the site under an EPA Administrative Order.
August 15, 1985	The Source Control Record of Decision (ROD) was signed, calling for the excavation and offsite landfilling of creosote waste piles.
March 1986	A Supplemental Phase II Remedial Investigation was performed to better define the extent of the soil contamination.
June 1986	The Phase II Feasibility Study was completed.
March 31, 1987	The final ROD was signed, incorporating the previous Source Control ROD (the selected alternative was onsite incineration).
1988	Two remedial design investigations determined that the extent of the contamination was underestimated.
February 15, 1990	EPA prepared an Explanation of Significant Differences to the ROD, which described that an additional 103,500 cubic yards of sediment would need to be incinerated and the groundwater contamination was present in three separate plumes.
July 10, 1991	Operation of the long term remedial action for groundwater began under the control of the EPA.
May 1, 1993	Pumping at Array 1 was discontinued to make way for construction of the onsite landfill.
November 1993 - July 28, 1995	Excavation and dredging of sediments were performed, and incineration took place onsite.

Table 1
Chronology of Site Events
Bayou Bonfouca Superfund Site
St. Tammany Parish, Louisiana

Date	Event
July 20, 1995	ROD Amendment signed calling for the use of the incinerator on the nearby Superfund Site of Southern Shipbuilding's wastes.
March 11, 1996	United States and Louisiana file CERCLA cost recovery actions against several former owners and operators, U.S. v. Braselman Corporation (E.D.L.A.)
December 1996	Incinerator was removed after operations at Southern Shipbuilding had ceased.
September 1996	A statutory 5-year review of the groundwater cleanup was completed, recommending continued groundwater recovery and treatment and further evaluation of the system's performance.
January 1997	Upon the completion of the source control actions by the EPA, the site was deeded to the City of Slidell by the Braselman Corporation, and the keys to the property were transferred to the City.
June 23, 1997	U.S. District Court enters consent decree resolving claims between U.S. and Kerr McGee Corporation, and Kerr McGee Chemical Corporation.
July 31, 1997	U.S. District Court enters consent decree resolving claims between U.S. and Fleming American Investment Trust, plc.
September 30, 1997	A Preliminary Closeout Report for the Source Control Remedial Action involving sediment excavation and incineration was issued.
September 1997	EPA completed a Performance Evaluation Report (PER) for the groundwater system and determined that modifications to the system were necessary.
October 1998	A Phase I Design Investigation was completed and determined that there was no indication of creosote under the landfill advancing toward the bayou, but that there was a potential for re-contamination of the bayou, as groundwater containing dissolved phase PAHs is discharged to the bayou from both sides.
June 1999	The Army Corps of Engineers awarded IT/OHM a task order for the Phase 2 Modifications at the site. The modifications specified at the site have been completed.
September 15, 1999	U.S. District Court enters consent decree resolving claims between the U.S., Louisiana, and the Alabama Great Southern Railroad Company.
September 1999	The extraction well pumps in Array 2 were replaced.
January 17, 2000	Construction of additional groundwater extraction Arrays 1a and 3 began.
March 2000	Array 1(a), Array 3, and five new off-site monitoring wells were installed,

Table 1
Chronology of Site Events
Bayou Bonfouca Superfund Site
St. Tammany Parish, Louisiana

Date	Event
	and the updated system began operating.
June 2001	The second statutory Five-Year review of the groundwater cleanup was completed, recommending updating of the groundwater monitoring program and regular landfill cap inspections.
June 29, 2001	Remediation System Evaluation Report for the groundwater system was completed. Recommendations to assure system effectiveness, reduce O&M costs, improve technical operations and gain site close out were made.
July 2001	The responsibility for O&M at the site was transferred from EPA to LDEQ.
July 2001	Final Operation and Maintenance Plan Groundwater Extraction Wells and Groundwater Treatment Systems Modifications (Phase 2) completed.
September 3, 2002	Installation of four new groundwater monitoring wells was completed. These wells will be used evaluate the effectiveness of the groundwater treatment system in capturing the plume of creosote contamination.
December 20, 2002	Revised Final Operation and Maintenance Plan Addendum completed.
February 2003	Sediment Remedy Re-evaluation for Bayou Bonfouca Site completed. Results indicate residual creosote contamination is below the clean-up goal identified in the ROD.
August 29, 2005	Hurricane Katrina made landfall near Slidell, Louisiana resulting in severe damage from wind and flooding to southeastern Louisiana. The treatment system was flooded and the groundwater treatment plant control building suffered flood and wind damage.
February 2006	Hurricane Katrina Response site Inspection and Sampling Results Technical Memorandum (TM) was completed. The TM provided an analysis of damages due to the hurricane and an estimate for repair cost.
July 2006	Third Five-Year Review completed.

Table 2
Operations and Maintenance Ground Water SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

	MW1		MW2		MW2a	MW4		MW5	
	12/20/2002	12/1/2004	12/20/2002	12/1/2004	12/20/2002	12/20/2002	12/1/2004	12/20/2002	12/1/2004
Analyte	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	mg/L	µg/L
1,2,4,5-Tetrachlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	**0.01**	ND	**0.01**	ND	ND	ND	ND
2-Nitroaniline	ND	ND	ND	ND	ND	ND	OM	ND	ND
2-Nitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-Nitroaniline	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloroaniline	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Nitroaniline	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Nitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetophenone	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Atrazine (Aatrex)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Chloroethoxy)methane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Chloroethyl)ether	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Chloroisopropyl)ether	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butyl benzyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 2
Operations and Maintenance Ground Water SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

	MW1		MW2		MW2a	MW4		MW5	
	12/20/2002	12/1/2004	12/20/2002	12/1/2004	12/20/2002	12/20/2002	12/1/2004	12/20/2002	12/1/2004
Analyte	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	mg/L	µg/L
Caprolactam	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	ND	ND	**0.007**	ND	**0.008**	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isophorone	ND	ND	ND	ND	ND	ND	ND	ND	ND
m,p-Cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	**1.3**	ND	**1.4**	ND	ND	ND	ND
Nitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Nitrosodi-n-propylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
a. 2002 data obtained from Revised Final Operation and Maintenance Plan Addendum
b. 2004 data obtained from McDonald Construction Dec. 2004 Monthly Operational Report

Table 3
Ground Water Hurricane Assessment SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

	MW1								MW5		
	10/1/2005				12/7/2005				10/1/2005		12/7/2005
Analyte	µg/L		Field Duplicate (µg/L)		µg/L		Field Duplicate (µg/L)		µg/L		µg/L
1,2,4,5-Tetrachlorobenzene	ND		ND		ND		ND		ND		ND
2,4,5-Trichlorophenol	ND		ND		ND		ND		ND		ND
2,4,6-Trichlorophenol	ND		ND		ND		ND		ND		ND
2,4-Dichlorophenol	ND		ND		ND		ND		ND		ND
2,4-Dimethylphenol	ND		ND		ND		ND		ND		ND
2,4-Dinitrophenol	ND		ND		ND		ND		ND		ND
2,4-Dinitrotoluene	ND		ND		ND		ND		ND		ND
2,6-Dinitrotoluene	ND		ND		ND		ND		ND		ND
2-Chloronaphthalene	ND		ND		ND		ND		ND		ND
2-Chlorophenol	ND		ND		ND		ND		ND		ND
2-Methylnaphthalene	**221**	**J**	**278**	**J**	**9.89**	**J**	**9.04**	**J**	ND		ND
2-Nitroaniline	ND		ND		ND		ND		ND		ND
2-Nitrophenol	ND		ND		ND		ND		ND		ND
3,3'-Dichlorobenzidine	ND		ND		ND		ND		ND		ND
3-Nitroaniline	ND		ND		ND		ND		ND		ND
4,6-Dinitro-2-methylphenol	ND		ND		ND		ND		ND		ND
4-Bromophenyl phenyl ether	ND		ND		ND		ND		ND		ND
4-Chloro-3-methylphenol	ND		ND		ND		ND		ND		ND
4-Chloroaniline	ND		ND		ND		ND		ND		ND
4-Chlorophenyl phenyl ether	ND		ND		ND		ND		ND		ND
4-Nitroaniline	ND		ND		ND		ND		ND		ND
4-Nitrophenol	ND		ND		ND		ND		ND		ND
Acenaphthene	**85.4**		**88.4**		**7.52**	**J**	**6.65**	J	ND		ND
Acenaphthylene	ND		ND		ND		ND		ND		ND
Acetophenone	ND		ND		ND		ND		ND		ND
Anthracene	ND		ND		ND		ND		ND		ND
Atrazine (Aatrex)	ND		ND		ND		ND		ND		ND
Benzaldehyde	ND		ND		ND		ND		ND		ND
Benzo(a)anthracene	ND		ND		ND		ND		ND		ND
Benzo(a)pyrene	ND		ND		ND		ND		ND		ND
Benzo(b)fluoranthene	ND		ND		ND		ND		ND		ND
Benzo(g,h,i)perylene	ND		ND		ND		ND		ND		ND
Benzo(k)fluoranthene	ND		ND		ND		ND		ND		ND
Biphenyl	ND		ND		**1.4**	**J**	**1.38**	**J**	ND		ND
Bis(2-Chloroethoxy)methane	ND		ND		ND		ND		ND		ND
Bis(2-Chloroethyl)ether	ND		ND		ND		ND		ND		ND
Bis(2-Chloroisopropyl)ether	ND		ND		ND		ND		ND		ND
Bis(2-Ethylhexyl)phthalate	ND		ND		ND		ND		ND		ND
Butyl benzyl phthalate	ND		ND		ND		ND		ND		ND
Caprolactam	**124**	**J**	**90**	**J**	ND		ND		**61.8**		ND
Carbazole	**62.6**		**63.9**		**0.781**	**J**	**0.714**	**J**	ND		ND
Chrysene	ND		ND		ND		ND		ND		ND
Dibenz(a,h)anthracene	ND		ND		ND		ND		ND		ND
Dibenzofuran	**33.9**		**34.9**		ND		ND		ND		ND
Diethyl phthalate	ND		ND		ND		ND		ND		ND
Dimethyl phthalate	ND		ND		ND		ND		ND		ND
Di-n-butyl phthalate	**0.652**	**J**	**0.428**	**J**	ND		ND		**0.643**	**J**	ND
Di-n-octyl phthalate	ND		ND		ND		ND		ND		ND
Fluoranthene	ND		ND		ND		ND		ND		ND
Fluorene	**19.4**		**19.2**		ND		ND		ND		ND
Hexachlorobenzene	ND		ND		ND		ND		ND		ND
Hexachlorobutadiene	ND		ND		ND		ND		ND		ND
Hexachlorocyclopentadiene	ND		ND		ND		ND		ND		ND
Hexachloroethane	ND		ND		ND		ND		ND		ND
Indeno(1,2,3-cd)pyrene	ND		ND		ND		ND		ND		ND
Isophorone	ND		ND		ND		ND		ND		ND
m,p-Cresol	ND		ND		ND		ND		ND		ND
Naphthalene	**3840**		**5010**		**440**		**425**		ND		ND
Nitrobenzene	ND		ND		ND		ND		ND		ND
n-Nitrosodi-n-propylamine	ND		ND		ND		ND		ND		ND

Table 3
Ground Water Hurricane Assessment SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

	MW1								MW5		
	10/1/2005				12/7/2005				10/1/2005		12/7/2005
Analyte	µg/L		Field Duplicate (µg/L)		µg/L		Field Duplicate (µg/L)		µg/L		µg/L
n-Nitrosodiphenylamine	ND		ND		ND		ND		ND		ND
o-Cresol	ND		ND		ND		ND		ND		ND
Pentachlorophenol	ND		ND		ND		ND		ND		ND
Phenanthrene	ND		ND		ND		ND		ND		ND
Phenol	ND		ND		ND		ND		ND		ND
Pyrene	ND		ND						ND		ND

Notes:
a. 2005 data obtained from Bayou Bonfouca Summary Table 060125

DATA QUALIFIER LEGEND

J detected, estimated concentration

Table 4
Hurricane Assessment Surface Sediment SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

			Onsite Locations						Offsite Locations															
Chemical Group	**Parameter**	**Units**																						
	Total PAH - ROD Standard	mg/Kg	**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**####**		**1,300**	
	Total PAH	mg/Kg	**3.5**	**J**	**3.3985**	**J**	**2.1**	**J**	**1.6467**	**J**	**4.7**	**J**	**1.131**	**J**	**2.4365**	**J**	**3.1**	**J**	**2.2**	**J**	**1.38**	**J**	**2.6**	**J**
	Total CPAH	mg/Kg	**0.4**	**J**	**0.3**	**J**	**0.2**	**J**	**0.1**	**J**	**0.7**	**J**	**0.1**	**J**	**0.3**	**J**	**0.3**	**J**	**0.2**	**J**	**0.1**	**J**	**0.4**	**J**
SVOC-Low Molecular Weight PAHs																								
SVOC	Naphthalene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Acenaphthylene	mg/Kg	**0.162**	**J**	**0.163**	**J**	**0.117**	**J**	**0.0843**	**J**	**0.251**	**J**	**0.0726**	**J**	**0.125**	**J**	**0.155**	**J**	**0.118**	**J**	3.23	U	**0.142**	**J**
SVOC	Acenaphthene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Fluorene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Anthracene	mg/Kg	**0.126**	**J**	**0.123**	**J**	**0.0715**	**J**	2.41	U	**0.174**	**J**	2.3	U	**0.0899**	**J**	**0.133**	**J**	**0.123**	**J**	3.23	U	**0.0896**	**J**
SVOC	Phenanthrene	mg/Kg	**0.174**	**J**	**0.185**	**J**	**0.117**	**J**	**0.0926**	**J**	**0.184**	**J**	2.3	U	**0.122**	**J**	**0.128**	**J**	**0.104**	**J**	3.23	U	**0.0848**	**J**
SVOC	Fluoranthene	mg/Kg	**0.613**	**J**	**0.635**	**J**	**0.308**	**J**	**0.282**	**J**	**0.693**	**J**	**0.177**	**J**	**0.443**	**J**	**0.565**	**J**	**0.379**	**J**	**0.21**	**J**	**0.362**	**J**
SVOC	Pyrene	mg/Kg	**0.553**	**J**	**0.519**	**J**	**0.252**	**J**	**0.226**	**J**	**0.48**	**J**	**0.137**	**J**	**0.334**	**J**	**0.428**	**J**	**0.29**	**J**	**0.16**	**J**	**0.309**	**J**
SVOC-Other Creosote Related																								
SVOC	2-Methylnaphthalene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Carbazole	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	**0.0593**	**J**	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Dibenzofuran	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC-High Molecular Weight PAHs																								
SVOC	Benzo(a)anthracene	mg/Kg	**0.29**	**J**	**0.285**	**J**	**0.155**	**J**	**0.119**	**J**	**0.367**	**J**	**0.0789**	**J**	**0.192**	**J**	**0.226**	**J**	**0.172**	**J**	**0.13**	**J**	**0.199**	**J**
SVOC	Chrysene	mg/Kg	**0.331**	**J**	**0.299**	**J**	**0.151**	**J**	**0.154**	**J**	**0.419**	**J**	**0.0935**	**J**	**0.203**	**J**	**0.266**	**J**	**0.202**	**J**	**0.11**	**J**	**0.235**	**J**
SVOC	Benzo(a)pyrene	mg/Kg	**0.243**	**J**	**0.196**	**J**	**0.141**	**J**	**0.132**	**J**	**0.371**	**J**	**0.0787**	**J**	**0.157**	**J**	**0.227**	**J**	**0.145**	**J**	**0.09**	**J**	**0.202**	**J**
SVOC	Benzo(b)fluoranthene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Benzo(k)fluoranthene	mg/Kg	**0.446**	**J**	**0.425**	**J**	**0.213**	**J**	**0.191**	**J**	**0.547**	**J**	**0.124**	**J**	**0.271**	**J**	**0.354**	**J**	**0.222**	**J**	**0.14**	**J**	**0.292**	**J**
SVOC	Benzo(g,h,i)perylene	mg/Kg	**0.179**	**J**	**0.21**	**J**	**0.16**	**J**	**0.11**	**J**	**0.415**	**J**	**0.0876**	**J**	**0.157**	**J**	**0.202**	**J**	**0.132**	**J**	**0.1**	**J**	**0.2**	**J**
SVOC	Indeno(1,2,3-c,d)pyrene	mg/Kg	**0.167**	**J**	**0.184**	**J**	**0.158**	**J**	2.41	U	**0.42**	**J**	2.3	U	**0.172**	**J**	**0.214**	**J**	**0.142**	**J**	3.23	U	**0.242**	**J**
SVOC	Dibenzo(a,h)anthracene	mg/Kg	**0.059**	**J**	**0.063**	**J**	**0.0672**	**J**	2.41	U	**0.219**	**J**	2.3	U	**0.0553**	**J**	**0.0695**	**J**	2.73	U	3.23	U	**0.113**	**J**
SVOC-Other																								
SVOC	2,4,5-Trichlorophenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2,4,6-Trichlorophenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2,4-Dichlorophenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2,4-Dimethylphenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2,4-Dinitrophenol	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	2,4-Dinitrotoluene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2,6-Dinitrotoluene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2-Chloronaphthalene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2-Chlorophenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	2-Nitroaniline	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	2-Nitrophenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	3,3'-Dichlorobenzidine	mg/Kg	3.76	U	3.83	U	4.8	U	4.81	U	4.44	U	4.59	U	3.96	U	4.38	U	5.46	U	6.45	U	4.66	U
SVOC	3-Nitroaniline	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	4,6-Dinitro-2-methylphenol	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	4-Bromophenyl phenyl ether	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	4-Chloro-3-methylphenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	4-Chloroaniline	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	4-Chlorophenyl phenyl ether	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	4-Nitroaniline	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	4-Nitrophenol	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	Acetophenone	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Atrazine (Aatrex)	mg/Kg	3.76	U	3.83	U	4.8	U	4.81	U	4.44	U	4.59	U	3.96	U	4.38	U	5.46	U	6.45	U	4.66	U
SVOC	Benzaldehyde	mg/Kg	3.76	UJ	3.83	UJ	4.8	UJ	4.81	UJ	4.44	UJ	4.59	UJ	3.96	UJ	4.38	UJ	5.46	UJ	6.45	UJ	4.66	UJ
SVOC	Biphenyl	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Bis(2-Chloroethoxy)methane	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Bis(2-Chloroethyl)ether	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Bis(2-Chloroisopropyl)ether	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Bis(2-Ethylhexyl)phthalate	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Butyl benzyl phthalate	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	0.118	J	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Caprolactam	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Diethyl phthalate	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Dimethyl phthalate	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Di-n-butyl phthalate	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Di-n-octyl phthalate	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	0.128	J	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Hexachlorobenzene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Hexachlorobutadiene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Hexachlorocyclopentadiene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Hexachloroethane	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Isophorone	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	m,p-Cresol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Nitrobenzene	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	n-Nitrosodi-n-propylamine	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	n-Nitrosodiphenylamine	mg/Kg	1.88	UJ	1.92	UJ	2.4	UJ	2.41	UJ	2.22	UJ	2.3	UJ	1.98	UJ	2.19	UJ	2.73	UJ	3.23	UJ	2.33	UJ
SVOC	o-Cresol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U
SVOC	Pentachlorophenol	mg/Kg	9.5	U	9.7	U	12.2	U	12.2	U	11.2	U	11.6	U	10	U	11.1	U	13.8	U	16.3	U	11.8	U
SVOC	Phenol	mg/Kg	1.88	U	1.92	U	2.4	U	2.41	U	2.22	U	2.3	U	1.98	U	2.19	U	2.73	U	3.23	U	2.33	U

Notes:
1. Bold values indicated detected constituents.
2. FD = field duplicate
3. Data obtained from Bayou Bonfouca Summary Table 060125

DATA QUALIFIER LEGEND

= *detected at the reported concentration*
J detected, estimated concentration
UJ not detected above RL, RL is estimated and may be biased low
U not detected above reported concentration / RL

Table 5
Hurricane Assessment Surface Sediment Metal Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

				Onsite Locations						Offsite Locations													
Chemical Group	Parameter	Units	Region 6 MSSL - Industrial Soil Outdoor worker	BAB-SS-004		BAB-SS-005		BAB-SS-012		BAB-SS-006		BAB-SS-007		BAB-SS-008		BAB-SS-009		BAB-SS-010		BAB-SS-011		BAB-SS-013	
SW846 6010	Aluminum	mg/Kg	100,000	7900	=	8740	=	8980	=	8780	=	7570	=	9220	=	7510	=	6830	=	10400	=	8350	=
SW846 6010	Antimony	mg/Kg	450	0.41	J	0.35	J	0.47	J	0.42	J	3.22	R	0.37	J	0.4	J	3.23	R	4.69	R	0.41	J
SW846 6010	Arsenic	mg/Kg	1.8	2.99	=	2.44	=	2.76	=	2.77	=	2.56	=	3.37	=	2.33	=	2.09	J	3.8	=	3.02	=
SW846 6010	Barium	mg/Kg	79,000	98.3	J	84.7	J	133	J	113	J	104	J	83.2	J	108	J	131	J	168	J	109	J
SW846 6010	Beryllium	mg/Kg	100,000	0.52	=	0.57	=	0.56	=	0.58	=	0.51	=	0.62	=	0.51	=	0.4	=	0.53	=	0.56	=
SW846 6010	Cadmium	mg/Kg	560	0.36	=	0.45	=	0.36	=	0.45	=	0.43	=	0.43	=	0.52	=	0.041	J	0.17	J	0.41	=
SW846 6010	Calcium	mg/Kg	NS	7860	=	4030	=	7560	=	3690	=	3270	=	2820	=	1690	=	1460	=	1590	=	4990	=
SW846 6010	Chromium	mg/Kg	500 (a)	12.5	=	13	=	13	=	13.3	=	12.3	=	14.1	=	11.3	=	9.57	=	16.1	=	12.9	=
SW846 6010	Cobalt	mg/Kg	2,100	4.53	J	4.89	J	4.55	J	5.15	J	4.82	J	5.69	J	5.23	J	2.76	J	4.04	J	5.15	J
SW846 6010	Copper	mg/Kg	42,000	38.2	=	40.3	=	39.5	=	40.7	=	38.1	=	44	=	36	=	28.7	=	49.5	=	40.7	=
SW846 6010	Iron	mg/Kg	100,000	12,000	=	12,900	=	13,000	=	13,300	=	12,000	=	14,100	=	11,300	=	9,780	=	15,400	=	13,200	=
SW846 6010	Lead	mg/Kg	800	54.3	=	58	=	55.6	=	59.2	=	54.9	=	63.8	=	52	=	42.6	=	68.4	=	58.7	=
SW846 6010	Magnesium	mg/Kg	NS	5360	=	2320	=	1950	=	2930	=	2330	=	2600	=	2100	=	1470	=	2240	=	2590	=
SW846 6010	Manganese	mg/Kg	35,000	116	=	106	=	118	=	130	=	111	=	126	=	127	=	62.4	=	94.2	=	213	=
SW846 6010	Nickel	mg/Kg	23,000	8.58	=	8.92	=	8.84	=	9.7	=	8.64	=	9.91	=	8.98	=	5.86	=	8.71	=	9.14	=
SW846 6010	Potassium	mg/Kg	NS	780	=	674	=	755	=	921	=	732	=	725	=	739	=	586	=	882	=	1170	=
SW846 6010	Selenium	mg/Kg	5,700	1.84	U	1.87	U	2.35	U	2.35	U	2.14	U	2.26	U	1.94	U	2.15	U	3.12	U	2.27	U
SW846 6010	Silver	mg/Kg	5,700	0.23	J	0.33	J	0.33	J	0.33	J	0.29	J	0.34	J	0.32	J	0.24	J	0.41	J	0.33	J
SW846 6010	Sodium	mg/Kg	NS	669	=	503	=	196	=	602	=	830	=	771	=	1100	=	2490	=	2180	=	468	=
SW846 6010	Thallium	mg/Kg	91 (b)	0.92	U	0.94	U	1.17	U	1.17	U	1.07	U	1.13	U	0.97	U	1.08	U	1.56	U	1.14	U
SW846 6010	Vanadium	mg/Kg	1,100	12.6	=	12.8	=	13.5	=	13.1	=	12.2	=	14.8	=	11.2	=	9.78	=	16.7	=	13.3	=
SW846 6010	Zinc	mg/Kg	100,000	170	=	182	=	167	=	184	=	176	=	189	=	181	=	84.2	=	141	=	169	=
SW846 7471A	Mercury	mg/Kg	340	0.17	=	0.19	=	0.22	=	0.23	=	0.18	=	0.22	=	0.19	=	0.15	=	0.24	=	0.21	=

Notes:

a. Based on 1/6 hexavalent to total chromium ratio.

b. Based on thallium chloride.

c. Shaded cells indicate values above Region 6 MSSL.

d. Data obtained from Bayou Bonfouca Summary Table 060125

DATA QUALIFIER LEGEND

= *detected at the reported concentration*
J detected, estimated concentration
UJ not detected above RL, RL is estimated and may be biased low
U not detected above reported concentration / RL

Table 6
Hurricane Assessment Aquatic Sediment SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

Chemical Group	Parameter	Units							BAB-AS-							
	Total PAH - ROD Standard	mg/Kg	**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**	
	Total PAH	mg/Kg	**3.129**	**J**	**6.994**	**J**	**2.8775**	**J**	**4.0685**	**J**	**2.5475**	**J**	**1.6768**	**J**	**1.4825**	**J**
	Total CPAH	mg/Kg	**0.0**	**J**	**0.4**	**J**	**0.2**	**J**	**0.2**	**J**	**0.2**	**J**	**0.1**	**J**	**0.0**	**J**
SVOC-Low Molecular Weight PAHs																
SVOC	Naphthalene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Acenaphthylene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Acenaphthene	mg/Kg	8.47	U	**0.271**	**J**	5.18	U	**0.263**	**J**	5.53	U	**0.17**	**J**	**0.208**	**J**
SVOC	Fluorene	mg/Kg	8.47	U	**0.285**	**J**	5.18	U	**0.24**	**J**	5.53	U	**0.145**	**J**	**0.202**	**J**
SVOC	Anthracene	mg/Kg	8.47	U	**0.389**	**J**	5.18	U	**0.177**	**J**	5.53	U	**0.0505**	**J**	**0.101**	**J**
SVOC	Phenanthrene	mg/Kg	8.47	U	**0.859**	**J**	5.18	U	**0.494**	**J**	5.53	U	**0.0525**	**J**	**0.368**	**J**
SVOC	Fluoranthene	mg/Kg	**0.6**	**J**	**1.4**	**J**	**0.587**	**J**	**0.73**	**J**	**0.486**	**J**	**0.376**	**J**	0.486	U
SVOC	Pyrene	mg/Kg	**0.41**	**J**	**1.07**	**J**	**0.498**	**J**	**0.74**	**J**	**0.436**	**J**	**0.368**	**J**	**0.29**	**J**
SVOC-Other Creosote Related																
SVOC	2-Methylnaphthalene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Carbazole	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	**0.0135**	**J**
SVOC	Dibenzofuran	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	**0.0957**	**J**	**0.121**	**J**
SVOC-High Molecular Weight PAHs																
SVOC	Benzo(a)anthracene	mg/Kg	**0.305**	**J**	**0.464**	**J**	**0.23**	**J**	**0.271**	**J**	5.53	U	0.421	U	**0.0722**	**J**
SVOC	Chrysene	mg/Kg	**0.252**	**J**	**0.429**	**J**	**0.224**	**J**	**0.241**	**J**	**0.185**	**J**	**0.0851**	**J**	**0.0623**	**J**
SVOC	Benzo(a)pyrene	mg/Kg	8.47	U	**0.323**	**J**	**0.173**	**J**	**0.203**	**J**	**0.188**	**J**	**0.0925**	**J**	0.486	U
SVOC	Benzo(b)fluoranthene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	**0.239**	**J**	**0.172**	**J**	**0.0819**	**J**
SVOC	Benzo(k)fluoranthene	mg/Kg	8.47	U	**0.45**	**J**	**0.268**	**J**	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Benzo(g,h,i)perylene	mg/Kg	8.47	U	**0.341**	**J**	**0.186**	**J**	**0.168**	**J**	**0.164**	**J**	**0.0706**	**J**	**0.0281**	**J**
SVOC	Indeno(1,2,3-c,d)pyrene	mg/Kg	8.47	U	**0.378**	**J**	5.18	U	5.34	U	5.53	U	**0.0506**	**J**	**0.025**	**J**
SVOC	Dibenzo(a,h)anthracene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	**0.0174**	**J**	0.486	U
SVOC-Other																
SVOC	2,4,5-Trichlorophenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2,4,6-Trichlorophenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2,4-Dichlorophenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2,4-Dimethylphenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2,4-Dinitrophenol	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	2,4-Dinitrotoluene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2,6-Dinitrotoluene	mg/Kg	8.47	U	5.61	U	5.18	UJ	5.34	UJ	5.53	UJ	0.421	UJ	0.486	UJ
SVOC	2-Chloronaphthalene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2-Chlorophenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	2-Nitroaniline	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	2-Nitrophenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	3,3'-Dichlorobenzidine	mg/Kg	16.9	U	11.2	U	10.4	U	10.7	U	11.1	U	0.842	U	0.972	U
SVOC	3-Nitroaniline	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	4,6-Dinitro-2-methylphenol	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	4-Bromophenyl phenyl ether	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	4-Chloro-3-methylphenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	4-Chloroaniline	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	4-Chlorophenyl phenyl ether	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	4-Nitroaniline	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	4-Nitrophenol	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	Acetophenone	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U

Table 6
Hurricane Assessment Aquatic Sediment SVOC Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

Chemical Group	Parameter	Units							BAB-AS-							
	Total PAH - ROD Standard	mg/Kg	**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**		**1,300**	
	Total PAH	mg/Kg	**3.129**	**J**	**6.994**	**J**	**2.8775**	**J**	**4.0685**	**J**	**2.5475**	**J**	**1.6768**	**J**	**1.4825**	**J**
	Total CPAH	mg/Kg	**0.0**	**J**	**0.4**	**J**	**0.2**	**J**	**0.2**	**J**	**0.2**	**J**	**0.1**	**J**	**0.0**	**J**
SVOC	Atrazine (Aatrex)	mg/Kg	16.9	U	11.2	U	10.4	U	10.7	U	11.1	U	0.842	U	0.972	U
SVOC	Benzaldehyde	mg/Kg	16.9	UJ	11.2	UJ	10.4	UJ	10.7	UJ	11.1	UJ	0.842	UJ	0.972	UJ
SVOC	Biphenyl	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.139	J
SVOC	Bis(2-Chloroethoxy)methane	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Bis(2-Chloroethyl)ether	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Bis(2-Chloroisopropyl)ether	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Bis(2-Ethylhexyl)phthalate	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Butyl benzyl phthalate	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.051	J
SVOC	Caprolactam	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Diethyl phthalate	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Dimethyl phthalate	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Di-n-butyl phthalate	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Di-n-octyl phthalate	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.0236	J
SVOC	Hexachlorobenzene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Hexachlorobutadiene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Hexachlorocyclopentadiene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Hexachloroethane	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Isophorone	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	m,p-Cresol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Nitrobenzene	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	n-Nitrosodi-n-propylamine	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	n-Nitrosodiphenylamine	mg/Kg	8.47	UJ	5.61	UJ	5.18	UJ	5.34	UJ	5.53	UJ	0.421	UJ	0.486	UJ
SVOC	o-Cresol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U
SVOC	Pentachlorophenol	mg/Kg	42.9	U	28.4	U	26.2	U	27	U	28	U	2.13	U	2.46	U
SVOC	Phenol	mg/Kg	8.47	U	5.61	U	5.18	U	5.34	U	5.53	U	0.421	U	0.486	U

Notes:

1. Bold values indicated detected constituents.

2. FD = field duplicate

3. Data obtained from Bayou Bonfouca Summary Table 060125

DATA QUALIFIER LEGEND

= *detected at the reported concentration*
J detected, estimated concentration
UJ not detected above RL, RL is estimated and may be biased low
U not detected above reported concentration / RL

Table 7
Hurricane Assessment Aquatic Sediment Metal Analytical Results
Bayou Bonfouca Superfund Site
Third Five-Year Review Report

				Bayou Bonfouca - Year 2001						Bayou Bonfouca - Year 2005								Eastern Drainage Channel - Year 2005			
Chemical Group	**Parameter**	**Units**	**Background**	**BBF-3**		**BBF-4**		**BBF-5**		**BAB-AS-015**		**BAB-AS-018**		**BAB-AS-016**		**BAB-AS-017**		**BAB-AS-019**		**BAB-AS-020**	
SW846 6010	Aluminum	mg/Kg	6600 - 9000	17000		12000		12000		**9740**	=	4990	=	8150	=	8830	=	536	=	2130	=
SW846 6010	Antimony	mg/Kg	4 U - 4.3 U	4.4	U	4.3		5	U	12.5	R	8.05	R	8.18	R	7.6	R	3.11	R	3.51	R
SW846 6010	Arsenic	mg/Kg	2.3 - 2.7	3.9		4.6		6.2		**3.48**	J	2.22	J	**2.92**	J	**2.83**	J	0.44	J	0.9	**J**
SW846 6010	Barium	mg/Kg	57 - 58	78		120		100		**202**	J	**111**	J	**115**	J	**91.4**	J	7.78	J	30	**J**
SW846 6010	Beryllium	mg/Kg	0.32 - 0.39	0.51		0.51		0.62		**0.55**	J	0.3	J	**0.42**	J	**0.44**	J	0.033	J	0.16	**J**
SW846 6010	Cadmium	mg/Kg	0.3 - 0.4	0.6		0.5		0.8		0.24	J	0.096	J	0.23	J	0.26	J	0.26	U	0.29	U
SW846 6010	Calcium	mg/Kg	1400	7200	J	15000	J	9000	J	**3360**	=	**5890**	=	**4520**	=	**2460**	=	**5510**	=	**11000**	=
SW846 6010	Chromium	mg/Kg	7.4 - 9.3	18		15		17		**14**	=	9.25	=	**11.3**	=	**11.6**	=	1.45	=	3.49	=
SW846 6010	Cobalt	mg/Kg	4.2 - 4.7	6.4		5.6		8.2		**5.66**	J	3.07	J	4.54	J	**4.79**	J	0.72	J	1.62	**J**
SW846 6010	Copper	mg/Kg	5.7 - 11	15		17		36		**42.1**	=	**19**	=	**28**	=	**29.5**	=	1.23	=	5.61	=
SW846 6010	Iron	mg/Kg	6900 - 8100	16,000		14,000		19,000		**14,800**	=	7960	=	**11,000**	=	**11,500**	=	1290	=	4170	=
SW846 6010	Lead	mg/Kg	24 - 39	37		38		53		**62.4**	=	29.4	=	**46.9**	=	**50.3**	=	6.24	=	15.1	=
SW846 6010	Magnesium	mg/Kg	960 - 1400	3400		3000		2900		**4110**	=	**2160**	=	**2210**	=	**2250**	=	358	=	1060	=
SW846 6010	Manganese	mg/Kg	38 - 57	110		130		160		**124**	=	**124**	=	**101**	=	**86.2**	=	24.6	=	**62.9**	=
SW846 6010	Nickel	mg/Kg	3.8 - 4.9	7.4		7.2		9.1		**9.43**	=	**5.34**	J	**6.72**	=	**6.47**	=	0.77	J	2.48	=
SW846 6010	Potassium	mg/Kg	390 - 500	1300		900		970		**1260**	=	**728**	=	**741**	=	**775**	=	69.7	=	268	=
SW846 6010	Selenium	mg/Kg	0.5 U - 0.7	0.7	J	0.7	J	1.4	J	8.35	U	5.36	U	5.45	U	5.07	U	2.08	U	2.34	U
SW846 6010	Silver	mg/Kg	2 U - 2.2 U	2.2	U	2.1	U	2.5	U	0.39	J	0.12	J	0.17	J	0.13	J	0.52	U	0.58	U
SW846 6010	Sodium	mg/Kg	490 - 890	4400	J	2100	J	2600	J	**8430**	=	**4990**	=	**3220**	=	**3910**	=	435	=	776	=
SW846 6010	Thallium	mg/Kg	0.2 U - 0.3	0.2	U	0.2	U	0.3		4.17	U	2.68	U	2.73	U	2.53	U	1.04	U	1.17	U
SW846 6010	Vanadium	mg/Kg	13 - 15	25		21		23		14.6	=	8.81	=	13.8	=	**15.1**	=	1.35	=	4.42	=
SW846 6010	Zinc	mg/Kg	48 - 73	130	J	140	J	220	J	**183**	=	**95.3**	=	**192**	=	**184**	=	21.1	=	37.4	=
SW846 7471A	Mercury	mg/Kg	0.04 - 0.05	0.05		0.05		0.07		**0.3**	=	**0.14**	=	**0.18**	=	**0.16**	=	0.038	=	**0.056**	=

Notes:

a. Background concentration range from December 2001 sampling performed at upstream locations BBF-1 and BBF-2.

b. Bold values indicate concentrations above background range.

c. Shaded cells indicate concentrations higher than observed in year 2001 counterpart sample.

d. Data obtained from Bayou Bonfouca Summary Table 060125

DATA QUALIFIER LEGEND

= detected at the reported concentration
J detected, estimated concentration
UJ not detected above RL, RL is estimated and may be biased low
U not detected above reported concentration / RL

Table 8
Recommendations and Followup Actions
Bayou Bonfouca Superfund Site
St. Tammany Parish, Louisiana

	Recommendation/Followup Action	Responsible Agency	Date Due
1	Recommended repairs to system components damaged by Hurricane Katrina (CH2M HILL, 2006) should be completed as soon as possible in order to restore the treatment system to its required level of operation. At the time of the site inspection, recovery system pumps were operational; however, the majority of repairs requiring replacement parts are pending. Some of the well vaults that were submerged appear to have increased rates of corrosion.	LDEQ	As funds become available
2	Identification labels on some of the ground water treatment system components are either illegible or missing. Illegible or missing labels should be replaced.	LDEQ	July 2007
3	The hurricane damaged sections property line fence should be repaired to restrict unauthorized entry to the site.	LDEQ	As funds become available
4	A small tree (2-3 feet tall) was growing near a vent at the top of the landfill. If allowed to continue growing, the root system could damage the landfill cap. This tree should be removed before damage to the cap occurs.	LDEQ	Already completed
5	The extraction rates for the three extraction arrays are controlled to maintain ground water elevation at or of above -4 feet MSL. This control level reduces the extraction rates below the capacity of the treatment system. An investigation should be conducted to determine if more aggressive pumping rates can be used without an increased risk of causing damaging subsidence. Increased pumping rates may result in increased NAPL recovery, potentially shortening the duration of operation of the GWTS.	LDEQ	July 2008
6	Analytical data from ground water monitor well sampling included in the monthly operational reports should be compiled to facilitate ongoing review of the data. Quarterly ground water monitoring reports should be prepared and submitted to LDEQ and EPA as specified by the Revised, Final O&M Plan.	LDEQ	July 2007

Table 8
Recommendations and Followup Actions
Bayou Bonfouca Superfund Site
St. Tammany Parish, Louisiana

	Recommendation/Followup Action	Responsible Agency	Date Due
7	Currently there is no clear exit strategy for the site. The Record of Decision (ROD) recognizes the Clean Water Act levels of 3.1 ng/L for PAHs in drinking water but states, "The technical feasibility of cleaning the ground water to this level is unknown." There is no clear point at which the pump and treat system can be shut down. Without a predetermined exit point, operation may continue long beyond the point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.	EPA/LDEQ	July 2008
8	Although not specifically required by the final ROD for the site, institutional controls should be put into place ensure the site remains protective in the long-term. EPA believes that this can be accomplished through a deed notice and is currently working with LDEQ and the City of Slidell to implement such a notice.	LDEQ	July 2007

CH2MHILL

0 125 250 500 Feet

Legend

- Legal Description Boundary*
- Inferred Boundary*
- Section, Township and Range

Figure 1
Site Location Map based on City of Slidell Legal Descriptioin

City of Slidell
St. Tammany Parish, LA

*Note: Boundary based on city document "Act of Donation By: Braselman Corporation" dated May 28, 1996

\\chuckwagon\GIS\NWOFiles\Environmental\City of Slidell\Figure1.mxd S Daigle 4/21/06

IMAGE --
X-REF ---
OFFICE HOUSTON, TX
DRAWING NUMBER 781612-D35

ST. TAMMANY STREET
WEST HALL AVE
CHANALE DRIVE
12" DIAMETER X 10' LONG CORRUGATED STEEL PIPE
PERKINS PROPERTY
HOUSE
WOOD FENCE
THOMAS PROPERTY
SUBSIDENCE MONITORING WELL
ARRAY 3
NEW CRUSHED LIMESTONE ACCESS ROAD
FOR BAYOU CROSSING PIPELINE, SEE SHEETS C-8, C-9, AND C-10
OSM-5 WET AREA
BAYOU BONFOUCA
SHEET PILING
ARRAY 1A
CONCRETE CONTAINMENT WALL FOR GROUNDWATER TREATMENT PLANT
GROUNDWATER TREATMENT PLANT CONTROL BUILDING
CONCRETE PAD
NEW ONSITE EXTRACTION WELL, TYP, SEE M-2
ARRAY 2
EAST DRAINAGE CHANNEL
BAYOU LANE
CHAIN LINK FENCE
SM1 SM2 SM3 SM4 SM5 SM6 SM7 SM8 SM9

LEGEND:
- NEW EXTRACTION WELLS
- NEW SUBSIDENCE MONITORING WELLS
- EXISTING SUBSIDENCE MONITORING WELL
- EXISTING ARRAY 2 EXTRACTION WELLS
- SUBSIDENCE MONUMENTS
- TRENCH/MANIFOLD FOR FLUIDS AND AIR PIPING AND COMMUNICATIONS/POWER CABLE/CONDUIT
- EXISTING ABOVE GROUND ARRAY 2 EXTRACTION WELL FLUID CONVEYANCE PIPING
- PIPELINE
- SM9 SM8 PLOWED TRENCH FOR DIRECT BURIED/CABLE FOR ONSITE SUBSIDENCE MONITOR WELLS
- WET AREA
- SHEET PILE
- FENCE-LINE

REFERENCE:
FROM "GROUNDWATER TREATMENT SYSTEMS MODIFICATIONS PRELIMINARY DESIGN SUBMITTAL", CH2M HILL, DRAWING NUMBER 14647M2, DATED MARCH 1989.

FIgure 2
Overall Site Plan
Bayou Bonfouca Superfund Site
Third Five-Year Review

SCALE 0 100 200 300 FEET

Revisions			
Symbol	Descriptions	Date	Approved

IT CORPORATION

BAYOU BONFOUCA
U.S. ARMY CORPS OF ENGINEERS TULSA DISTRICT NEW ORLEANS DISTRICT
U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 6

Designed by: CH2M HILL
Drawn by: J. RDZ
Checked by: G. Jones
Approved by: A. Gradet

PLAN VIEW OVERALL SITE PLAN
OPERATION AND MAINTENANCE PLAN
GWTS MODIFICATIONS (PHASE 2)
BAYOU BONFOUCA SUPERFUND SITE

Scale: AS SHOWN
Date: 11/22/00
Drawing Number 781612D35
Sheet reference number: AB-G4
Figure 1
Contract No. DACA56-94-D-0020

VERIFY SCALE 0 1"
PLOT DATE: 7/2/01
PLOT SCALE: 1= 100

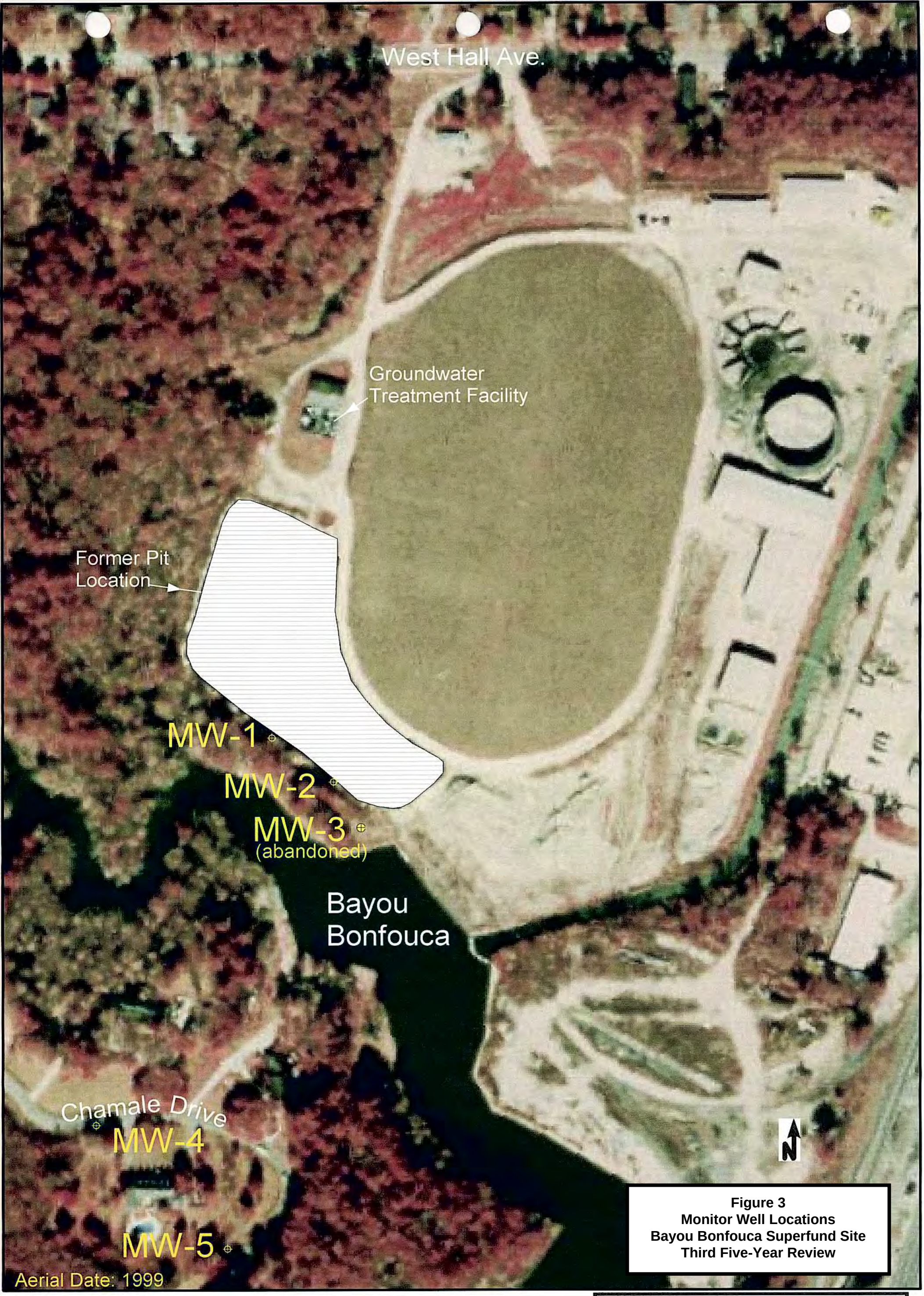

Figure 3
Monitor Well Locations
Bayou Bonfouca Superfund Site
Third Five-Year Review

- ⊕ Monitoring Well Locations (yellow)
- ⊕ Abandoned Monitoring Well Locations (yellow)
- ☐ Former Pit Location

200 0 200 Feet

Bayou Bonfouca Slidell, Louisisana USACE New Orleans District					**Figure 2**
Bayou Bonfouca Site Showing Well Monitoring Locations Based on DGPS Survey and Former Pit Location.					
Drawing File: 2615ACE002	DRAWN BY: Lesley Prochaska	DATE: 10/01/2002	CHECKED BY: SC	DATE: 10/01/2002	
	Project Number: DACW29-00-D-003				

Attachment 1
Documents Reviewed

Attachment 1
List of Documents Reviewed

CH2M HILL, 1997. *Performance Evaluation Report for Shallow Artesian Aquifer Remediation, Bayou Bonfouca Superfund Site, Slidell, Louisiana*. Final Report. September 1997.

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Attachment 2
Interview Record Forms

Five-Year Review Interview Record Bayou Bonfouca Superfund Site Slidell, Louisiana	**Interviewee: Rich Johnson** **Affiliation:** **LDEQ** **Telephone:** 225-654-1164 **email:** Rich.Johnson@LA.gov

Site Name	EPA ID Number	Date of Interview	Interview Method
Bayou Bonfouca Superfund Site	EPA ID# LAD 980745632	Feb 7, 2006	By email

Interview Contacts

Name	Organization	Phone	Email	Address
Mike McAteer	EPA Region 6	214-665-7157	mailto:mcateer.mike@epa.gov	1445 Ross Ave Dallas, Texas 75202
Margaret O=Hare	CH2M HILL, EPA contractor	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Bill Thomas	CH2M HILL, EPA contractor	972-980-2170	wthomas2@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

Purpose of the Five-Year Review

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, to confirm that human health and the environment continue to be protected by the remedial actions being performed at the site. This interview is being conducted as a part of the third five-year review for the Bayou Bonfouca site. The period covered by this five-year review is from completion of the second five-year review in 2001 to current.

Interview Questions

1. What is your overall impression of the work conducted at the site since the second Five-Year Review period (mid-2001)?

Response: Up to Hurricane Katrina everything was ok. But following the storm we have sustained damage to the site and need repairs.

2. From your perspective, what effects have continued remedial operations at the site had on the surrounding community? Are you aware of any ongoing community concerns regarding the site or its operation and maintenance, particularly in reference to the hurricane impacts, or other issues?

Response: Overall the community seems to be happy with it. Concerns of any damage or possible releases caused by the hurricane, were addressed by EPA and LDEQ sampling and site inspections.

3. Have there been routine communications or activities conducted by your office regarding the site? (e.g. site visits, inspections, reporting activities, etc.) If so, please describe purpose and results.

Response: With the advent of the hurricane I've been to the site at least once a month. Purposes of the site visits were to talk with Rick Tibbs regarding site damage. Also last week the state delivered replacement tools etc. that were damaged from Katrina.

4. Are you aware of any unanticipated events, incidents, or activities that have occurred at the site, such as dumping, vandalism, fire, or anything that required emergency response from local authorities? If so, please give details.

Response: The Hurricane was unanticipated, but did not require response from locals.

5. Have there been any complaints, violations or other incidents related to the site that required a response by your office? If so, please summarize the events and results.

Response: None that I can think of.

6. Are you aware of any problems or difficulties encountered since the second five year review period (mid-2001) which impacted the operation of the facility or a change in O&M procedures, including impacts from the 2005 hurricanes? Please describe the changes and impacts.

Response: Hurricane Katrina has caused damage to the system on site. We are waiting for a damage assessment report from the EPA and funds to repair these damages.

7. Have there been any changes in state or local environmental standards since the second five-year review period (mid-2001) that may call into question the protectiveness or effectiveness of the remedial action?

Response: No.

8. Do you know of any opportunities to optimize the operation, maintenance, or sampling efforts at the site since the second five year review period (mid-2001)? Have such changes been adopted?

Response: No.

9. Do you feel well informed about the site's activities and progress?

Response: Yes.

10. Do you have any comments, suggestions, or recommendations regarding the site?

Response: We are waiting for funding from the EPA to repair damages caused by Hurricane Katrina.

Five-Year Review Interview Record Bayou Bonfouca Superfund Site Slidell, Louisiana	**Interviewee:** **Ms Lucy Tierney** **Affiliation:** none **Telephone:** 985-649-7870 **email:** lucy tierney @ lycos.com

Site Name	EPA ID Number	Date of Interview	Interview Method
Bayou Bonfouca Superfund Site	EPA ID# LAD 980745632	2/21/06	US mail

Interview Contacts

Name	Organization	Phone	Email	Address
Mike McAteer	EPA Region 6	214-665-7157	mailto:mcateer.mike@epa.gov	1445 Ross Ave Dallas, Texas 75202
Margaret O'Hare	CH2M HILL, EPA contractor	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Bill Thomas	CH2M HILL, EPA contractor	972-980-2170	wthomas2@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

Purpose of the Five-Year Review

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, to confirm that human health and the environment continue to be protected by the remedial actions performed. This interview is being conducted as a part of the third five-year review for the Bayou Bonfouca site. The period covered by this five-year review is from completion of the second five-year review in 2001 to current.

Interview Questions

1. Please describe your relationship to the Bayou Bonfouca Superfund Site.

Response: I am a site neighbor and former member of Citizens Working Against Major Pollution (S.W.A.M.P) which managed the grants for citizens around the incinerator.

2. What is your overall impression of the work conducted at the site since the second five-year review period (mid-2001)?

Response: I assume E.P.A. is continuing to remove the oily layer floating on top of the city water supply. Surely they check to see grass is mown on the hill of ash. Surely they send reports to the site repository, the library on Robert Blvd.

3. From your perspective, what effects have continued remedial operations at the site had on the surrounding community?

Response: Assuming the oily coating is continuously removed from the underground water aquifer, I presume our drinking water is cleaner than it would be otherwise.

3. Are you aware of any ongoing community concerns regarding the site or its operation and maintenance, particularly in reference to the hurricane impacts, or other issues?

Response:

4. Do you feel well-informed about the site's activities and progress?

Response: I feel somewhat informed by the rare newspaper article

5. Do you have any comments, suggestions, or recommendations regarding the site?

Response: I think, considering the great effort and expense to clean the sites, a monument or two should be erected so that citizens are forever reminded of the necessity of doing our work in an environment-friendly fashion. I might word it thus:

Here is where citizens allowed corporations to dump creosote laden with insecticides into what was a pristine bayou inhabited by ~~Native~~ Americans. It was turned into a horrible black ~~lake~~ body of water with dying shrubs & trees around. People could not swim here without having their skin burnt from the chemicals.

Your tax dollars were spent by E.P.A. in order to attempt to remedy that foul situation. Tax dollars came from other Americans, ~~and some~~ And some of the perpetrators of that crime also paid, although they were not put in jail.

E.P.A. did its best, although it has learned from experience that incineration is not the best remedy. Truly there is no adequate remedy against pollution that ~~has~~ was done for ~~So~~ many years.

This monument also ~~tha~~ is in memory of those who breathed incinerator smoke.

Your government is trying to protect you against criminals who have no regard for the health of citizens and the environment. Please note that some fish now reside in the bayou. Please admire the few trees and plants that survived both ordeals.

Lucy W. Tierney
2/21/06

* (monument at barge-cleaning site would mention toxic chemicals there)

Attachment 3
Site Inspection Checklist

Bayou Bonfouca Superfund Site
Slidell, St. Tammany Parish, Louisiana
Five-Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program. N/A means "not applicable".

I. SITE INFORMATION

Site Name: Bayou Bonfouca Superfund Site	**EPA ID:** LAD980745632
City/State: Slidell, Louisiana	**Date of Inspection:** 02/09/2006
Agency Completing 5 Year Review: EPA	**Weather/temperature:** 55° F, Sunny, light north wind

Remedy Includes: (Check all that apply)
- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other:

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. O&M site manager:
   Name: Rick Tibbs
   Title: Plant Superintendent - McDonald Construction
   Date:
   Interviewed: ☒ at site ☐ at office ☐ by phone Phone Number:
   Problems, suggestions: ☒ Additional report attached (if additional space required).

2. Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency: Louisiana Department of Environmental Quality
   Contact:
   Name: Rich Johnson
   Title:
   Date:
   Phone Number: 225-654-1164
   Problems, suggestions: ☒ Additional report attached (if additional space required).

   Agency: City of Slidell

Contact:
Name: Martin Bruno
Title: City Planner
Date:
Phone Number:
Problems, suggestions: ☒ Additional report attached (if additional space required).

Agency:
Contact:
Name:
Title:
Date:
Phone Number:
Problems, suggestions: ☐ Additional report attached (if additional space required).

Agency:
Contact:
Name:
Title:
Date:
Phone Number:
Problems, suggestions: ☐ Additional report attached (if additional space required).

3. Other interviews (optional) ☐ N/A ☒ Additional report attached (if additional space required).

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents
   - ☒ O&M Manuals — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-Built Drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance Logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks: Site operation's staff create daily operations reports that are sent to the Project Manager.

2. Health and Safety Plan Documents
   - ☒ Site-Specific Health and Safety Plan — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Contingency plan/emergency response plan — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks:

3. O&M and OSHA Training Records — ☒ Readily available — ☒ Up to date — ☐ N/A
   Remarks:

4. Permits and Service Agreements
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☒ Effluent discharge — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: Discharge permit is not required. Discharge limits set by EPA, and they are not part of a formal permit

5. Gas Generation Records Remarks:	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records Remarks: Settlement survey for entire site is conducted monthly	☒ Readily available	☒ Up to date	☐ N/A
7. Groundwater Monitoring Records Remarks:	☐ Readily available	☐ Up to date	☐ N/A
8. Leachate Extraction Records Remarks:	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records Remarks:	☒ Readily available	☒ Up to date	☐ N/A
10. Daily Access/Security Logs Remarks:	☐ Readily available	☐ Up to date	☐ N/A

IV. O&M Costs ☒ Applicable ☐ N/A

1. O&M Organization
   - ☐ State in-house
   - ☒ Contractor for State
   - ☐ PRP in-house
   - ☐ Contractor for PRP
   - ☐ Other: Contractor

2. O&M Cost Records

Cost was estimated by McDonald Construction approximately $23,000 per month depending on amount of maintenance. Onsite personnel and the LDEQ representative present at the site inspection concurred with that amount.

☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
Original O&M cost estimate: ☐ Breakdown attached

Total annual cost by year for review period if available

From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period ☐ N/A

Describe costs and reasons: The overall condition of the groundwater treatment system appears to be fair (it is operating). Flood waters from Hurricane Katrina inundated the site, causing damage to various system components and to the control building. A number of action items were identified in the Hurricane Katrina Response Bayou Bonfouca Superfund Site, Louisiana-Site Inspection and Sampling Results Technical Memorandum (February 2006) to keep the plant in good working order and address long-term concerns associated with the condition of the equipment after the flood. Estimated cost is $232,285 with -30/+50 per cent range of $162,600 to $348,400.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

1. Fencing

1. Fencing damaged ☒ Location shown on site map ☐ Gates secured ☐ N/A

Remarks: Property line fencing (~ 1200 ft) north and west of the groundwater treatment plant was damaged by fallen trees from Hurricane Katrina

2. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: One sign was posted on the entry gate to the site. One additional sign was posted on the fence facing the bayou.

3. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented:	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced:	☐ Yes	☒ No	☐ N/A

Type of monitoring (e.g, self-reporting, drive by):
Frequency:
Responsible party/agency:
Contact:

Name:
Title:
Date:
Phone Number:
Reporting is up-to-date: ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency: ☐ Yes ☐ No ☒ N/A
Specific requirements in deed or decision documents have been met: ☐ Yes ☐ No ☒ N/A
Violations have been reported: ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Additional report attached (if additional space required).

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks: ICs have not yet been put into place. EPA is working with LDEQ to establish a notice restricting future use of the property.

4. General

1. Vandalism/trespassing ☐ Location shown on site map ☐ No vandalism evident
Remarks: In 2005 there was an attempt made to vandalize the site truck parked on the east side of the treatment building. The vandals left the site through the wooded area west of the treatment building when site personnel arrived.

2. Land use changes onsite ☒ N/A
Remarks:

3. Land use changes offsite ☒ N/A
Remarks:

VI. GENERAL SITE CONDITIONS

1. Roads ☒ Applicable ☐ N/A

1. Roads damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks:

2. Other Site Conditions

Remarks: Aside from damage associated with Hurricanes Katrina/Rita, site appears well-maintained.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

1. Landfill Surface

1. Settlement (Low spots) ☐ Location shown on site map ☒ Settlement not evident
Areal extent: Depth:
Remarks:

2. Cracks ☐ Location shown on site map ☒ Cracking not evident
Lengths: Widths: Depths:
Remarks:

3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ Erosion not evident
4.	Holes Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ Holes not evident
5.	Vegetative Cover ☒ Cover properly established ☒ No signs of stress ☒ Grass ☐ Trees/Shrubs Remarks:		
6.	Alternative Cover (armored rock, concrete, etc.) Remarks:		☒ N/A
7.	Bulges Areal extent: Remarks:	☐ Location shown on site map Height:	☒ Bulges not evident
8.	Wet Areas/Water Damage ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks:	☒ Wet areas/water damage not evident ☐ Location shown on site map Areal extent: ☐ Location shown on site map Areal extent: ☐ Location shown on site map Areal extent: ☐ Location shown on site map Areal extent:	
9.	Slope Instability Areal extent: Remarks:	☐ Slides ☐ Location shown on site map	☒ No evidence of slope instability
2.	Benches (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	☐ Applicable ☒ N/A	
1.	Flows Bypass Bench Remarks:	☐ Location shown on site map	☐ N/A or okay
2.	Bench Breached Remarks:	☐ Location shown on site map	☐ N/A or okay
3.	Bench Overtopped Remarks:	☐ Location shown on site map	☐ N/A or okay
3.	Letdown Channels	☐ Applicable ☒ N/A	

1.	Settlement Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ No evidence of settlement
2.	Material Degradation Material type: Remarks:	☐ Location shown on site map Areal extent:	☐ No evidence of degradation
3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ No evidence of erosion
4.	Undercutting Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ No evidence of undercutting
5.	Obstructions Type: Areal extent: Remarks:	☐ Location shown on site map Height:	☐ N/A
6.	Excessive Vegetative Growth ☐ Evidence of excessive growth ☐ Location shown on site map Remarks:	☐ No evidence of excessive growth ☐ Vegetation in channels but does not obstruct flow Areal extent:	
4.	Cover Penetrations	☒ Applicable ☐ N/A	
1.	Gas Vents ☐ Active ☒ Passive ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Routinely sampled ☐ Functioning ☐ Needs O& M	☐ N/A ☐ Good condition
2.	Gas Monitoring Probes ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks: A small tree (~ 3ft high) has started growing at one of the vents. This tree should be removed.	☐ Functioning ☒ Needs O&M	☒ N/A ☐ Good condition
3.	Monitoring Wells (within surface area of landfill) ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Functioning ☐ Needs O&M	☒ N/A ☐ Good condition

4.	Leachate Extraction Wells ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:		☐ Functioning ☐ Needs O&M	☒ N/A ☐ Good condition
5.	Settlement Monuments Remarks:	☒ Located	☒ Routinely surveyed	☐ N/A
5.	Gas Collection and Treatment	☐ Applicable	☒ N/A	
1.	Gas Treatment Facilities ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
2.	Gas Collection Wells, Manifolds and Piping ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
6.	Cover Drainage Layer	☒ Applicable	☐ N/A	
1.	Outlet Pipes Inspected Remarks:	☒ Functioning		☐ N/A
2.	Outlet Rock Inspected Remarks:	☐ Functioning		☒ N/A
7.	Detention/Sedimentation Ponds	☐ Applicable	☒ N/A	
1.	Siltation Areal extent: Remarks:	☐ Siltation evident Depth:		☐ N/A
2.	Erosion Areal extent: Remarks:	☐ Erosion evident Depth:		☐ N/A
3.	Outlet Works Remarks:	☐ Functioning		☐ N/A

4.	Dam Remarks:	☐ Functioning	☐ N/A
8.	Retaining Walls	☐ Applicable	☒ N/A
1.	Deformations Horizontal displacement: Remarks:	☐ Location shown on site map Vertical displacement:	☐ Deformation not evident Rotational displacement:
2.	Degradation Remarks:	☐ Location shown on site map	☐ Degradation not evident
1.	Perimeter Ditches/Off-site discharge	☒ Applicable	☐ N/A
1.	Siltation Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ Siltation not evident
2.	Vegetative Growth Areal extent: Remarks:	☐ Location shown on site map Type:	☒ Vegetation does not impede flow
3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ Erosion not evident
4.	Discharge Structure ☒ Functioning Remarks:	☐ Location shown on site map ☒ Good Condition	☐ N/A
	VIII. VERTICAL BARRIER WALLS	☐ Applicable	☒ N/A
1.	Settlement Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Settlement not evident
2.	Performance Monitoring ☐ Performance not monitored ☐ Performance monitored ☐ Evidence of breaching Remarks:	Frequency: Head differential:	☐ N/A
	IX. GROUNDWATER/SURFACE WATER REMEDIES	☒ Applicable	☐ N/A
1.	Groundwater Extraction Wells, Pumps, and Pipelines	☒ Applicable	☐ N/A
1.	Pumps, Wellhead Plumbing, and Electrical	☐ N/A	

☒ All required wells located ☐ Good condition ☒ Needs O& M
Remarks: O&M needed to repair damage due to Hurricane Katrina. See Hurricane Katrina Response Technical Memorandum, February 2006

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A
☒ System located ☐ Good condition ☒ Needs O& M
Remarks: O&M needed to repair damage due to Hurricane Katrina. See Hurricane Katrina Response Technical Memorandum, February 2006

3. Spare Parts and Equipment ☐ N/A
☐ Readily available ☐ Good condition
☐ Requires Upgrade ☒ Needs to be provided
Remarks: treatment system is functioning Spare parts need to be procured in order to restore system to 100% working condition. See Hurricane Katrina Response Technical Memorandum, February 2006

2. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Collection Structures, Pumps, and Electrical ☐ N/A
☐ Good condition ☐ Needs O& M
Remarks:

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A
☐ Good condition ☐ Needs O& M
Remarks: Not observed.

3. Spare Parts and Equipment ☐ N/A
☐ Readily available ☐ Good condition
☐ Requires Upgrade ☐ Needs to be provided
Remarks:

3. Treatment System ☒ Applicable ☐ N/A

1. Treatment Train (Check components that apply)
☐ Metals removal ☒ Oil/water separation ☐ Bioremediation
☐ Air stripping ☒ Carbon adsorbers ☒ Filters (list type): Sand, Oleophilic
☒ Additive (list type, e.g., chelation agent, flocculent)
☐ Others (list):
☐ Good condition ☒ Needs O&M
☒ Sampling ports properly marked and functional
☒ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☒ Quantity of groundwater treated annually (list volume): typically 4.2 to 4.8 million gal per year
☐ Quantity of surface water treated annually (list volume):
Remarks: Treatment system component labels have faded and in some cases are illegible. Treated groundwater quantity has dropped off to 250,000 to 350,000 gal per month since the hurricane Katrina and Rita. See Hurricane Katrina Response Technical Memorandum, February 2006

2. Electrical Enclosures and Panels (properly rated and functional) ☐ N/A

☐ Good condition ☒ Needs O& M
Remarks: See Hurricane Katrina Response Technical Memorandum, February 2006

3. Tanks, Vaults, Storage Vessels ☐ N/A
☐ Good condition ☐ Proper secondary containment ☒ Needs O&M
Remarks: See Hurricane Katrina Response Technical Memorandum, February 2006

4. Discharge Structure and Appurtenances ☐ N/A
☒ Good condition ☐ Needs O& M
Remarks:

5. Treatment Building(s) ☐ N/A
☐ Good condition (esp. roof and doorways) ☒ Needs Repair
☐ Chemicals and equipment properly stored
Remarks: Hurricane Katrina caused some minor damage to the building roof. There was flood damage to the building interior that requires replacement of sheetrock. See Hurricane Katrina Response Technical Memorandum, February 2006

6. Monitoring Wells (pump and treatment remedy) ☐ N/A
☐ All required wells located ☐ Properly secured/locked ☒ Functioning ☐ Routinely sampled
☐ Good condition ☒ Needs O&M
Remarks: Exposure to hurricane flood waters has caused corrosion in some vaults. See Hurricane Katrina Response Technical Memorandum, February 2006. Some vault locks are missing; these need to be replaced

4. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. Monitoring Wells (natural attenuation remedy) ☐ N/A
☐ All required wells located ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Needs O&M
Remarks:

5. Long Term Monitoring ☐ Applicable ☒ N/A

2. Monitoring Wells ☐ N/A
☐ All required wells located ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Needs O&M
Remarks:

X. OTHER REMEDIES ☐ Applicable ☐ N/A

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

1. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.)

The remedy is designed to recover free-phase creosote from the shallow artesian aquifer and to prevent migration of dissolved-phase and free-phase contamination into the Bayou Bonfouca. The groundwater treatment system appears to be effective at removing creosote from the shallow artesian aquifer. New sentinel groundwater monitoring wells were installed during the third five-year review period. Sampling results indicate that contamination has not reached these sentinel wells. The results of the Sediment Remedy Re-Evaluation investigation performed during this five-year review period indicate that the residual sediment creosote contamination is below the clean-up goal identified in the ROD. The data supports the finding that Bayou Bonfouca is in a state of biological recovery within the area historically affected by the former wood treating activities. Damage associated with Hurricane Katrina must be that specifically affects the operation of the ground water treatment plant and security of the site (ie. perimeter fencing) must be repaired to ensure the plant continues to operate as designed. Institutional controls must be put into place to support long-term protectiveness.
2. Adequacy of O&M
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. LTRA activities at the site appear toe be well implemented. The O&M procedures appear adequate to maintain the system and to keep the completed portions of the remedy protective
3. Early Indicators of Potential Remedy Failure
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None
4. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The use of more aggressive pumping rates should be investigated. If higher pumping rates could be used without increased risk of subsidence, higher pumping rates could increase recovery of NAPL and potentially reduce the duration of the current system.

Bayou Bonfouca Superfund Site Inspection – Inspection Team Roster

Name	Organization	Title
Mike McAteer	USEPA	Remedial Project Manager
Rich Johnson	Louisiana DEQ	
Margaret O'Hare	CH2M HILL	5-Year Review Project Manager
Bill Thomas	CH2M HILL	Associate Engineer

Attachment 4
Site Inspection Photographs

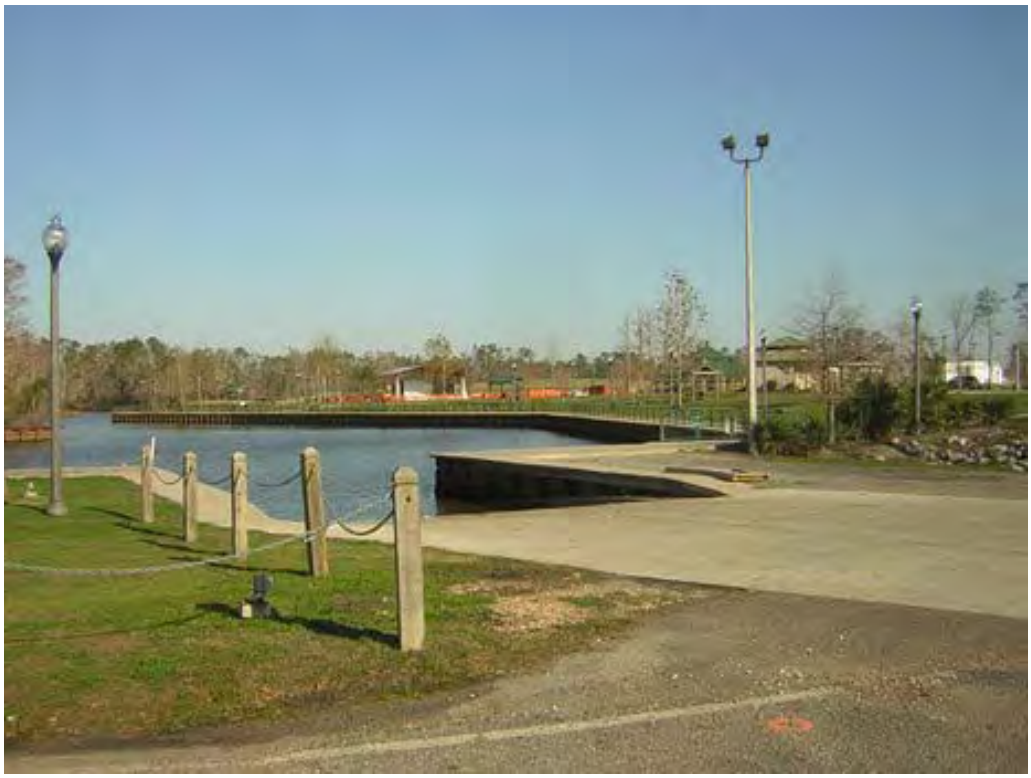

Photo 1: City park & boat ramp south of Bayou Bonfouca. The site landfill cover is visible in the background (past the structure in the photo center). Taken 2/16/2006.	Filename: DSCN2439.jpg

Photo 2: Bayou Bonfouca ground water treatment plant. Taken 2/16/2006	Filename: DSCN2440.jpg

Photo 3: Bayou Bonfouca ground water treatment plant. Taken 2/16/2006.	Filename: DSCN2441.jpg

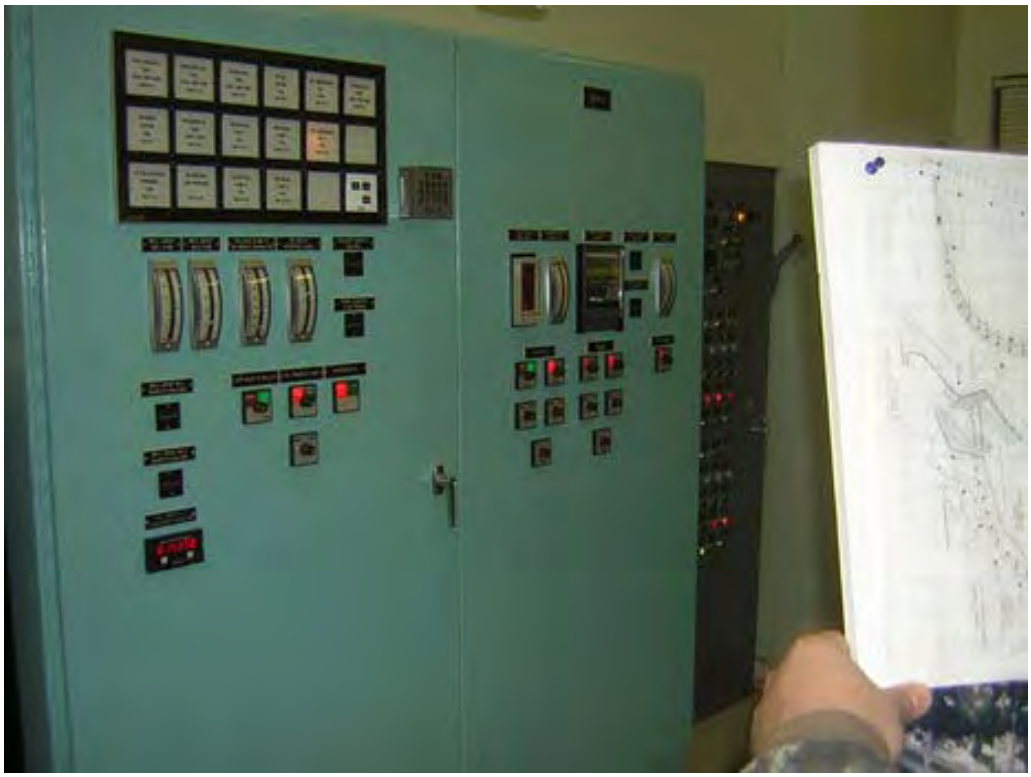

Photo 4: Control panel -- Inside ground water treatment plant control building. Taken 2/16/2006.	Filename: DSCN2442.jpg

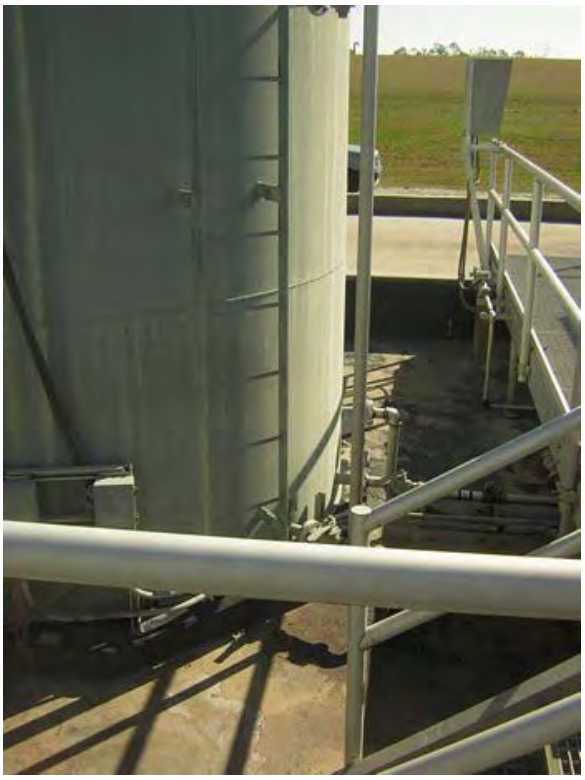

Photo 5: Bayou Bonfouca ground water treatment plant. Taken 2/16/2006.	Filename: DSCN2444.jpg

Photo 6: Pumps within ground water treatment system, submerged and damaged during Hurricane Katrina. Taken 2/16/2006.	Filename: DSCN445.jpg

Photo 7: Bottom left, pumps within ground water treatment system, submerged and damaged during Hurricane Katrina. Taken 2/16/2006.	Filename: DSCN2446.jpg

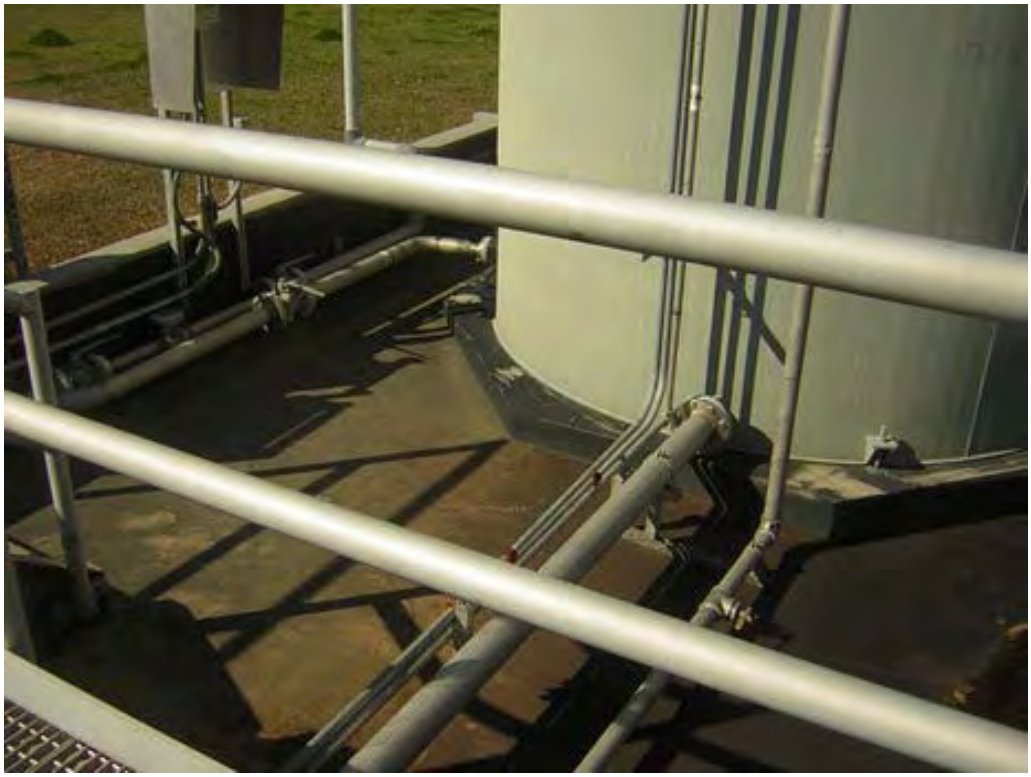

Photo 8: Ground water treatment system piping. Taken 2/16/2006	Filename: DSCN2447.jpg

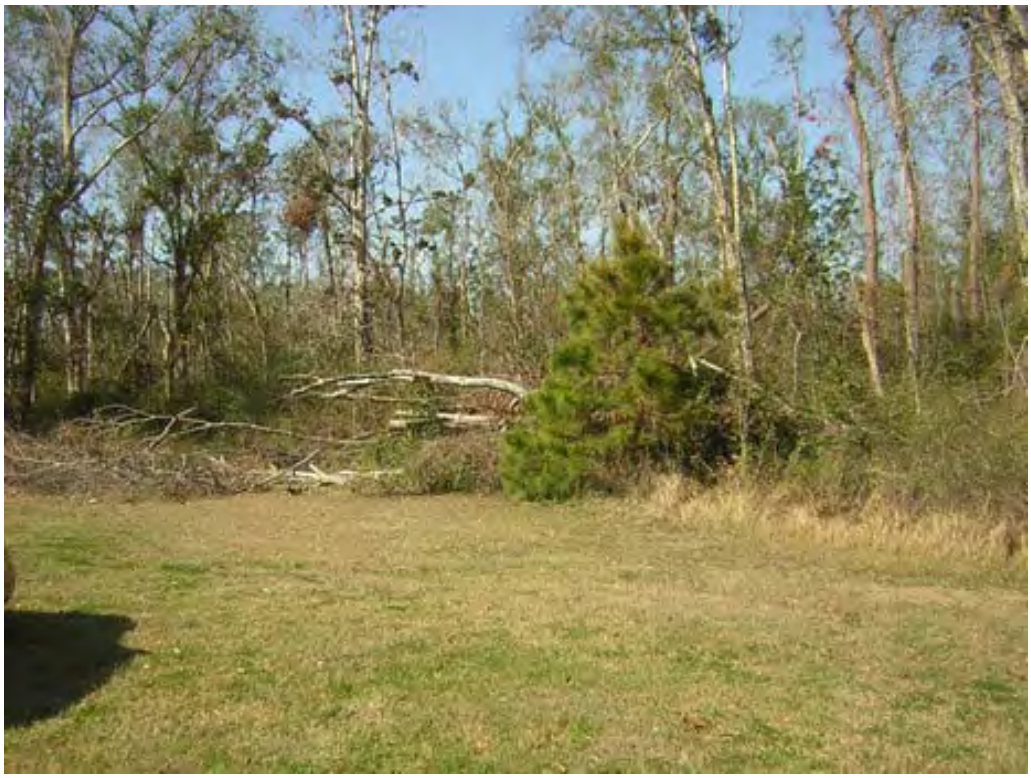

Photo 9: Downed trees from Hurricane Katrina west of the ground water treatment plant. Taken 2/16/2006	Filename: DSCN2448.jpg

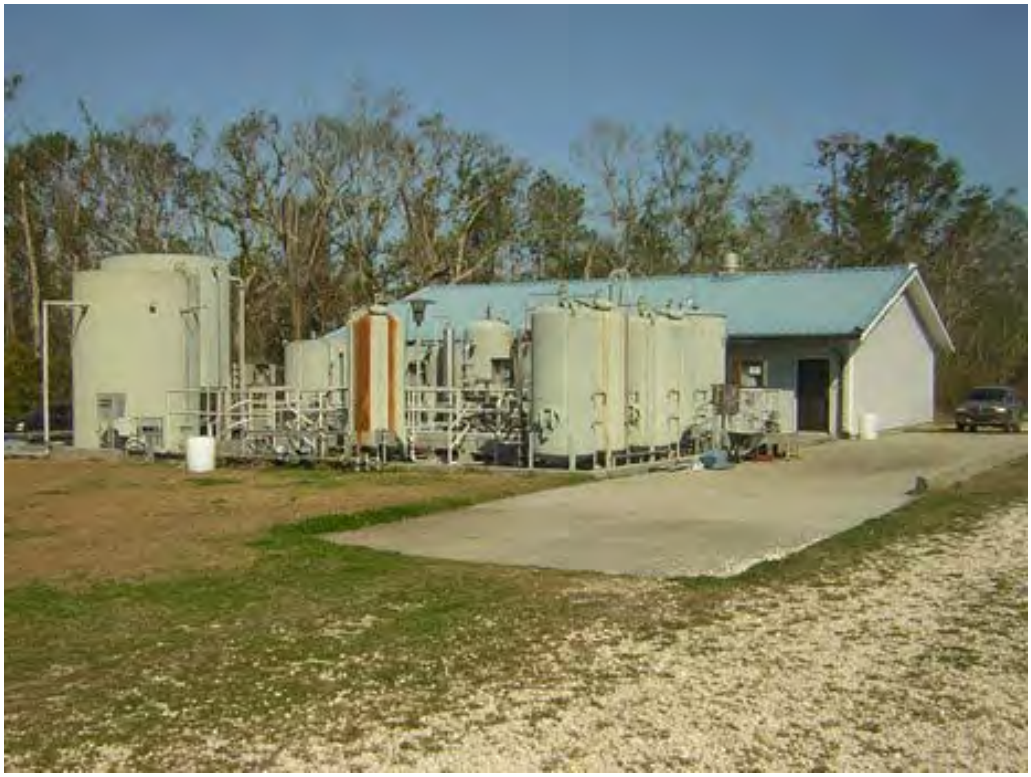

Photo 10: Overview of ground water treatment plant. Taken 2/16/2006	Filename: DSCN2449.jpg

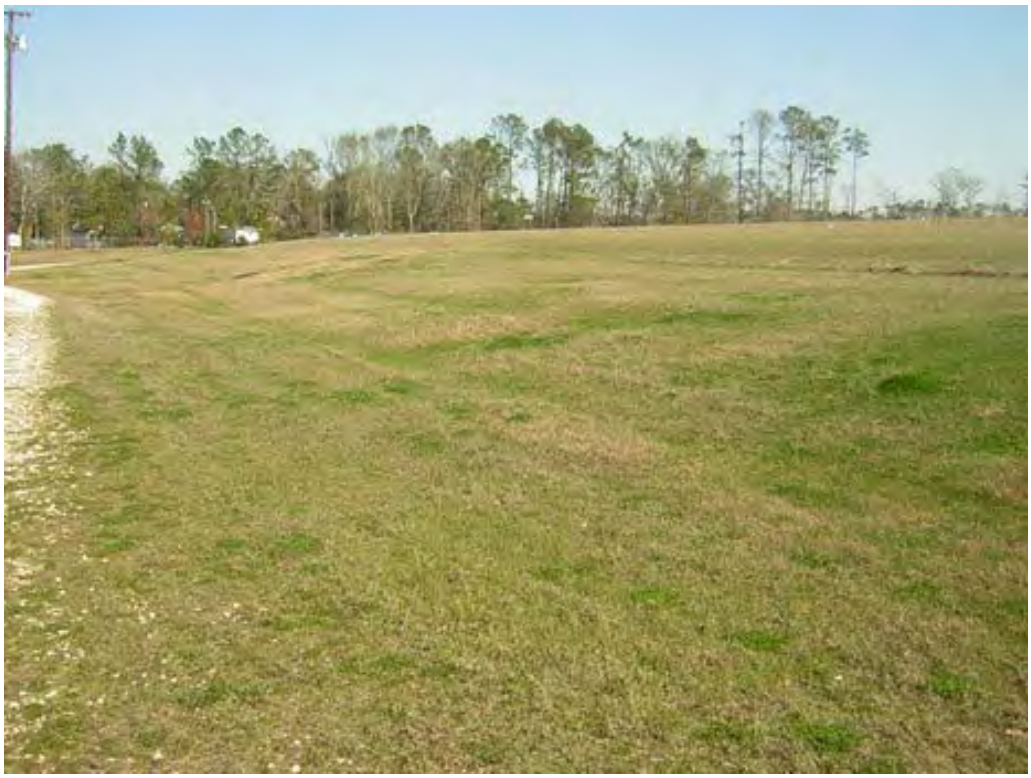

Photo 11: Looking north along west side of onsite landfill cover. Taken 2/16/2006	Filename: DSCN2450.jpg

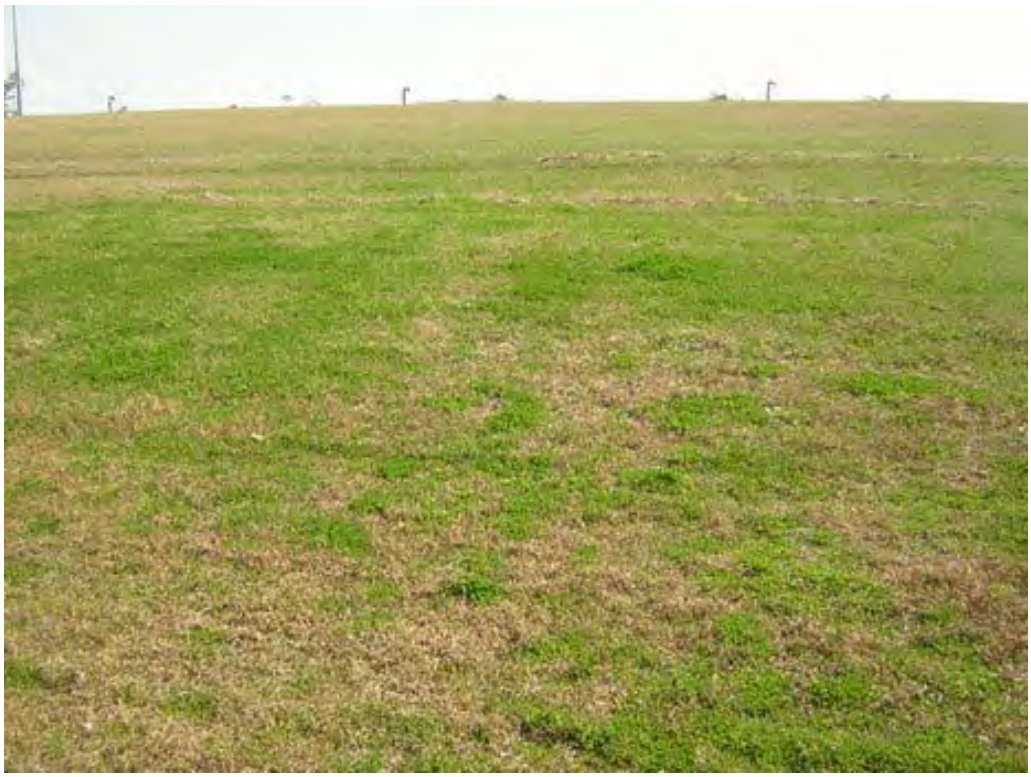

Photo 12: Looking east along the onsite landfill cover. Vents visible at the top of the landfill in background. Taken 2/16/2006	Filename: DSCN2451.jpg

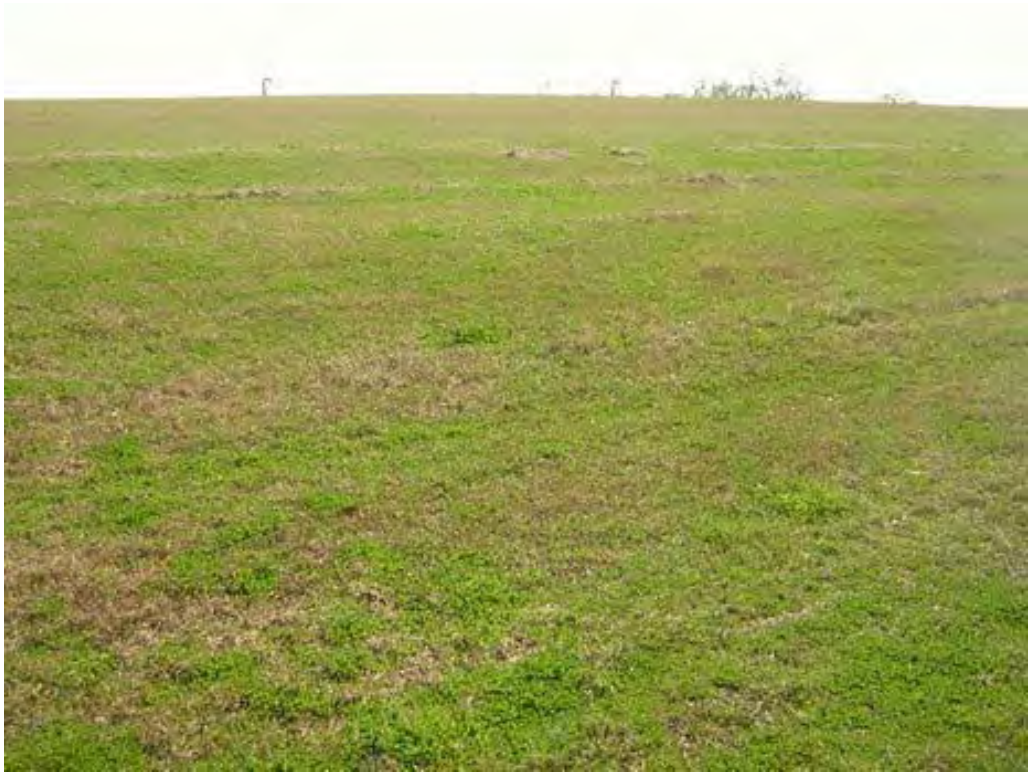

Photo 13: Looking southeast along the onsite landfill cover. Taken 2/16/2006	Filename: DSCN2452.jpg

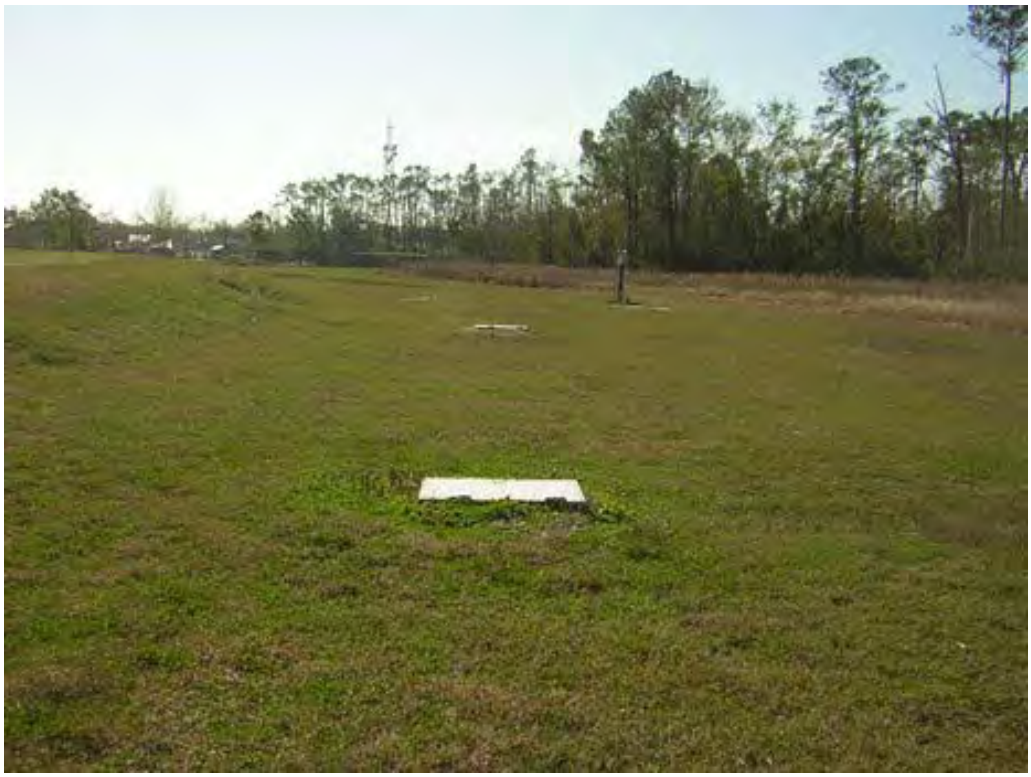

Photo 14: Looking south along recovery array 1A. Well vaults are flush-mount, and were inundated with water during Hurricane Katrina. Taken 2/16/2006	Filename: DSCN2453.jpg

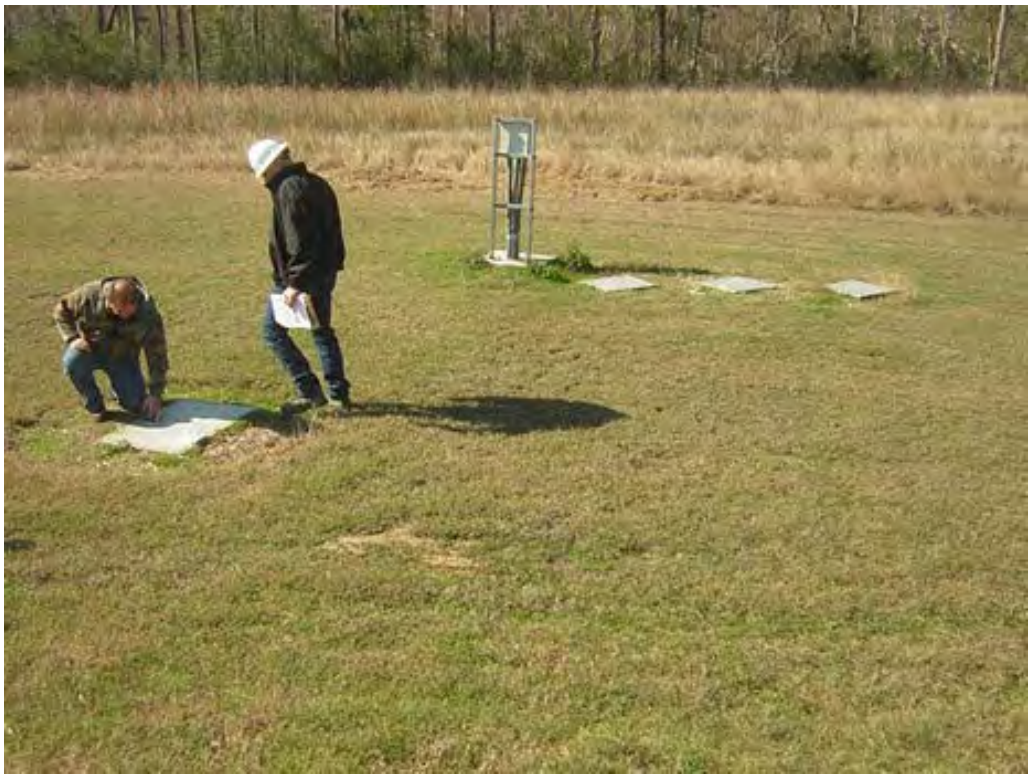

Photo 15: Recovery array 1A well vaults. Taken 2/16/2006	Filename: DSCN254.jpg

Photo 16: . Inside recovery array 1A well vault. Taken 2/16/2006	Filename: DSCN2455.jpg

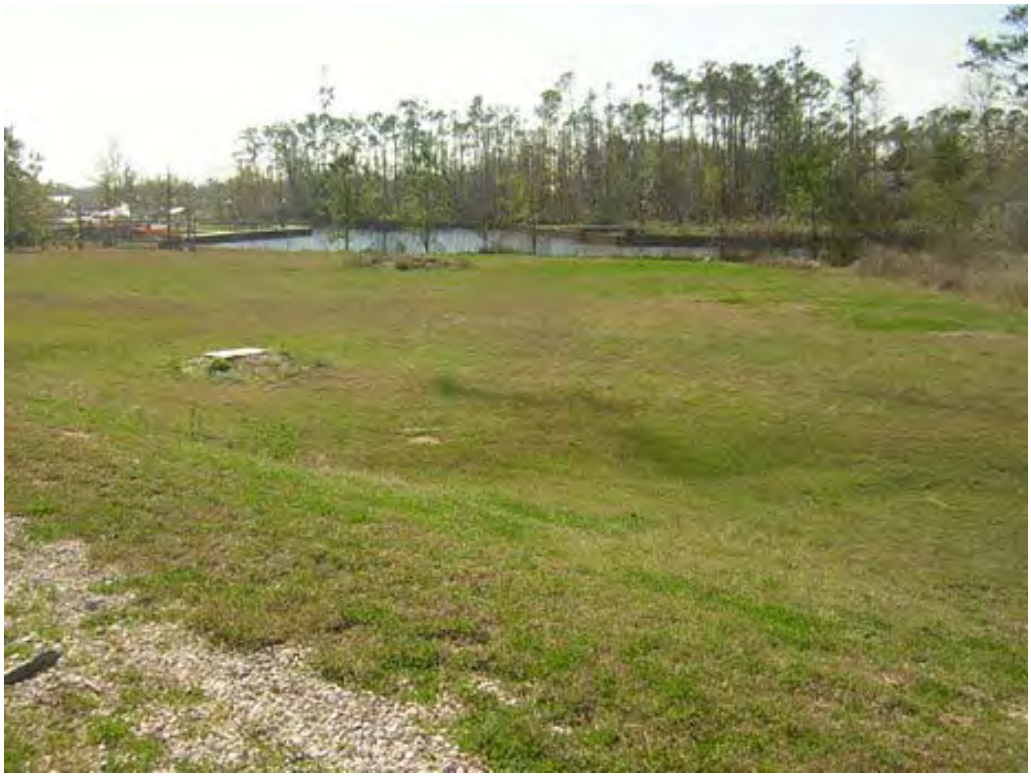

Photo 17: Looking south across array 1A toward Bayou Bonfouca. Taken 2/16/2006	Filename: DSCN2456.jpg

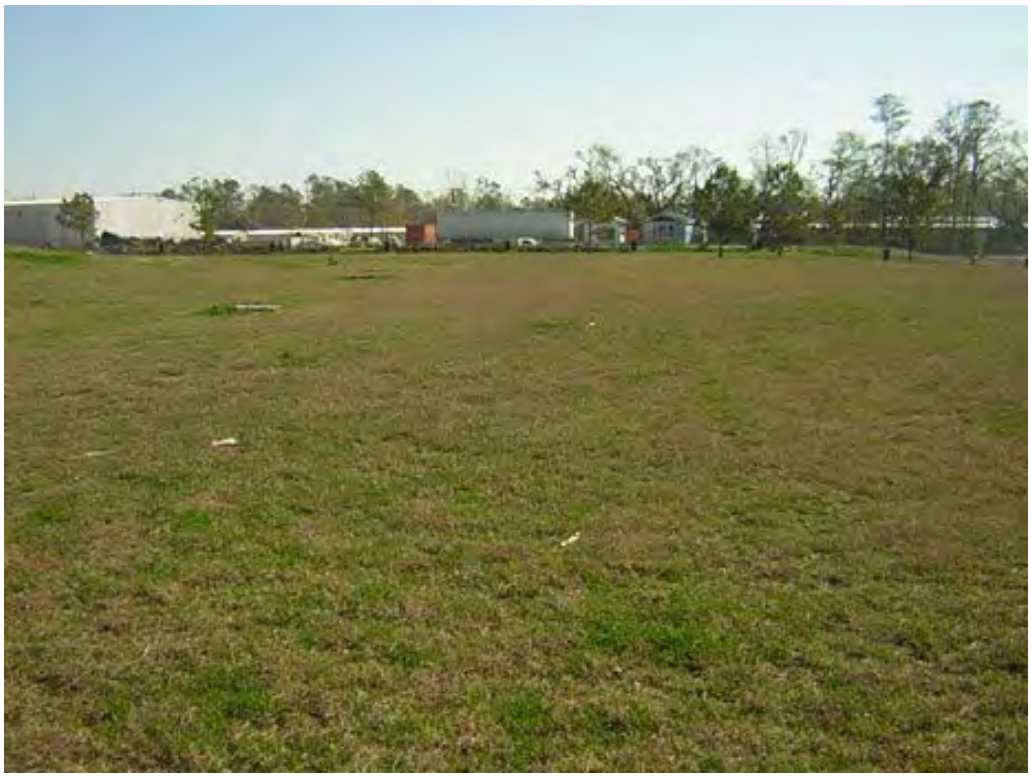

Photo 18: Looking east along recovery well array 1A, on south side of landfill, toward city maintenance facility in the background. Taken 2/16/2006	Filename: DSCN2457.jpg

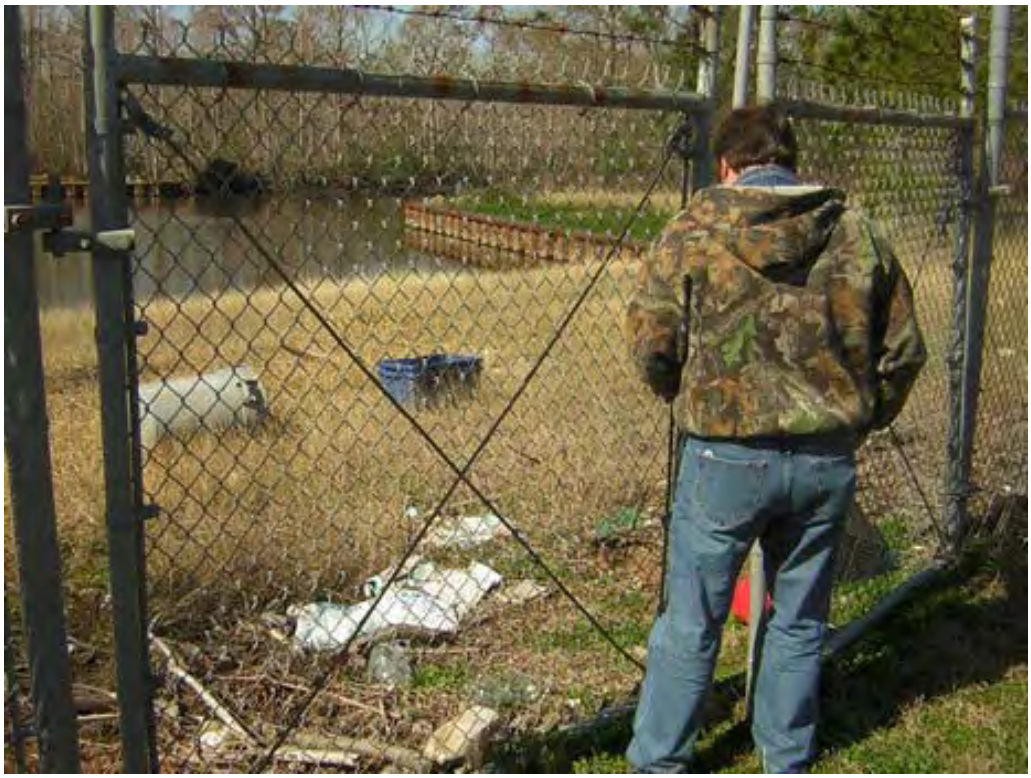

Photo 19: Looking west through fence at southwest edge of site along bayou. Debris deposited by floodwaters from Hurricanes Katrina/Rita. Taken 2/16/2006	Filename: DSCN2458.jpg

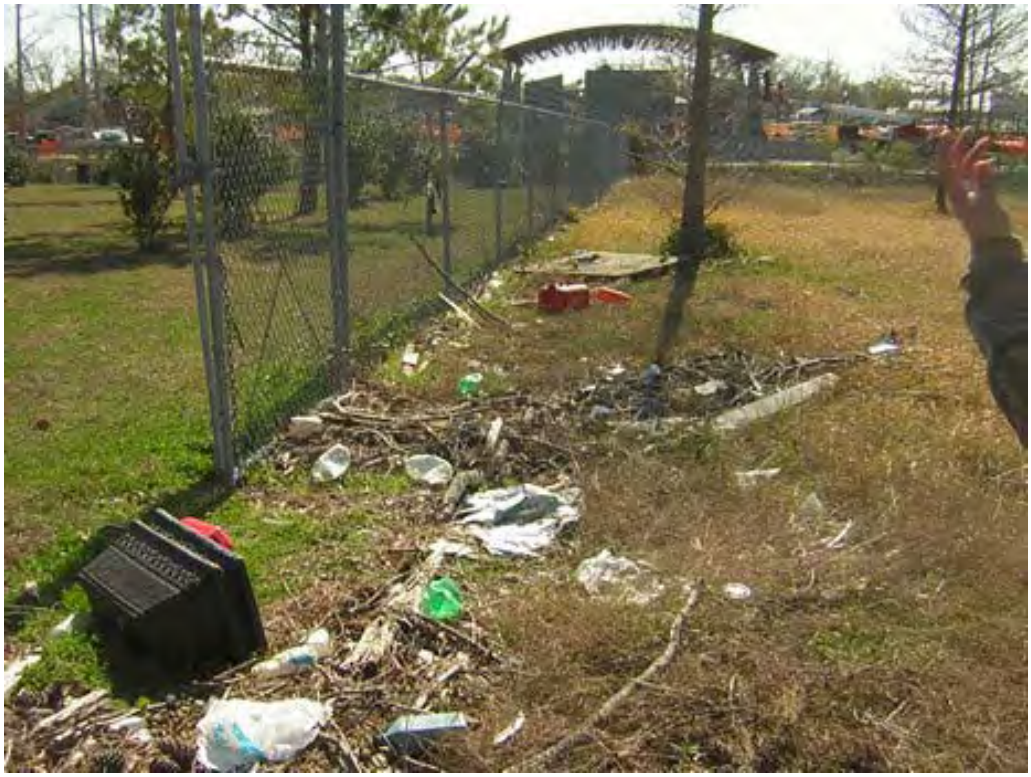

Photo 20: Looking south along fence at southwest edge of site along bayou. Debris deposited by floodwaters from Hurricanes Katrina/Rita. Taken 2/16/2006	Filename: DSCN2459.jpg

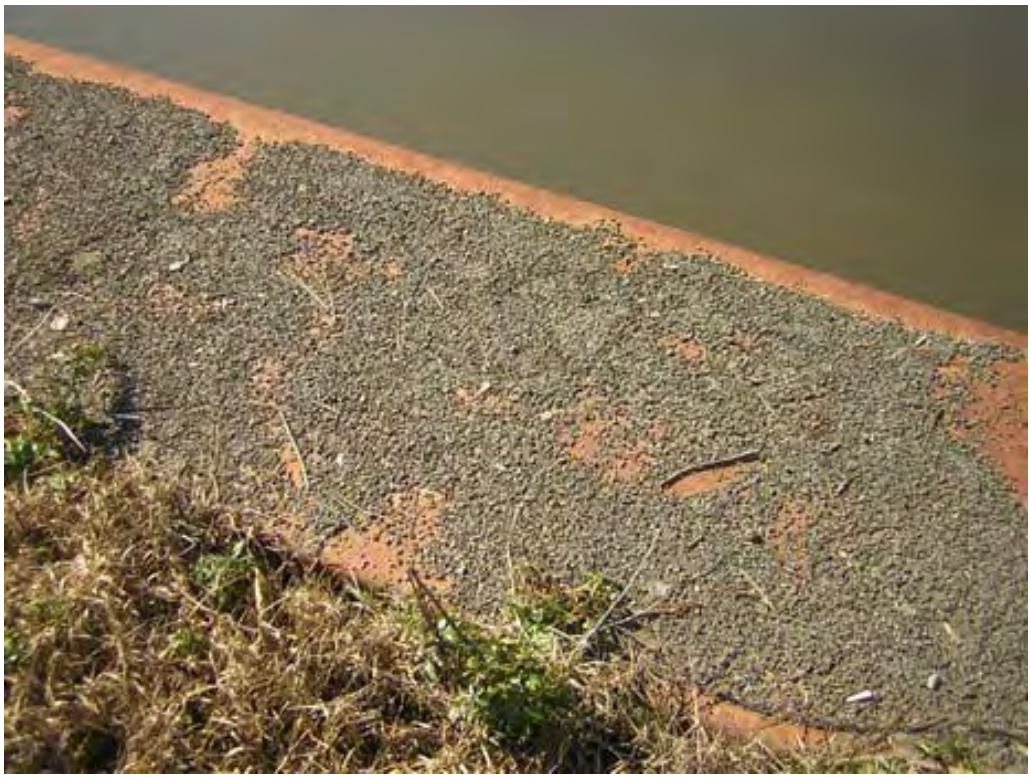

Photo 21: Dried sediment on top of sheet pile wall along bayou left behind by floodwaters associated with Hurricanes Katrina/Rita. Taken 2/16/2006	Filename: DSCN2460.jpg

Photo 22: Vault for piping connection across bayou to recovery array 3, on east side of bayou. Taken 2/16/2006	Filename: DSCN2462.jpg

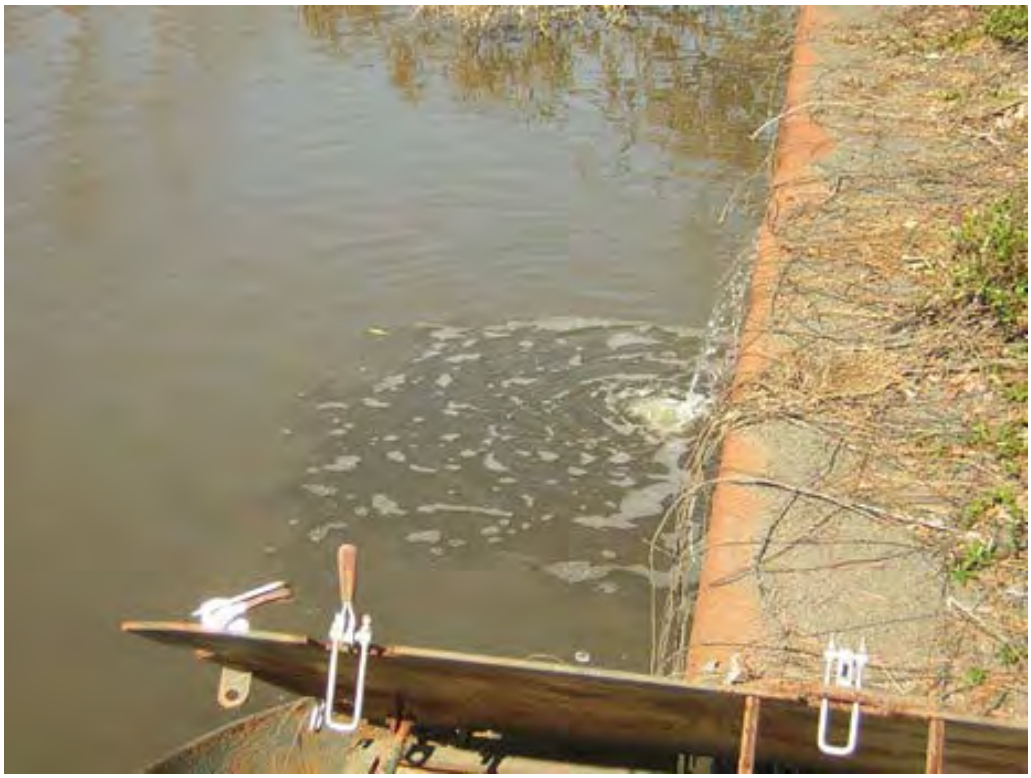

Photo 23: Treated discharge into bayou from ground water treatment plant. Taken 2/16/2006	Filename: DSCN2463.jpg

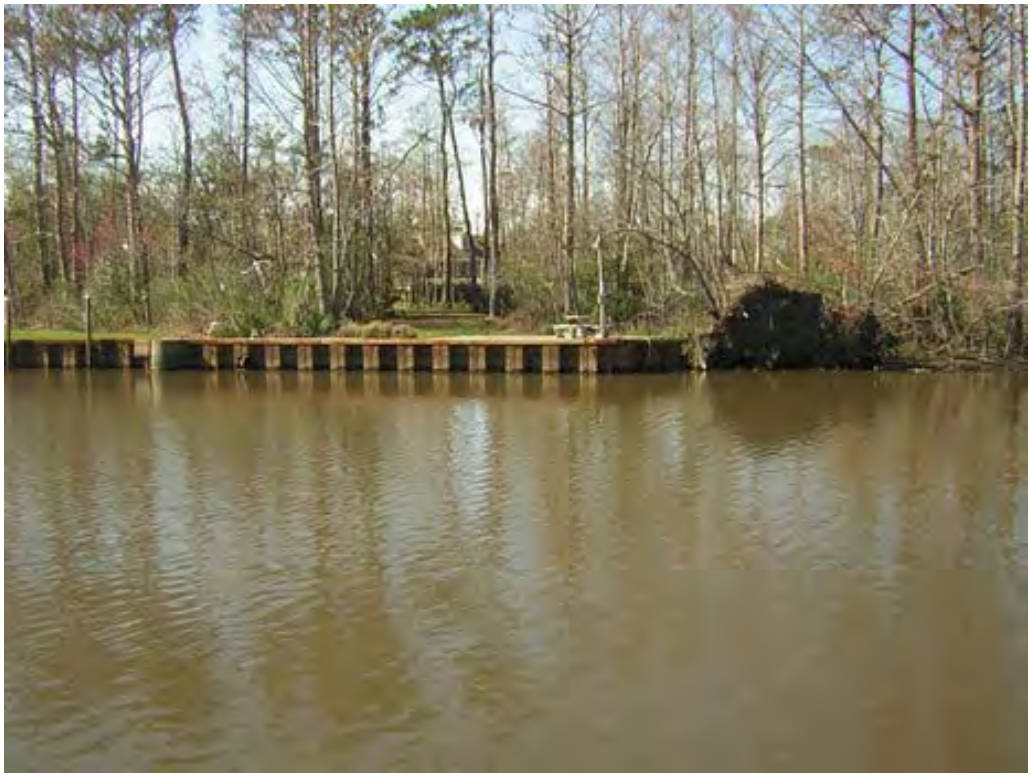

Photo 24: Looking west across bayou toward north end of recovery array 3. Taken 2/16/2006	Filename: DSCN2464.jpg

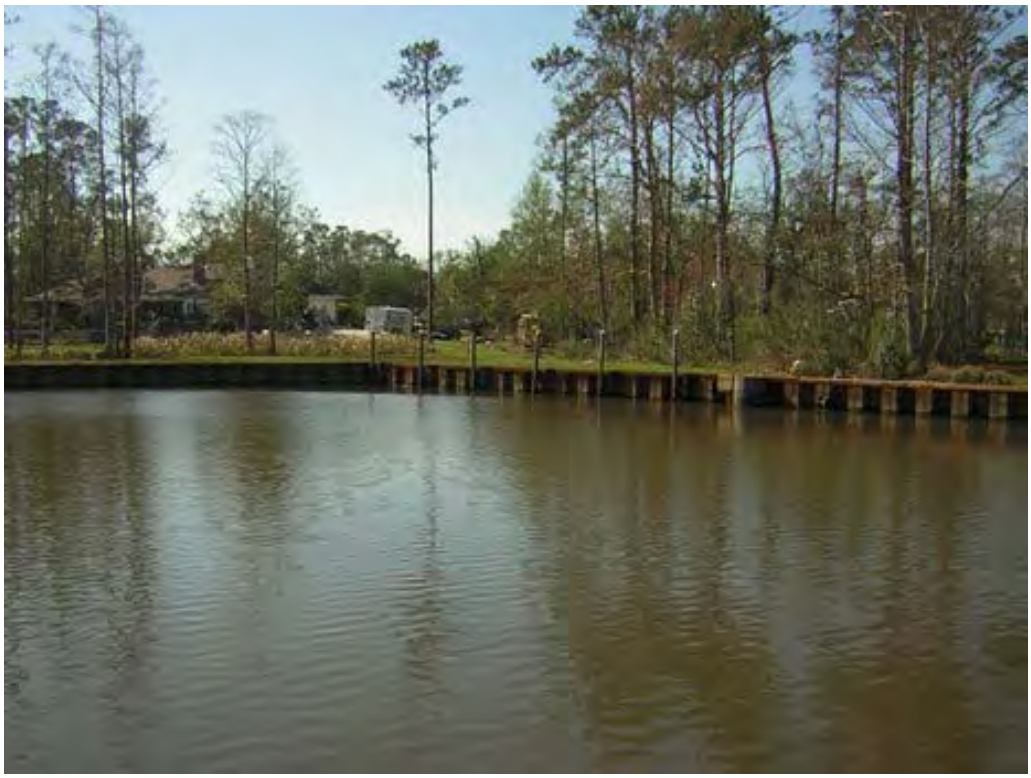

Photo 25: Looking west across bayou toward recovery array 3. Taken 2/16/2006	Filename: DSCN2465.jpg

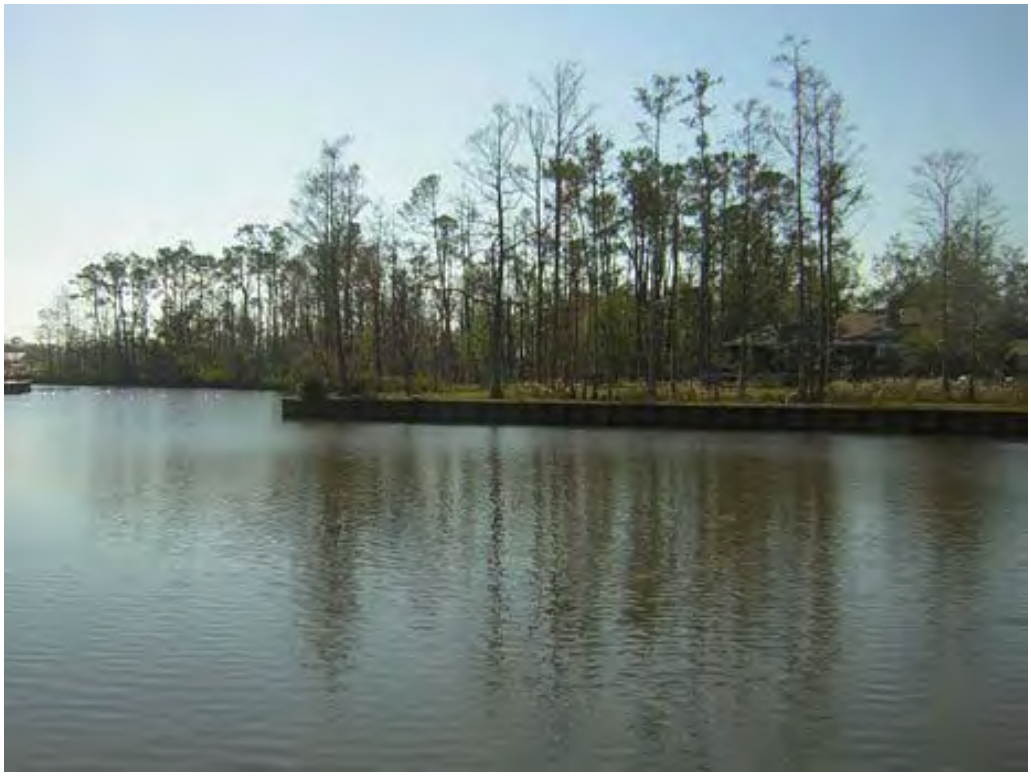

Photo 26: Looking west across bayou toward south end of recovery array 3. Taken 2/16/2006	Filename: DSCN2466.jpg

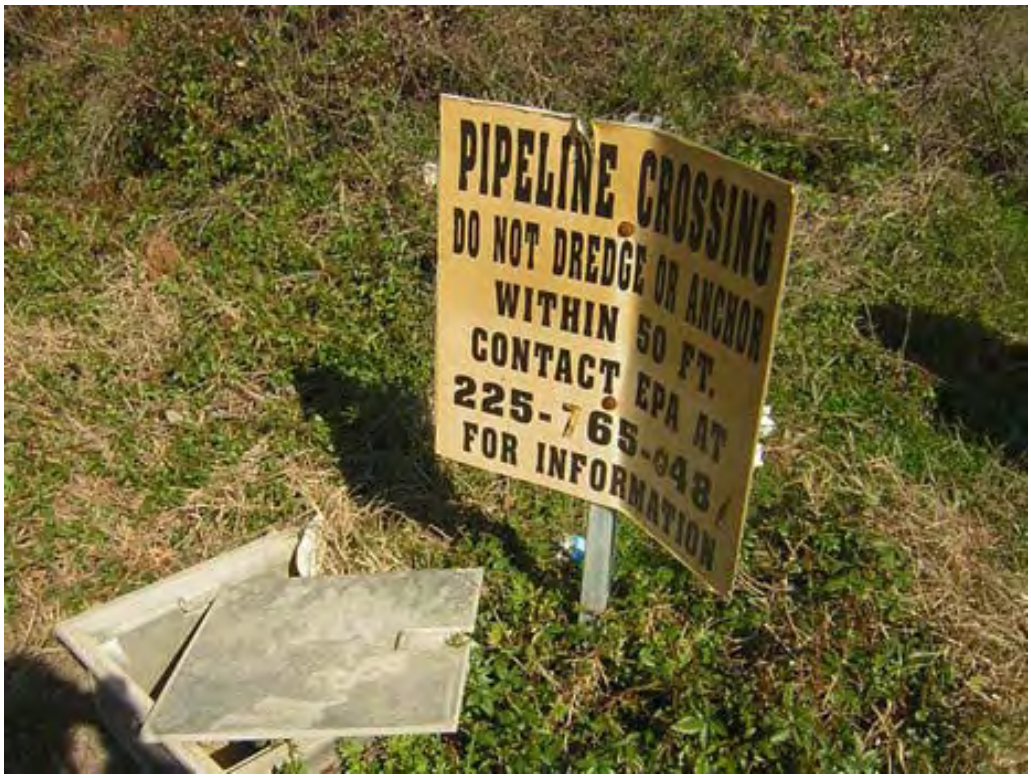

Photo 27: Warning sign for the recovery array pipeline that crosses the bayou. Taken 2/16/2006.	Filename: DSCN2467.jpg

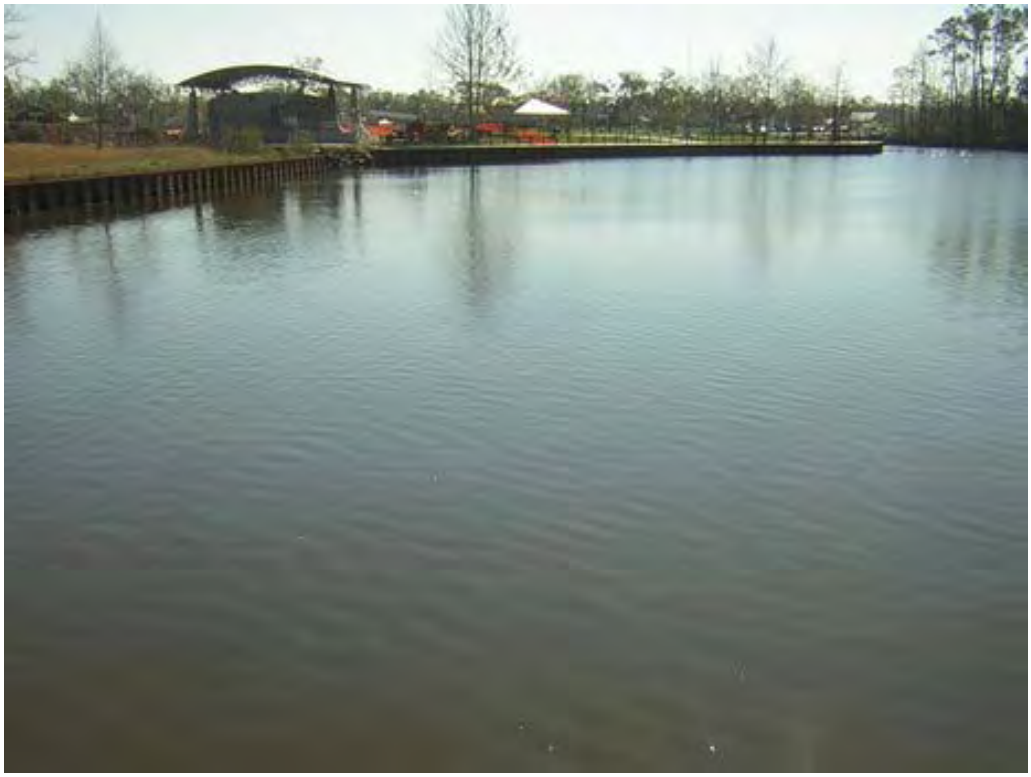

Photo 28: Looking south across east side of bayou toward city park. Taken 2/16/2006	Filename: DSCN2468.jpg

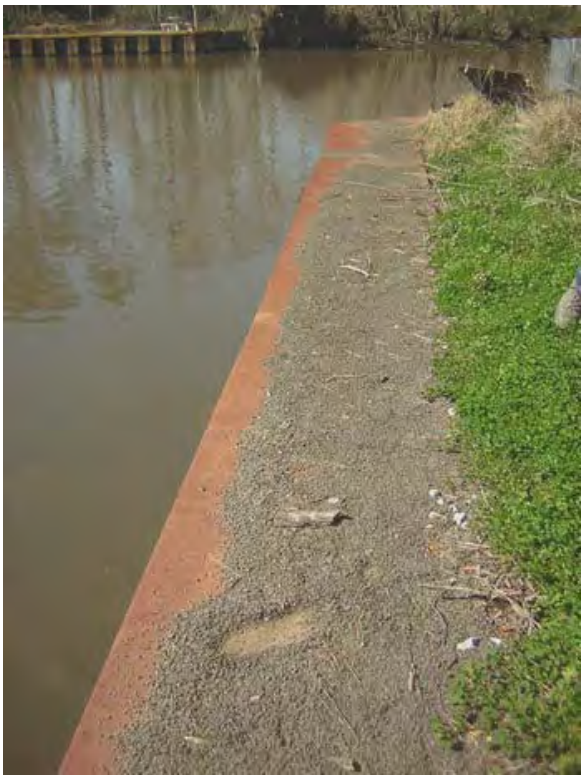

Photo 29: Dried sediment on top of sheet pile wall along bayou left behind by floodwaters associated with Hurricanes Katrina/Rita. Taken 2/16/2006	Filename: DSCN2469.jpg

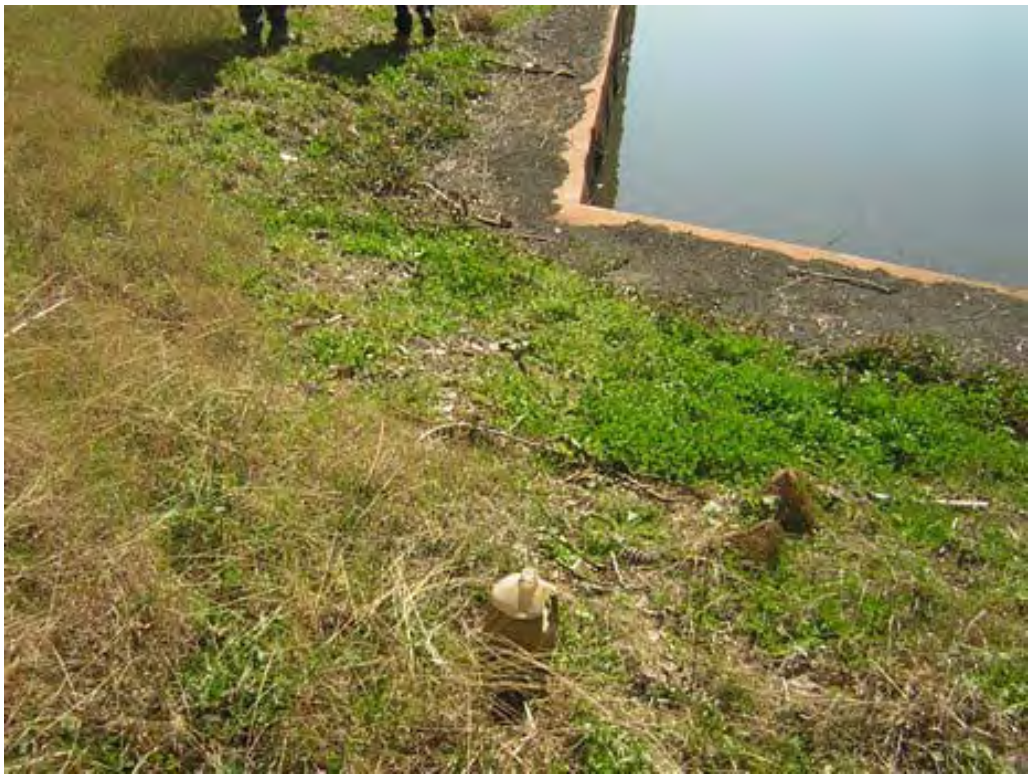

Photo 30: Dried sediment on top of sheet pile wall along bayou and debris left behind by floodwaters associated with Hurricanes Katrina/Rita. Taken 2/16/2006	Filename: DSCN2470.jpg

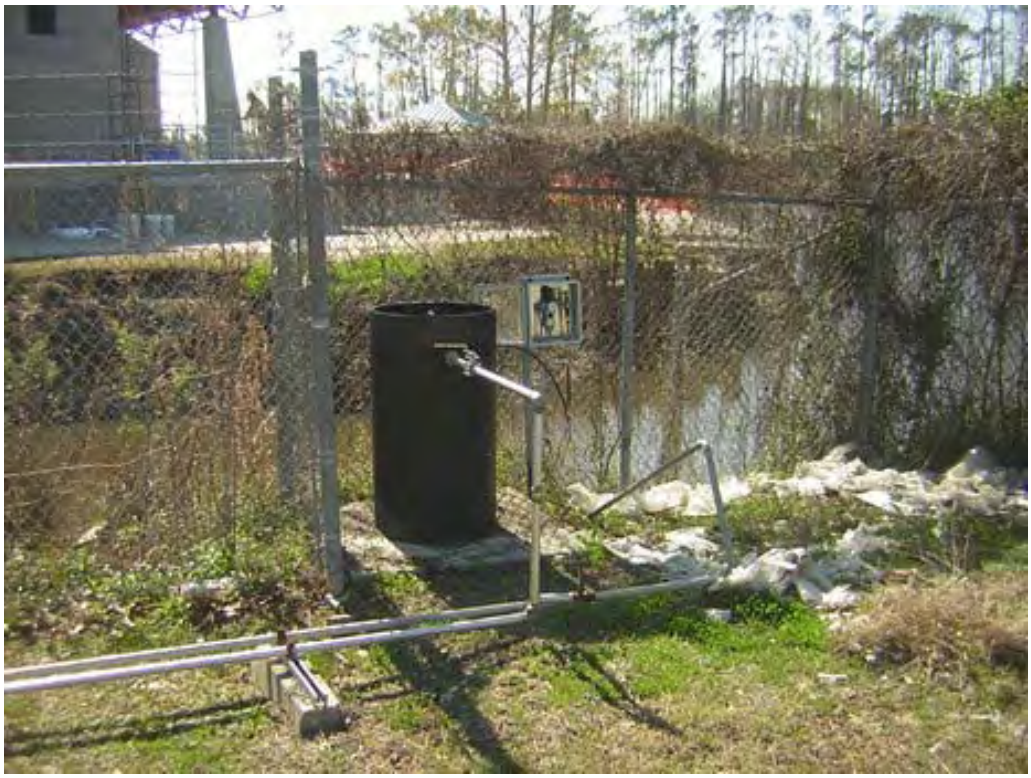

Photo 31: Well at west end of recovery array 2. City park in background. Taken 2/16/2006	Filename: DSCN2471.jpg

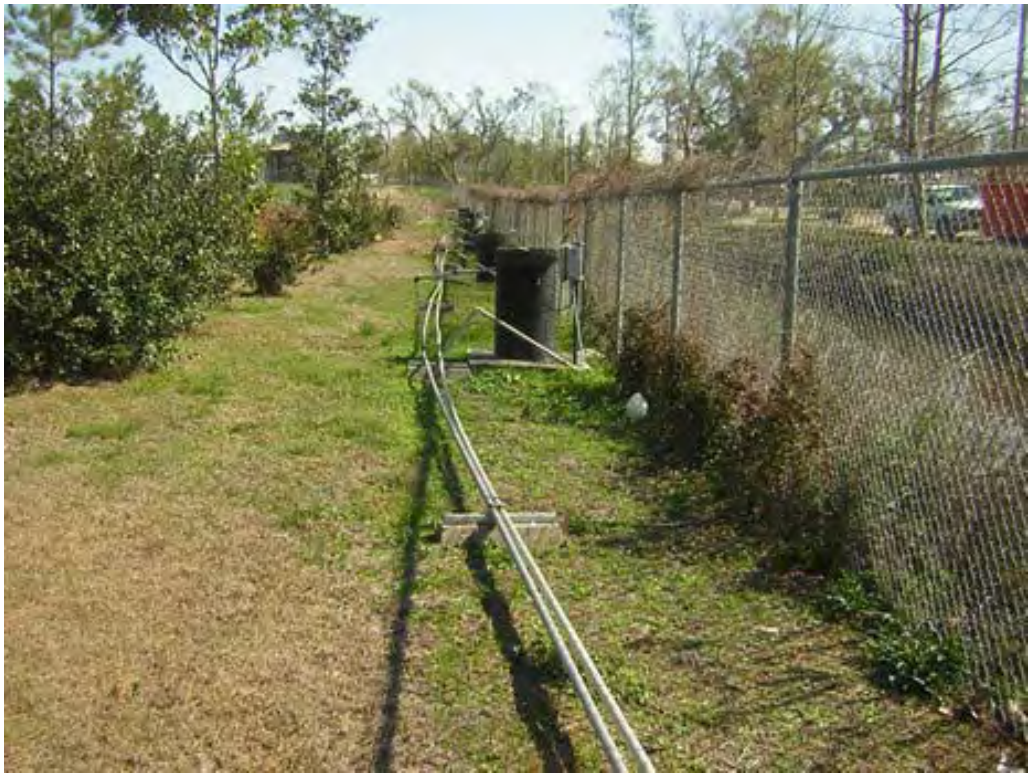

Photo 32: Looking east along piping and well vaults for recovery array 2. Taken 2/16/2006	Filename: DSCN2472.jpg

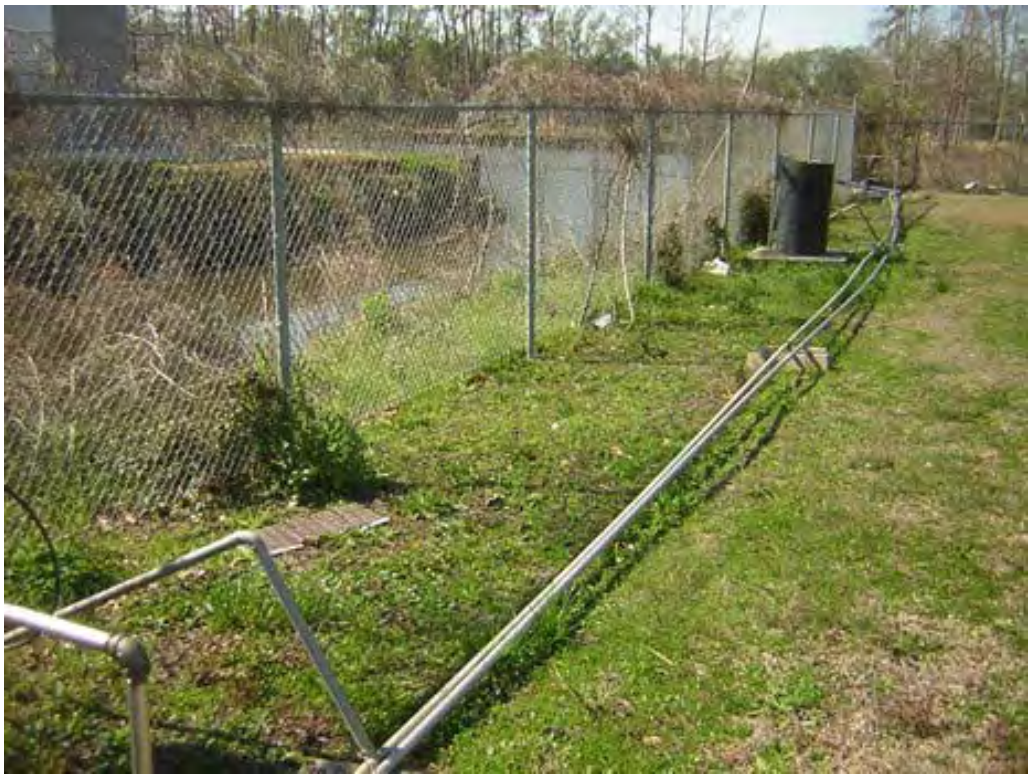

Photo 33: Looking west along piping and well vaults for recovery array 2. Taken 2/16/2006	Filename: DSCN2473.jpg

Photo 34: Close up of piping and well vault for recovery array 2. Taken 2/16/2006	Filename: DSCN2474.jpg

Photo 35: Close up of piping and well vault for recovery array 2. Taken 2/16/2006	Filename: DSCN2475.jpg

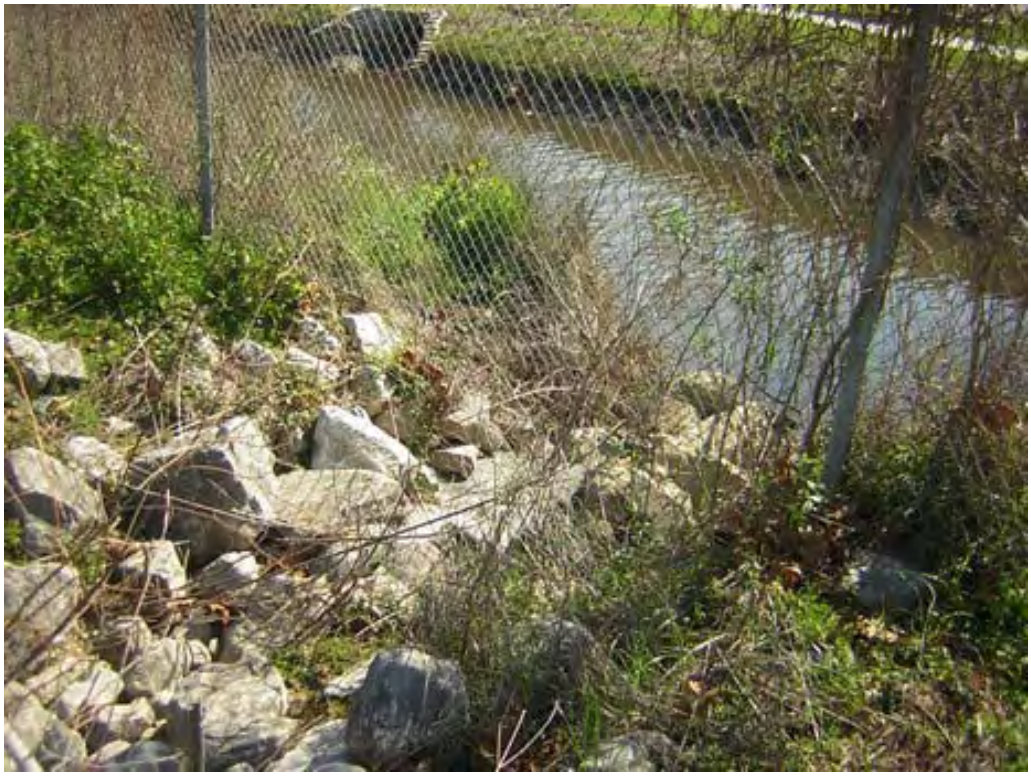

Photo 36: Surface drainage channel into East Drainage Channel on southeast side of site. Taken 2/16/2006	Filename: DSCN2476.jpg

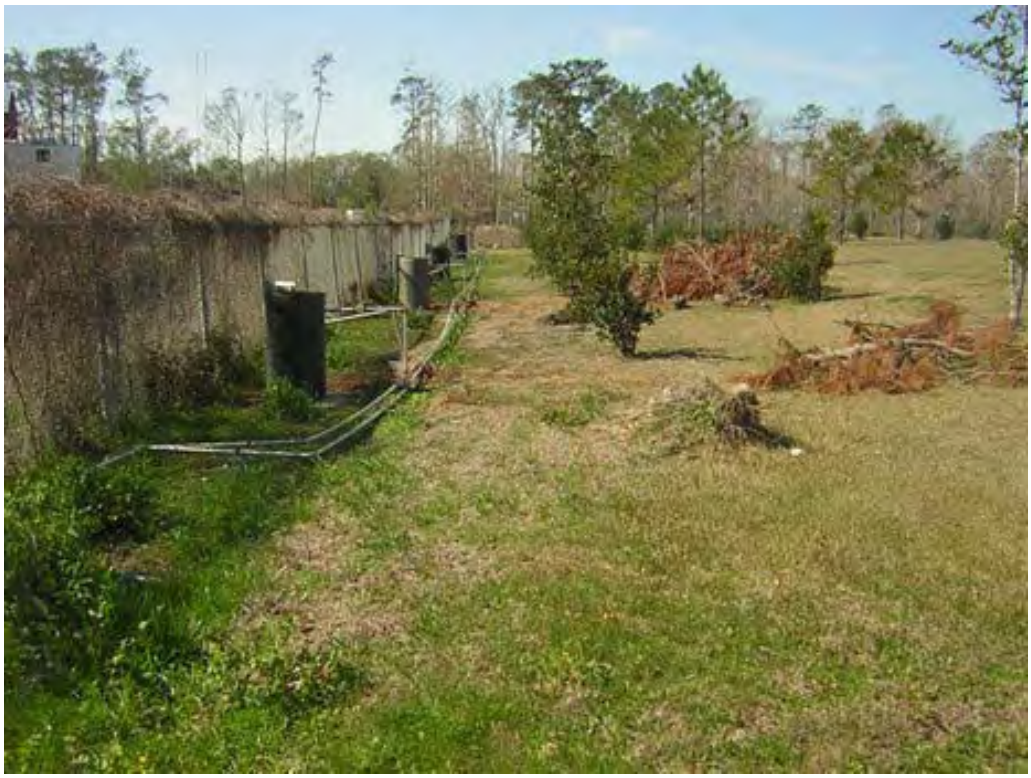

Photo 37: Looking west along southern side of recovery array 2. Taken 2/16/2006	Filename: DSCN2477.jpg

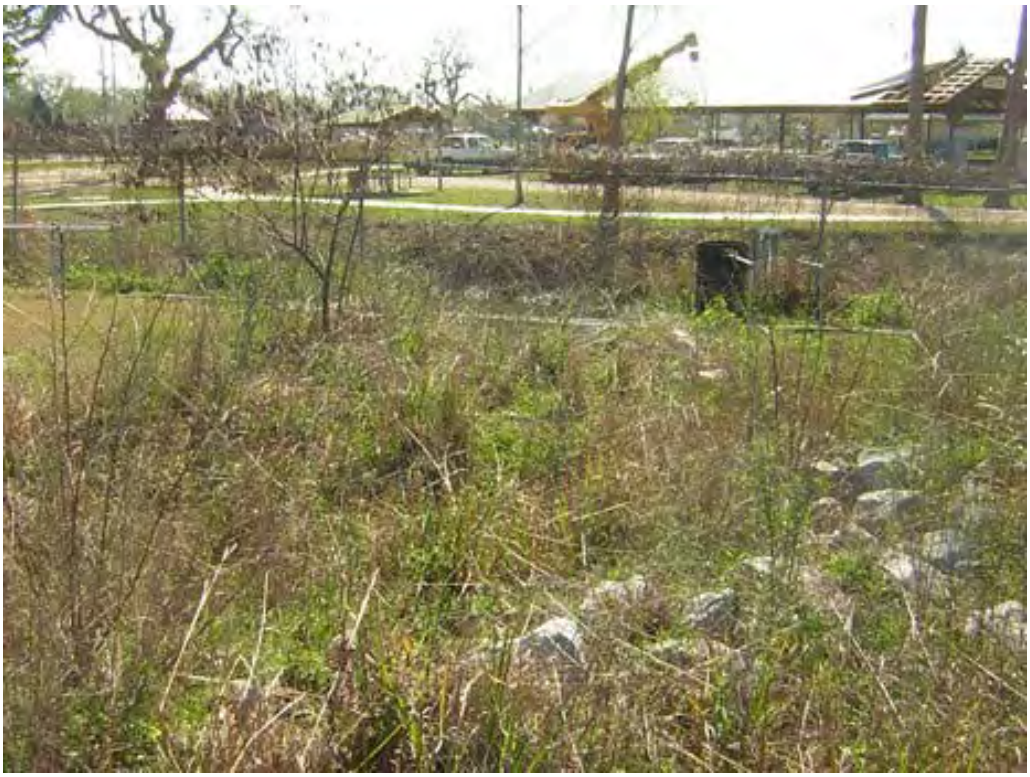

Photo 38: Looking south along surface runoff drainage ditch, which drains to East Drainage Channel in background. Taken 2/16/2006	Filename: DSCN2478.jpg

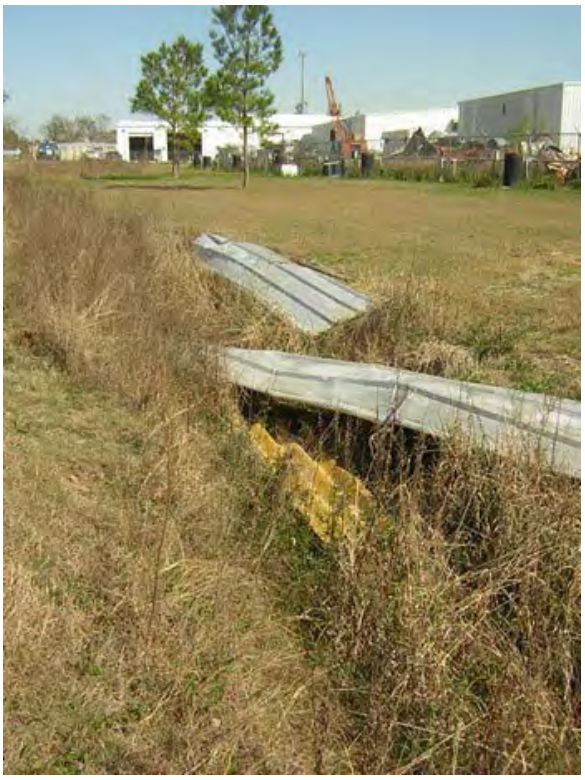

Photo 39: Looking north along surface drainage ditch. Debris from Hurricanes Katrina/Rita visible in ditch. Taken 2/16/2006	Filename: DSCN2480.jpg

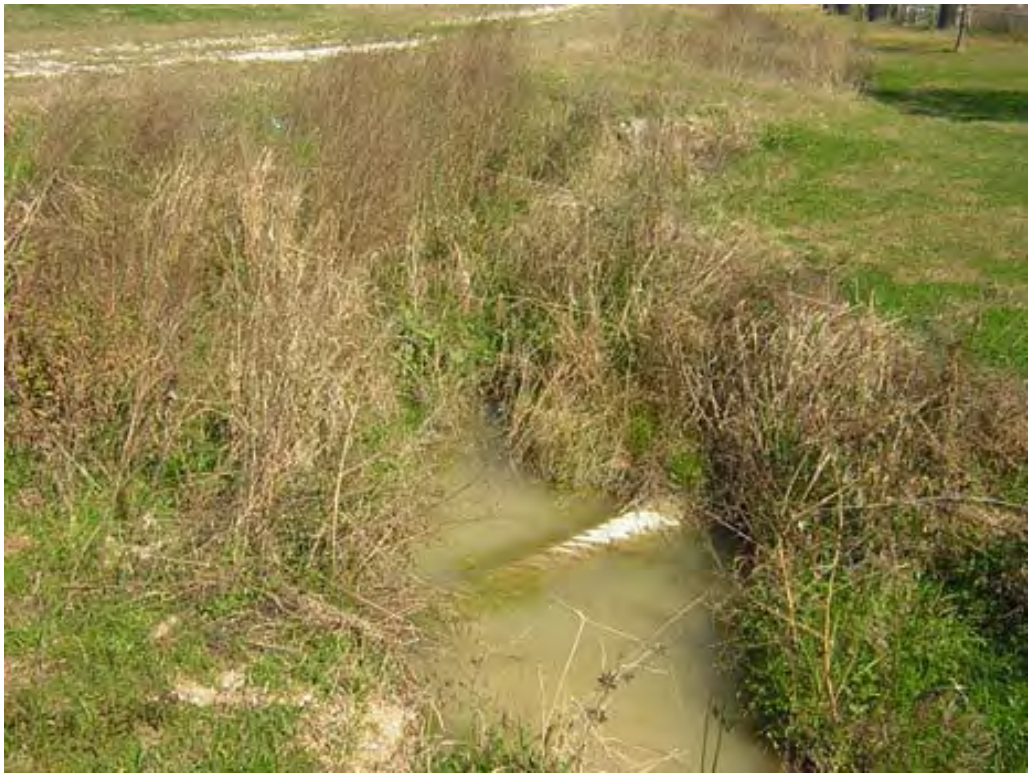

Photo 40: Looking north along surface drainage ditch on southeast side of landfill. Taken 2/16/2006	Filename: DSCN2481.jpg

Photo 41: Looking south along piping and well vaults for northeast side of recovery array 2. Taken 2/16/2006	Filename: DSCN2482.jpg

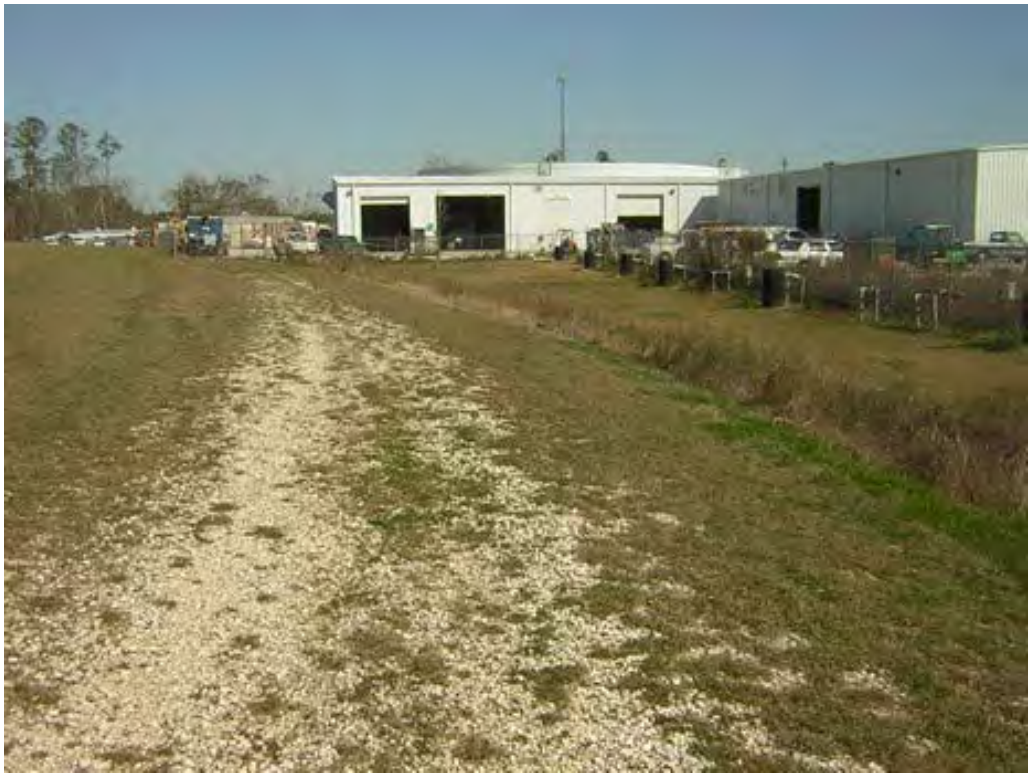

Photo 42: Looking north along the east side of the landfill. The north end of recovery array 2 is to the right. Taken 2/16/2006	Filename: DSCN2484.jpg

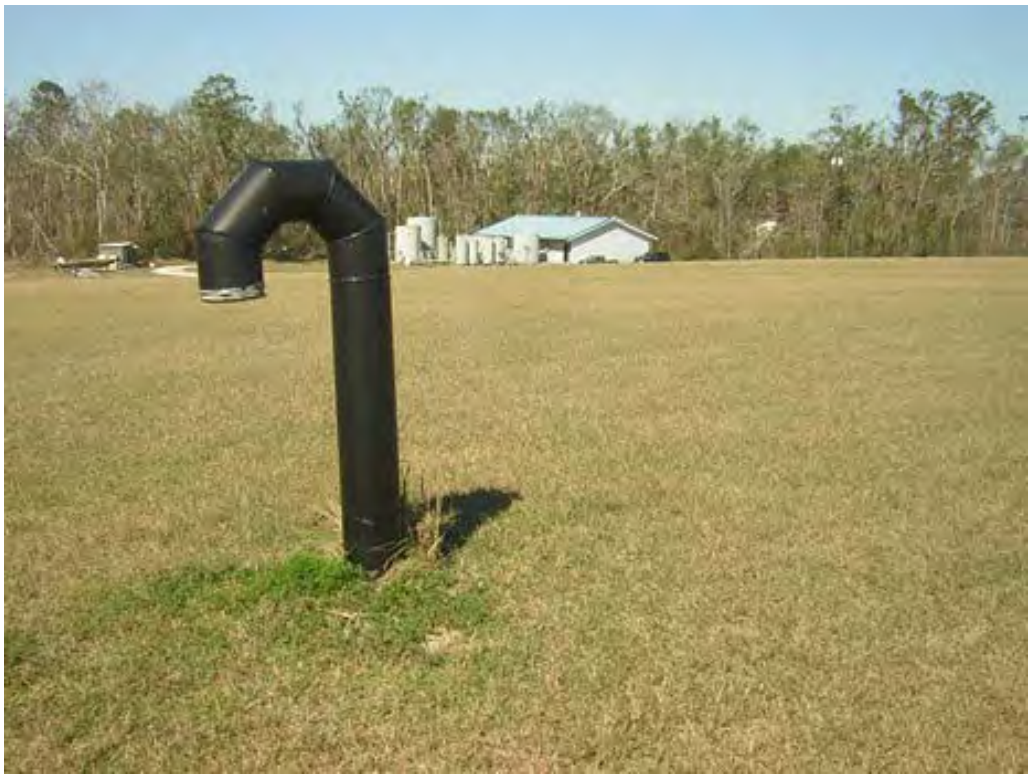

Photo 43: Landfill vent pipe on top of landfill cover. Ground water treatment plant visible in background. Taken 2/16/2006	Filename: DSCN2485.jpg

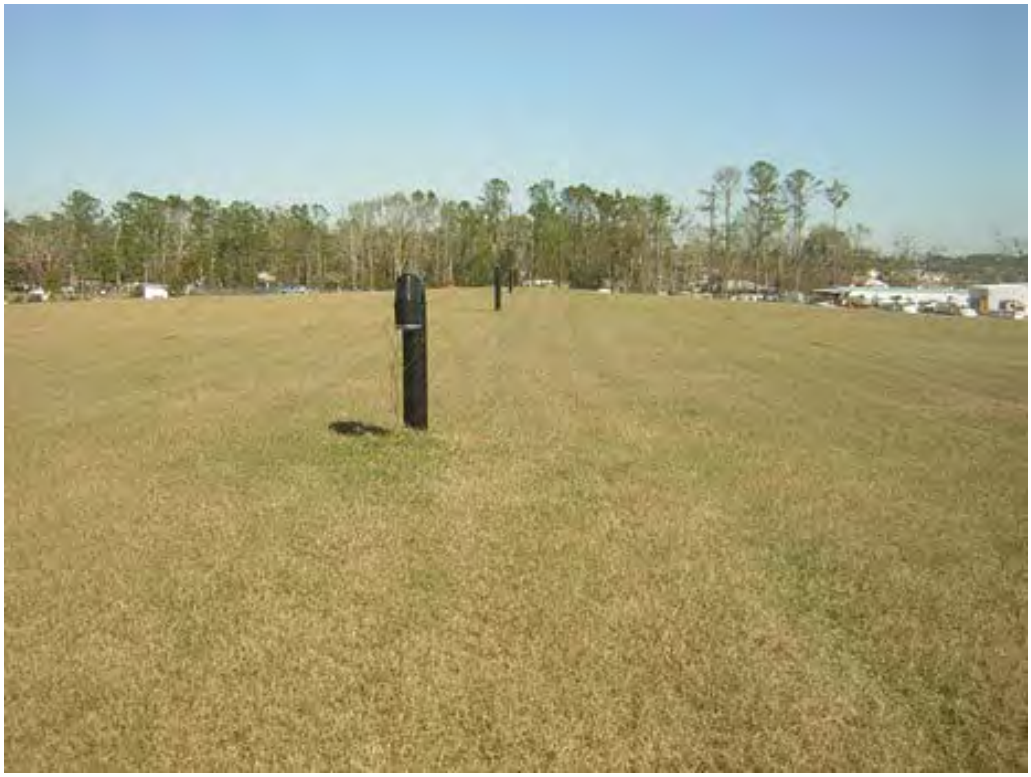

Photo 44: Looking north along line of vent pipes on top of landfill cover. Note small tree growing adjacent to vent pipe in foreground. Taken 2/16/2006	Filename: DSCN2486.jpg

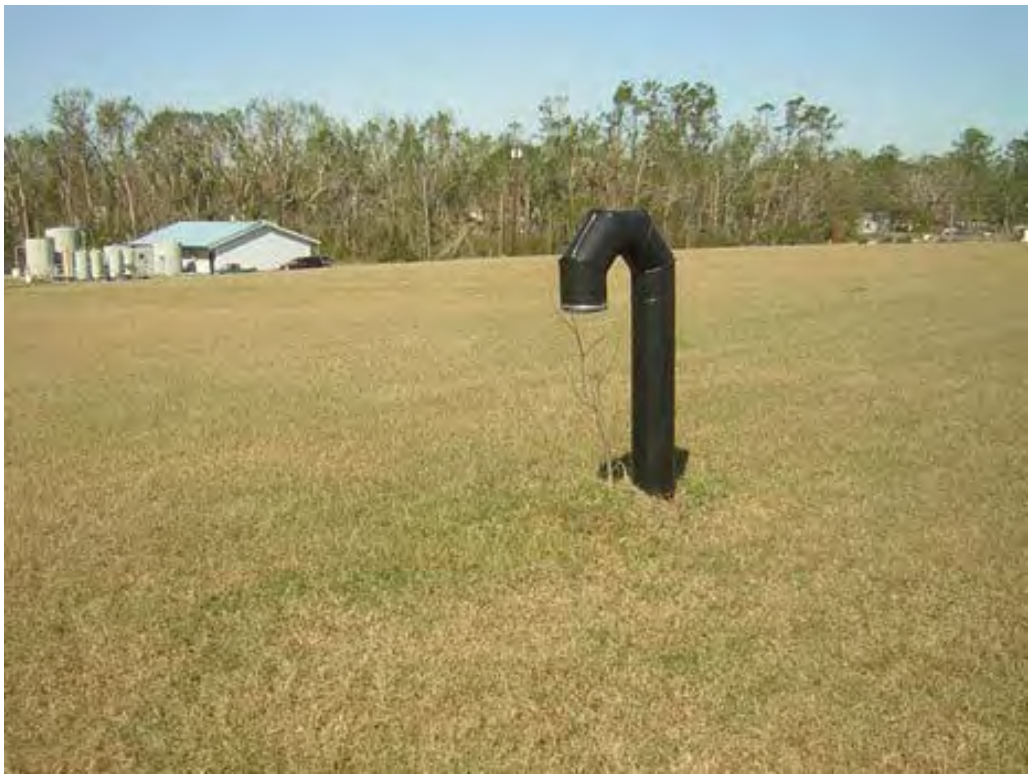

Photo 45: Vent pipe on top of landfill cover. Note small tree growing adjacent to vent pipe. Taken 2/16/2006	Filename: DSCN2487.jpg

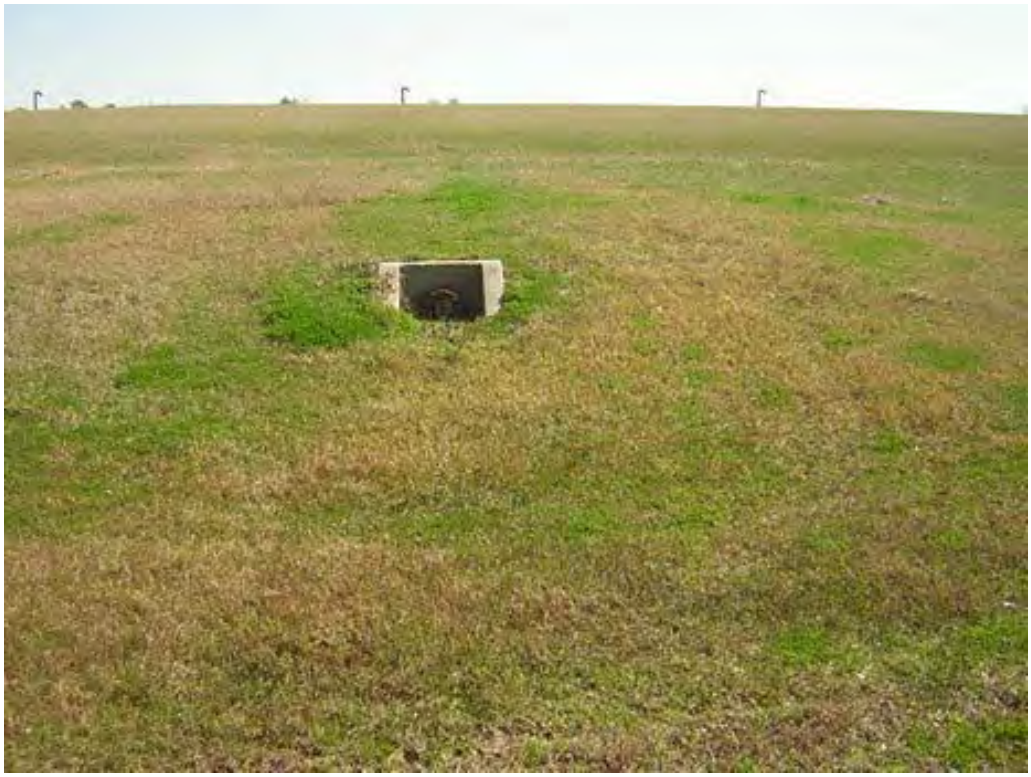

Photo 46: Surface drainage for landfill cover. Taken 2/16/2006	Filename: DSCN2488.jpg

Photo 47: West side of Bayou Bonfouca at south end of recovery array 3. Downed trees associated with hurricane damage. Taken 2/16/2006	Filename: DSCN2489.jpg

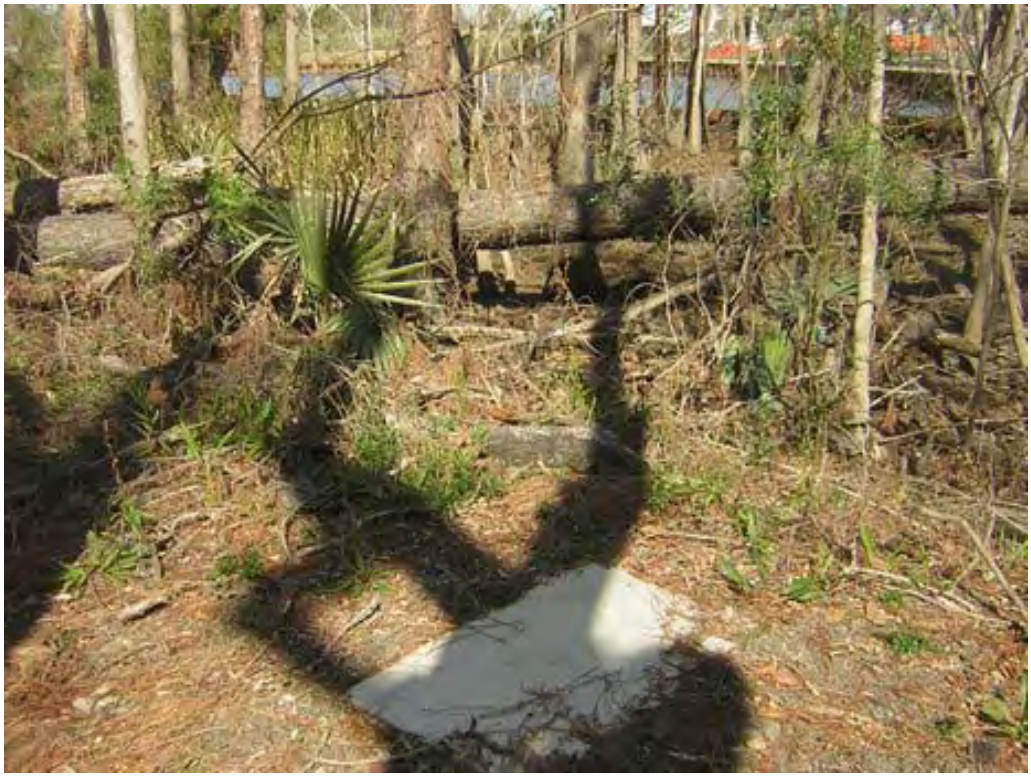

Photo 48: West side of bayou, south end of recovery array 3. Well vault cover visible in foreground. Downed trees associated with hurricane damage. Taken 2/16/2006.	Filename: DSCN2490.jpg

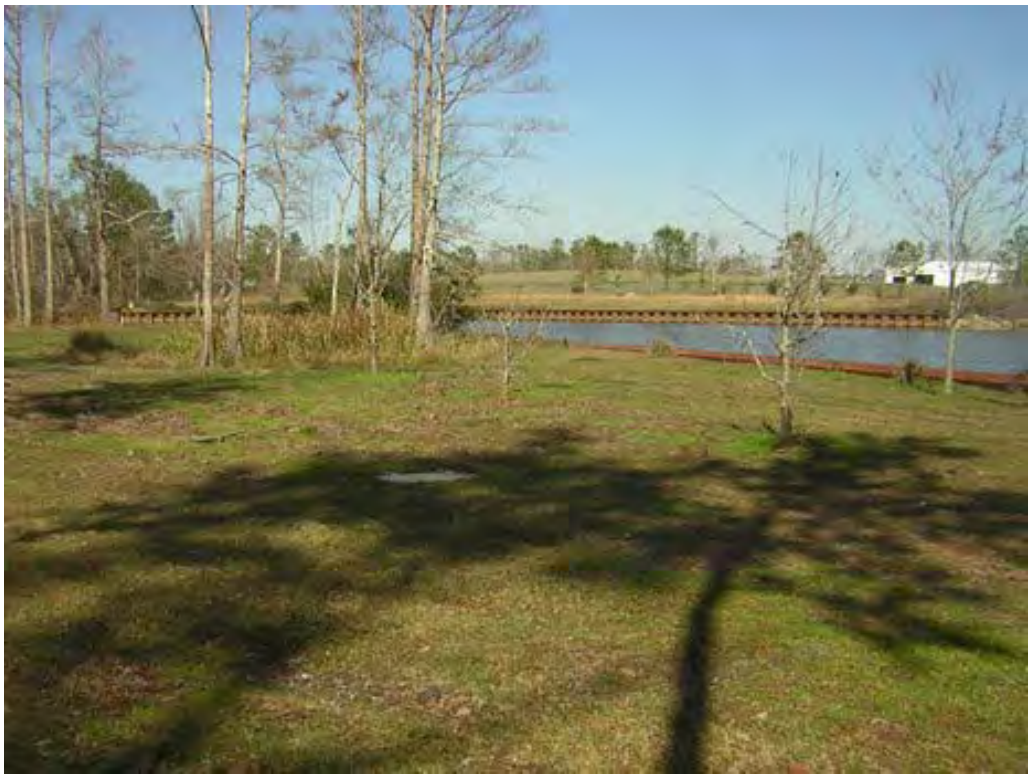

Photo 49: Looking northeast across Bayou Bonfouca. Array 3 well vault visible in center of photograph (flush mount). Taken 2/16/2006	Filename: DSCN2492.jpg

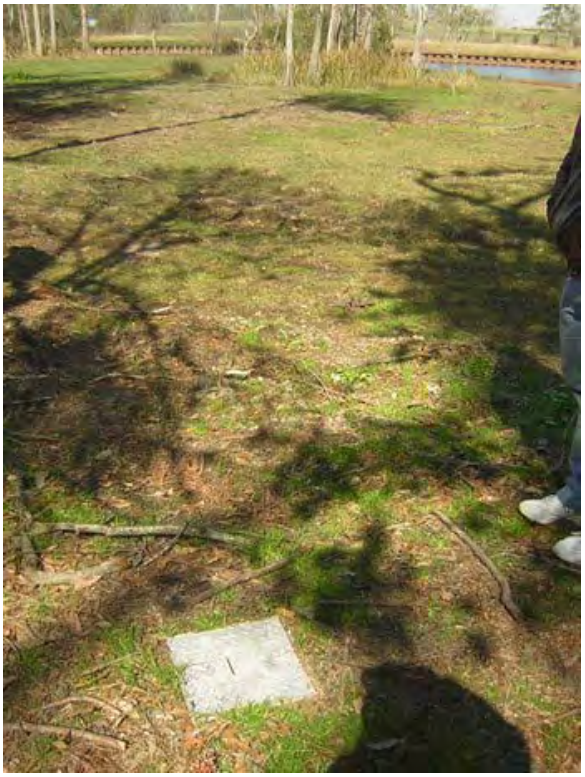

Photo 50: Piezometer for recovery array 3. Taken 2/16/2006	Filename: DSCN2493.jpg

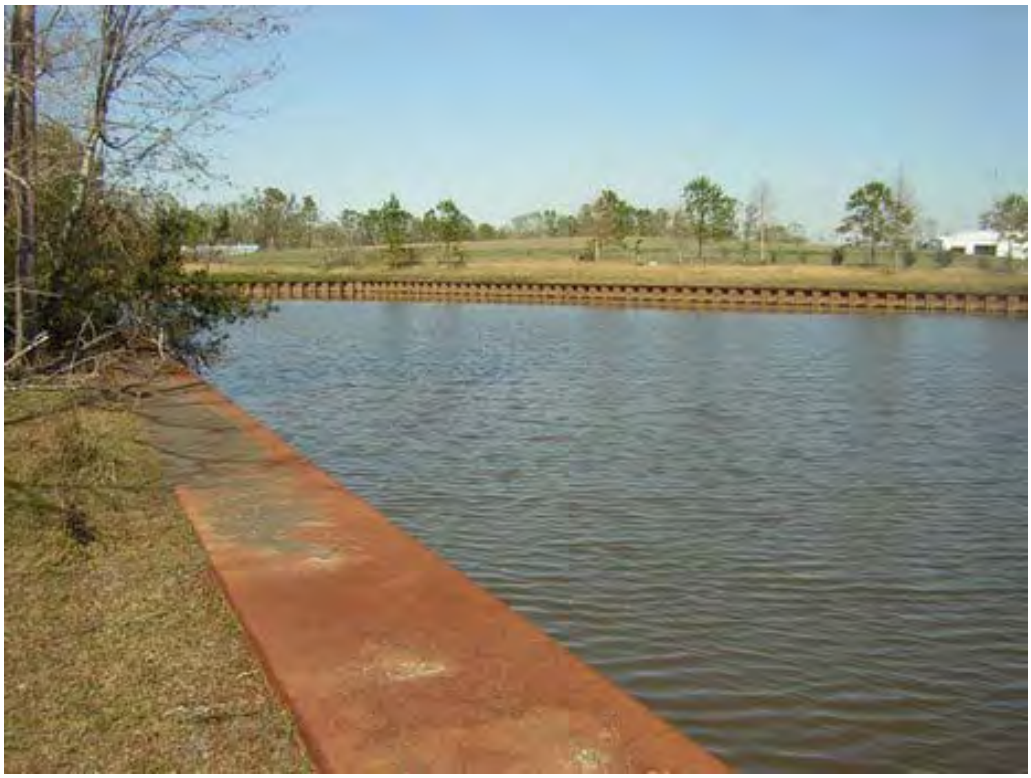

Photo 51: Looking north across Bayou Bonfouca toward onsite landfill. Ground water treatment plant is visible in far background left. Taken 2/16/2006	Filename: DSCN2494.jpg

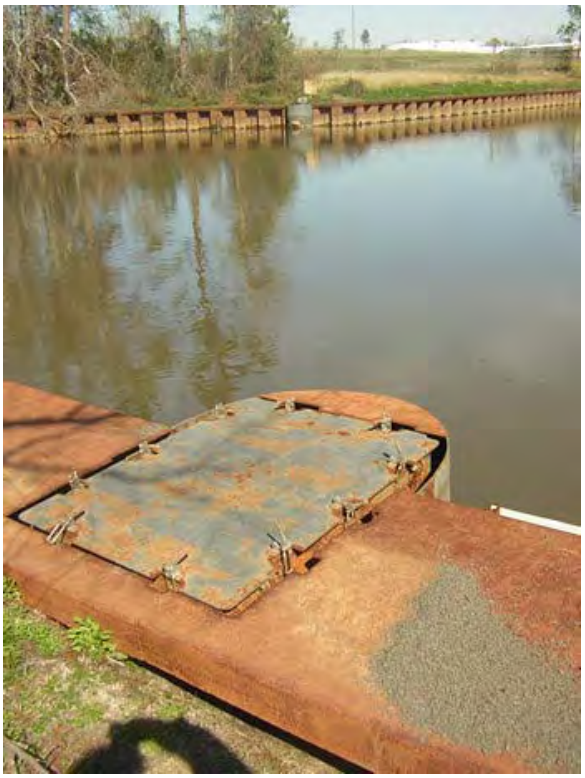

Photo 52: Vault for pipeline at bayou crossing from recovery array 3 to main part of site. Taken 2/16/2006	Filename: DSCN2495.jpg

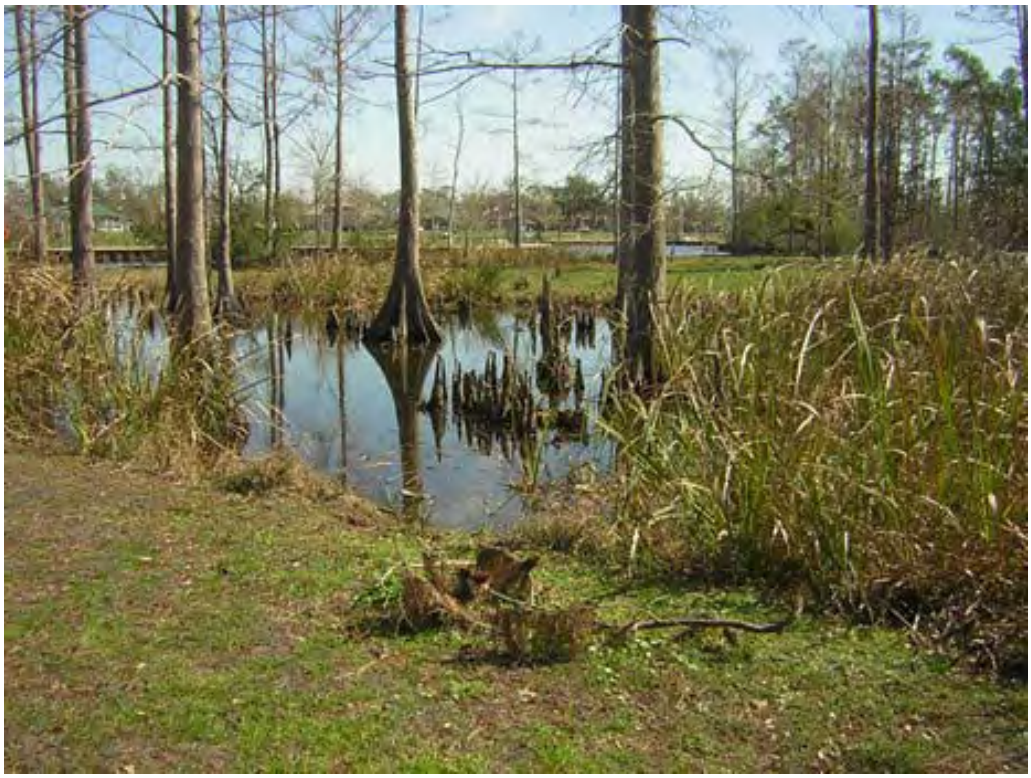

Photo 53: Looking southeast across small wetland that crosses recovery array 3. Taken 2/16/2006	Filename: DSCN2496.jpg

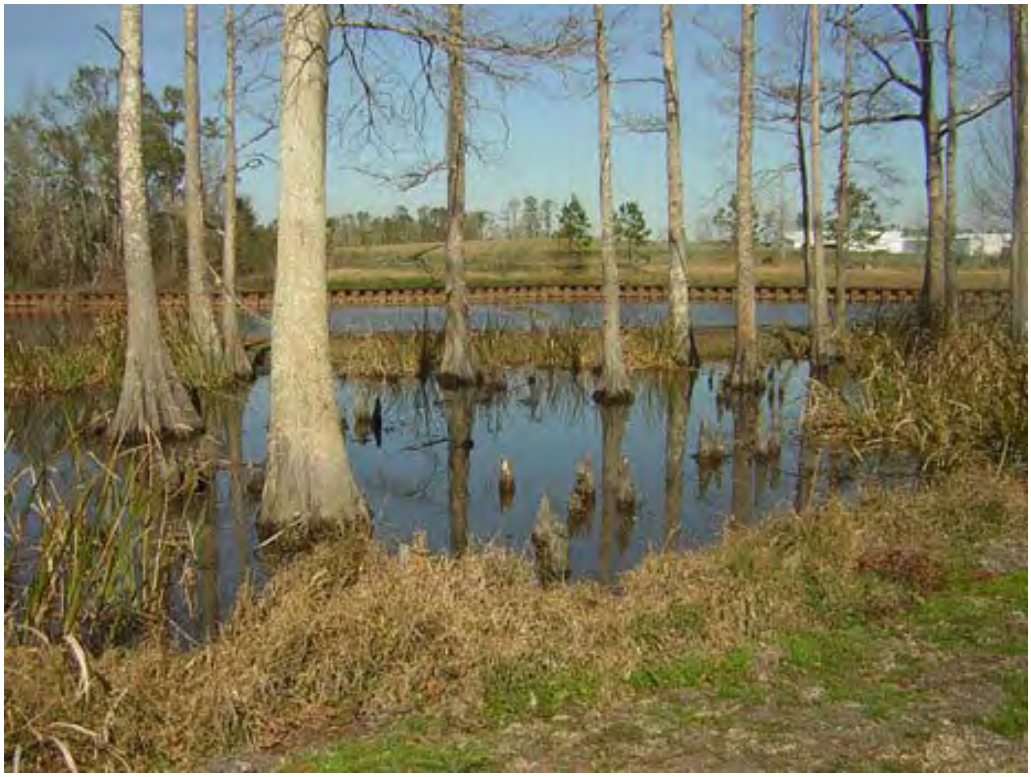

Photo 54: Looking northeast from northern side of Array 3 across bayou towards main part of site. Taken 2/16/2006	Filename: DSCN2497.jpg

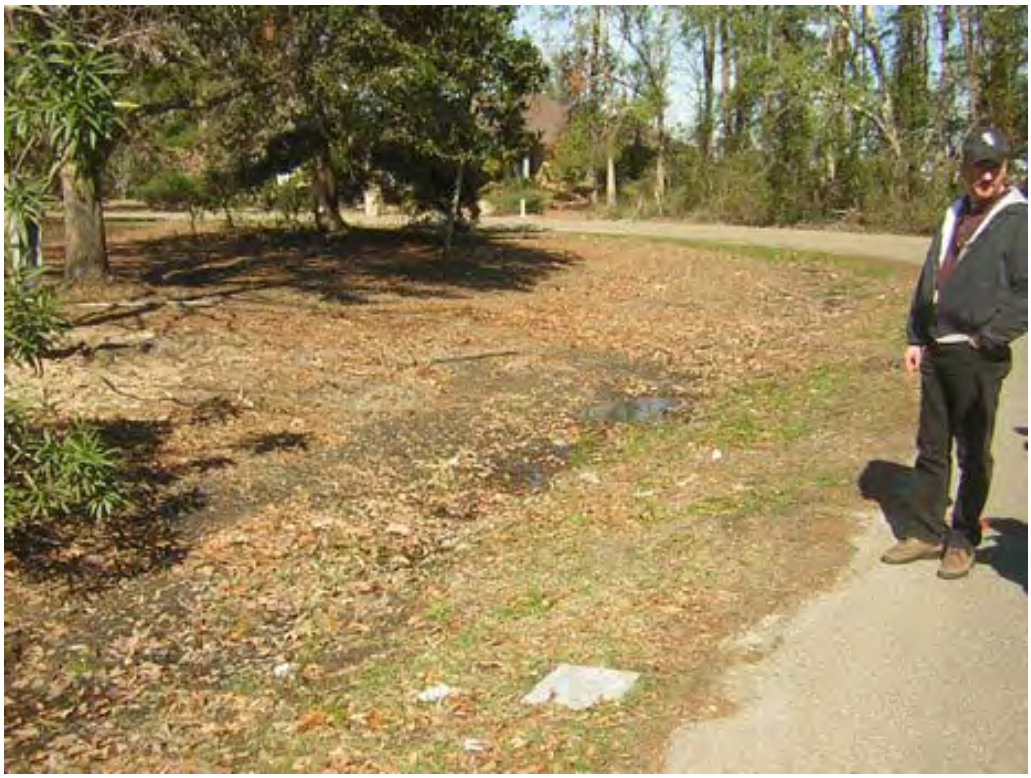

Photo 55: Offsite ground water monitor well MW-5, located on Chamale Drive west of recovery array 3. Taken 2/16/2006	Filename: DSCN2498.jpg

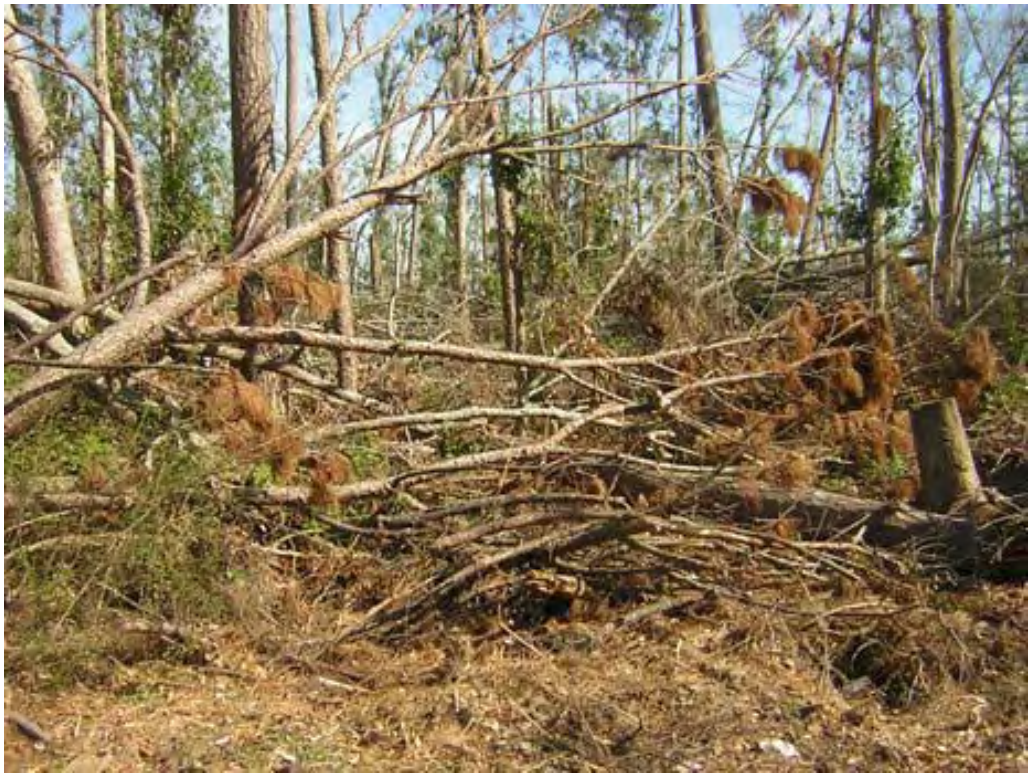

Photo 56: Downed trees along east side of St. Tammany Street. Top rail of perimeter site fence visible in background. Taken 2/16/2006	Filename: DSCN2499.jpg

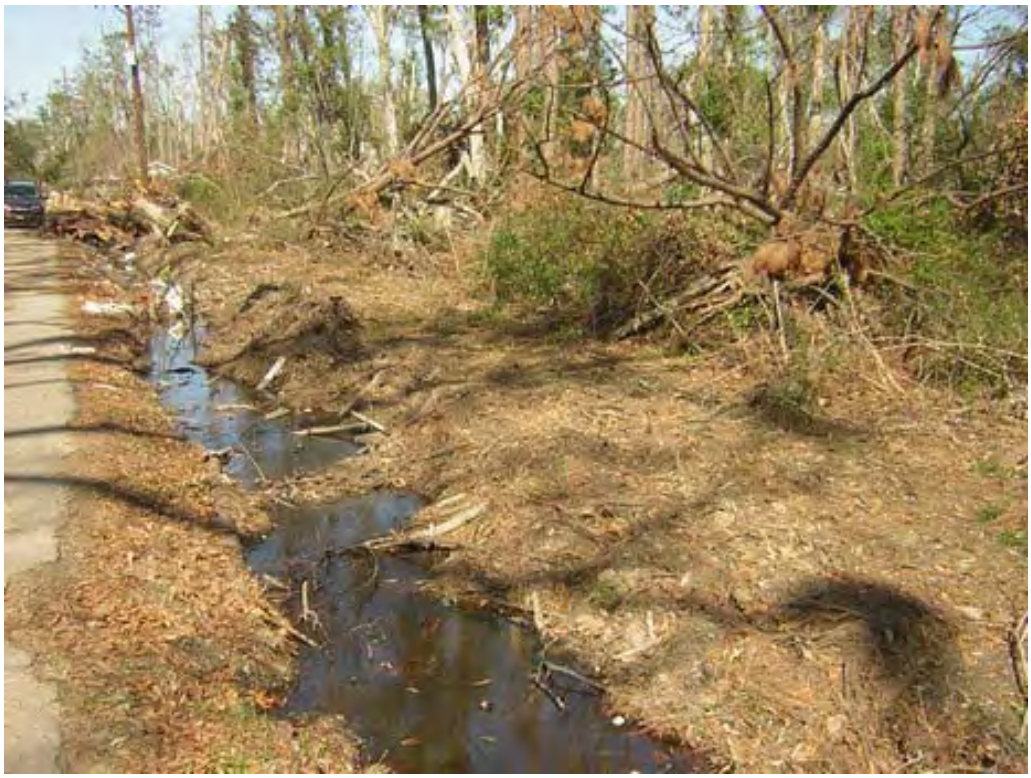

Photo 57: Looking north along the ditch on the east side of St. Tammany Street. Taken 2/16/2006	Filename: DSCN2501.jpg

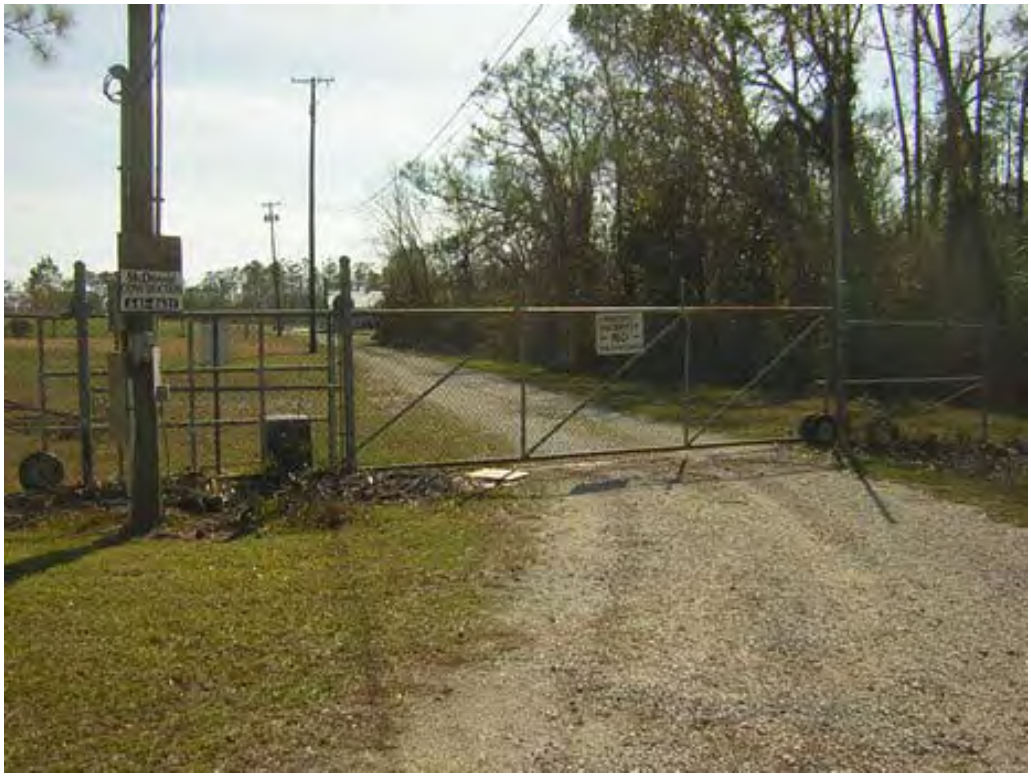

Photo 58: Front gate access to site. Taken 2/16/2006	Filename: DSCN2505.jpg

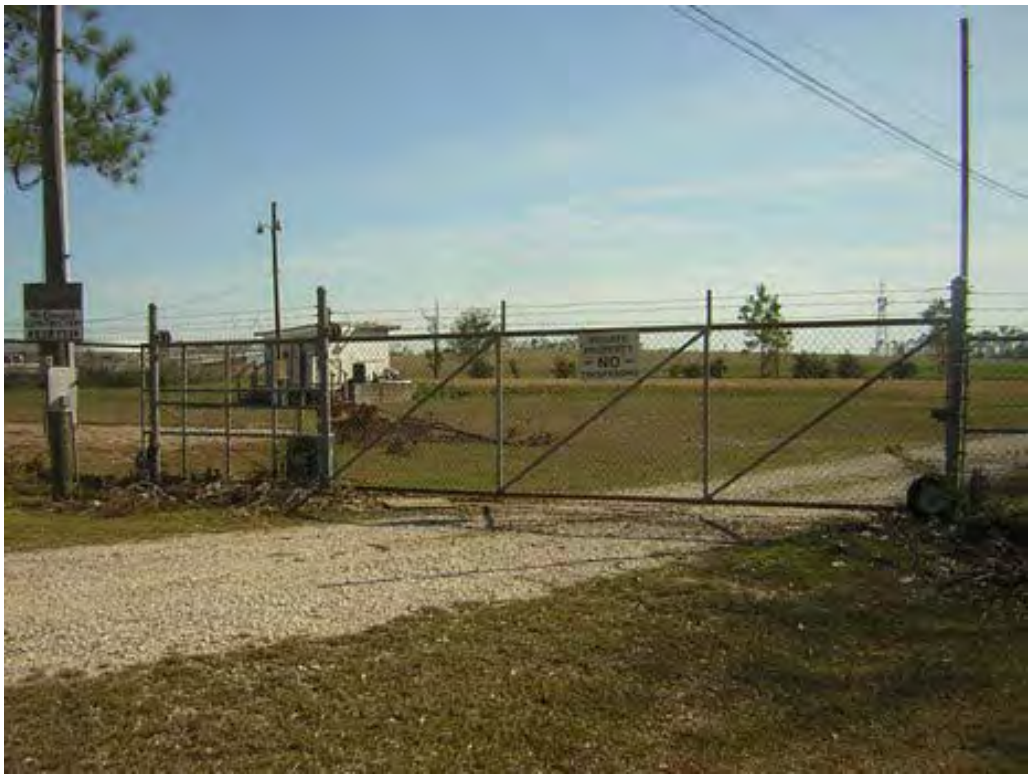

Photo 59: Front gate access to site. Taken 2/16/2006	Filename: DSCN2504.jpg

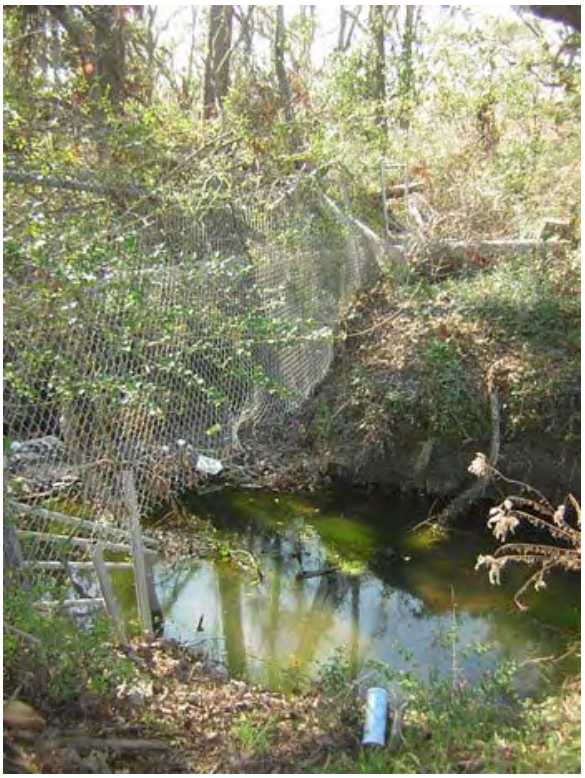

Photo 60: Damaged perimeter fence west of site entrance gate. Taken 2/16/2006	Filename: DSCN2503.jpg

Attachment 5
Notices to the Public Regarding the Five-Year Review

BAYOU BONFOUCA SUPERFUND SITE
PUBLIC NOTICE
U.S. EPA Region 6 Conducts
Third Five-Year Review of Site Remedy

February 2006

The U.S. Environmental Protection Agency Region 6 (EPA) is conducting the third Five-Year Review of remedial actions for the Bayou Bonfouca Superfund Site in Slidell, St. Tammany Parish, Louisiana. The review will evaluate the ability of the remedy to protect public health and the environment. The 54-acre site is located south of West Hall Avenue in Slidell and north of and adjacent to Bayou Bonfouca. EPA's remedy addresses contamination of soils, sediments, and ground water by creosote and other compounds from historic wood treating operations.

Once completed, the results of the third Five-Year Review will be made available to the public at the following information repository:

Slidell Public Library
555 Robert Blvd.
Slidell, LA 70458

For more information about the Site, contact Mike McAteer, Remedial Project Manager, at (214) 665-7157 or 1-800-533-3508 (toll-free) or by e-mail at mcateer.mike@epa.gov. Information about the Bayou Bonfouca Site also is available on the Internet at www.epa.gov/region6/superfund.

CONFIRMED PUBLICATION in the Slidell Sentry-News on February 15, 2006
CH2M HILL/Bernard Hodes 972-980-2170

BAYOU BONFOUCA SUPERFUND SITE PUBLIC NOTICE
U.S. EPA Region 6 Completes
Third Five-Year Review of Site Remedy
July 2006

The U.S. Environmental Protection Agency Region 6 (EPA) has completed the third Five-Year Review of remedial actions for the Bayou Bonfouca Superfund Site in Slidell, St. Tammany Parish, Louisiana. The 54-acre site is located south of West Hall Avenue in Slidell and north of and adjacent to Bayou Bonfouca. EPA's remedy addresses contamination of soils, sediments, and ground water by creosote and other compounds from historic wood treating operations. The review consisted of a site inspection, interviews with persons familiar with the remedial action, and review of data and currently applicable regulatory requirements.

Based on the results of the Third Five-Year Review, the remedy conducted at the Bayou Bonfouca Site is protective of human health and the environment. The next Five-Year Review is scheduled for 2011.

The Third Five-Year Review Report is available for review at the following information repository:

Slidell Public Library
555 Robert Blvd.
Slidell, LA 70458

For more information about the Site, contact Mike McAteer, Remedial Project Manager, at (214) 665-7157 or 1-800-533-3508 (toll-free) or by e-mail at mcateer.mike@epa.gov. Information about the Bayou Bonfouca Site also is available on the Internet at www.epa.gov/region6/superfund.

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