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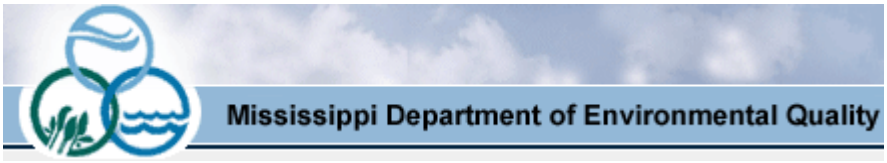


**and**

## MISSISSIPPI BLUFFS INDUSTRIAL PARK, LLC

# Corrective Action Plan

Former Vicksburg Chemical Company
Vicksburg, Mississippi

Agency Interest No. 1766

17 October 2008

ARCADIS

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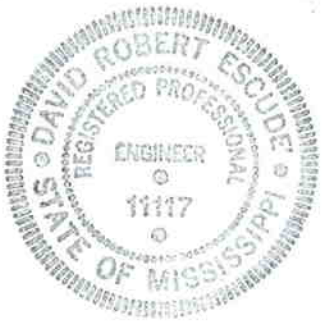


**Corrective Action Plan**

Former Vicksburg Chemical Company
Vicksburg, Mississippi
Agency Interest No. 1766

Prepared for:
Mississippi Department of Environmental Quality and Mississippi Bluffs Industrial Park, LLC

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Our Ref.:
LA002656.0001.00018

Date:
17 October 2008

# Table of Contents

**Tables**



**Figures**



**Appendices**

ARCADIS

## List of Acronyms

Former Vicksburg Chemical Company
Vicksburg, Mississippi
Agency Interest No. 1766

| | |
|---|---|
| CAP | Corrective Action Plan |
| CoC | Chemical of Concern |
| ft bls | Feet Below Land Surface |
| gpm | Gallons per Minute |
| HASP | Health and Safety Plan |
| MCL | Maximum Contaminant Level |
| MDEQ | Mississippi Department of Environmental Quality |
| P&A | Plugged and Abandoned |
| QAPP | Quality Assurance Project Plan |
| RCRA | Resource Conservation and Recovery Act |
| RFI | RCRA Facility Investigation |
| SPLP | Synthetic Precipitation Leaching Procedure |
| SWMU | Solid Waste Management Unit |
| TRG | Target Remediation Goal |
| µg/L | Micrograms per Liter |

## 1. Introduction

ARCADIS was retained by Mississippi Bluffs Development, Inc. (Mississippi Bluffs), to conduct remediation activities at the former Vicksburg Chemical Company (Vicksburg Chemical) located at 4280 Rifle Range Road in Vicksburg, Mississippi (Figure 1). The site was formerly a pesticide and herbicide manufacturing facility divided into two areas called the North Plant and South Plant. Since Vicksburg Chemical declared bankruptcy on March 8, 2002, the site had not been regularly investigated or maintained until ARCADIS began conducting site activities in 2007. This Corrective Action Plan (CAP) presents a plan of action to address environmental concerns detailed in the July 18, 2007, *Site Characterization Report* submitted to the Mississippi Department of Environmental Quality (MDEQ) by ARCADIS.

### 1.1 Objectives/Rationale

There are on-site chemical of concern (CoC) concentrations above restricted MDEQ Tier 1 target remediation goals (TRGs) for soil and groundwater. The objective of the remediation efforts described herein is to mitigate the risk of CoC exposure to human and environmental receptors above regulatory standards. Due to the various media impacted, a multi-faceted approach to site remediation will be implemented. The combination of the solutions listed below will provide a level of protection to human and environmental receptors that is appropriate for the re-use of this site.

## 2. Conceptual Design

Remedial Option 3 presented in the *Site Characterization Report* consists of a combined approach to site remediation including incorporation of solidified pond sludges and impacted soil material into the on-site landfill (Solid Waste Management Unit [SWMU] 2), installation of an engineered cap with stabilization of potential surface soil source areas, installation of a collection trench with a groundwater recovery system, restriction of groundwater used on the property using legal instruments, and long-term groundwater monitoring. The storm water ponds will be evaluated for continued use. The findings of the evaluation will be determined in part by the intended future use as determined by the site developer. In the event that the storm water ponds are not incorporated into the client's site development plan, they will be closed. In addition, areas of the facility may be amenable to in-situ air sparging processes. Air sparging is also included as a potential component of the overall remediation.

### 2.1 Material Consolidation and Landfill Capping

Three areas contain materials of environmental concern that will not be covered by the engineered cap mentioned above and discussed in more detail in Section 2.2. These areas are sludges in the North Pond and the two soil piles in the South Plant. Figure 2 shows the locations of these areas. The material from these areas will be transported to the previously mentioned SWMU 2 landfill for disposal. SWMU 2 is an on-site landfill located in the South Plant.

As reported in the *Site Characterization Report*, analytical testing of the North Pond sludges indicated that this material is nonhazardous. In addition, testing of the physical characteristics of the sludge in the North Pond indicate that the sludges are too weak to be effectively transported (i.e., may not pass paint filter test) and placed, and ultimately will not support the weight of the engineered cap that will be installed over SWMU 2. A solidification study conducted on the pond sludge indicated that it is amenable to reagent additions to increase strength. Additions of Class C fly ash and Portland cement met the established strength criterion for supporting the landfill cap, the more stringent of the transport and support strength requirements. After removal of the North Pond sludges, the pond will be filled and/or re-graded to promote positive drainage.

There are two soil piles in the South Plant that contain approximately 12,500 cubic yards of contaminated material. Due to the presence of elevated levels of toxaphene, the soil piles will be removed and transported to SWMU 2 for disposal. After removal of the soil material to natural ground surface, confirmatory sampling will be conducted to ensure that all of the toxaphene impacts above limiting MDEQ TRGs have been removed. The remaining soil will be sloped to promote drainage.

Once consolidation of the soil piles and pond sludges has occurred, the SWMU 2 landfill will be recapped. The purpose of recapping the landfill is to prevent receptor exposure to the stored material and storm water infiltration.

### 2.2 Engineered Cap

The most widespread environmental impacts at the Vicksburg Chemical facility occurred in the South Plant. The Baseline Site Conceptual Exposure Model indicates that soil contamination resulted from historical surficial spills.

The purpose of an engineered soil cap over this South Plant area is twofold. The soil cap will eliminate human exposure to the covered soil concentrations that exceed

restricted MDEQ Tier 1 TRGs. Secondly, the soil cap will limit the amount of storm water that infiltrates into this area. The limiting of infiltrated storm water will serve to lessen the hydraulic effects that cause subsurface migration of CoC. Boundaries of the engineered soil cap over the South Plant area are depicted on Figure 2.

### 2.3 Collection Trench with Groundwater Recovery

A collection trench with groundwater recovery will be installed in the South Plant. The purpose of the wall will be to intercept CoC that migrate toward Stouts and Hennesseys bayous. CoC migrating toward the bayous will be captured by the groundwater recovery system.

Based on the amenability of some of the CoC with the highest concentrations to in-situ remediation methods, a pilot study may be conducted to evaluate air sparging, dual-phase extraction, and/or chemical oxidation. Prior to installing the collection trench, the results of the pilot study will be evaluated to determine if it is the most feasible option.

### 2.4 Institutional Controls

Institutional controls will be placed on the site to inform the public of the CoC concentrations remaining underneath the soil cap and to ensure that the integrity of the cap is not compromised by future site activities. In addition, the institutional controls will be used to restrict the withdrawal of groundwater at the site.

### 2.5 Long-Term Groundwater Monitoring

Long-term groundwater monitoring will be implemented to ensure that CoC concentrations remain within the hydraulic control of the groundwater collection system. A detailed explanation of the proposed groundwater monitoring is included in Section 8.

## 3. System Components

Different system components will be used in the various areas requiring remediation. A description of these components follows in the subsections below.

### 3.1 Solidification/Stabilization

Two soil samples [S/S-14 (0-2) and S/S-21 (0-2)] in the proposed South Plant capped area had detected concentrations of dinoseb in surface soil samples collected from

0 to 2 feet below land surface (ft bls). Synthetic Precipitation Leaching Procedure (SPLP) analysis indicated that dinoseb had the potential to leach from the soil at a concentration above the MDEQ groundwater Tier 1 TRG for dinoseb. An additional soil sample from the location with the highest dinoseb soil concentration was further analyzed during a stabilization study. Based on the results of the stabilization study, which are included in the *Site Characterization Report*, the addition of a mixture of 2.5 percent activated carbon plus 5 percent Portland cement or 2.5 percent activated carbon plus 15 percent fly ash by volume (or equivalent mixture) prevented dinoseb from leaching above the detection limit in a subsequent SPLP test.

Approximately 375 in-place cubic yards over 7,000 square feet of soil will be stabilized around the S/S-14 (0-2) location prior to grading and cap placement. The soil will be tilled prior to adding the amendments. The amendments will be placed in three applications and will be tilled into the soil. Tilling will continue until all of the reagents have been incorporated into the soil matrix. Confirmation sampling will be conducted after the reagents have been mixed. This sampling will consist of submitting samples to a laboratory for SPLP dinoseb analysis.

### 3.2 South Plant Engineered Cap and SWMU 2 Landfill Cover

The most widespread soil contamination characterized in the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was located in the South Plant process area. Due to the close proximity, but discontinuous nature, of the individual areas of contamination determined in the process areas, this entire area will be covered with an engineered cap. The engineered cap will serve to prevent direct contact with impacted soils near the ground surface. In addition, the cap will minimize the percolation of storm water through contaminated soil.

The soil cap will be placed over the South Plant process area and the SWMU 2 landfill. The extents of the soil caps are shown on Figure 2. Prior to installation of the soil cap, construction plans and specifications will be submitted to MDEQ for approval. The plans and specifications will contain the information needed by a contractor to provide a price and ultimately provide details necessary to construct the soil cap. It will be designed in accordance with Mississippi Commission on Environmental Quality Regulation SW-2 for nonhazardous solid waste landfill cover final cover system or equivalent. Section E.2.a of SW-2 outlines the requirements for a final cover system. The main design requirements are to have an infiltration layer of 18 inches of earthen material with permeability no greater than $1 \times 10^{-5}$ centimeters per second. An erosion layer consisting of at least 6 inches of earthen material capable of sustaining native

plant growth will be emplaced over the infiltration layer. A conceptual drawing depicting the cross section of the engineered soil cap is included as Figure 3.

### 3.3 Collection Trench with Groundwater Recovery

The natural groundwater gradient in the first encountered permeable zone at the site flows toward Stouts and Hennesseys bayous. This natural groundwater flow has transported historically released contamination toward the bayous. Groundwater modeling conducted using data collected in 2007 and 2008 indicated that, under current conditions, groundwater contamination will continue to migrate and could eventually be released to these surface water bodies. To prevent the release of contaminant concentrations above regulatory levels to the bayous, a collection trench with groundwater recovery will be installed in the South Plant.

The collection trench will be installed at the location shown on Figure 2. Prior to installation of the trench, construction plans and specifications will be submitted to MDEQ for approval. The plans and specifications will contain the information needed by a contractor to provide a price and ultimately provide details necessary to construct the soil cap. The collection trench will be installed from ground surface to an approximate maximum depth of 65 ft bls. A soil investigation conducted in 2007 indicated that the first impermeable layer, the Byram marl, is located at that depth in the proposed collection trench location. A top of Byram marl structure map is included as Figure 4. The collection trench will be completed in this layer.

Contaminant transport modeling indicated that a collection trench without groundwater recovery would not prevent contaminant concentrations above regulatory levels from reaching the bayous. A horizontal recovery trench will be installed in conjunction with the collection trench. The groundwater model indicated that the formation would support a groundwater recovery rate of 6.2 gallons per minute. This is approximately the maximum rate of groundwater recovery for this area. This recovery rate should maintain a water level near the collection trench of 30 to 40 ft bls. A conceptual detail depicting the collection trench is included as Figure 5.

The groundwater recovery system will be designed to maintain a 6-gallon-per-minute (gpm) recovery rate. Based on the results of the groundwater model, operation of the recovery trench may last 50 years. The recovered groundwater will be collected in two holding tanks, tested, and pumped to the City of Vicksburg wastewater treatment plant.

## 4. Schedule

A Gantt chart showing the project schedule is provided in Appendix A. The activities listed in Appendix A are contingent on MDEQ approval of this CAP.

Initial site activities will consist of preparation of the site for the engineered cap, landfill cover, and collection trench installations. The work is expected to be completed in two phases. Each phase will have a bid process that consists of design, developing the scopes of work, developing the construction specifications, conducting a bid walk, evaluating bids, and awarding of the work.

The first bid process will consist of solicitation of estimates for solidification of the North Pond sludge, transportation of the sludge to SWMU 2, transportation of the material in soil piles to SWMU 2, stabilization of the area near S/S-14 (0-2), and surveying of SWMU 2 after the pond sludge and soil pile material have been placed into SWMU 2. Upon awarding the work, ARCADIS will provide oversight to ensure that it is completed to specifications and in a timely manner.

The second bid process will consist of solicitation of estimates for the installation of the engineered cap, installation of the SWMU 2 cover, and installation of the collection trench. Upon awarding the work, ARCADIS will provide oversight to ensure that it is completed to specifications and in a timely manner.

## 5. Remedial Goals

MDEQ established soil and groundwater standards for Brownfields sites. These standards are known as MDEQ Tier 1 TRGs. Due to the institutional control that will be filed to protect the engineered cap and limit groundwater use, the restricted TRGs for soil are appropriate.

Remedial goals for this project will be the MDEQ Tier 1 TRGs promulgated in 2002, with the exception of the soil and groundwater standards listed for arsenic. The groundwater standard listed in the Tier 1 TRGs is 50 micrograms per liter (µg/L), the former maximum contaminant level (MCL). The U.S. Environmental Protection Agency lowered the MCL to 10 µg/L from 50 µg/L in 2001. The lower MCL will be applied to the arsenic concentrations measured at the site. At the site, 11.8 milligrams per kilograms is used as the arsenic regulatory standard for soil. This standard is based on the 95 percent upper confidence limit of the mean of the background concentration. All of the other groundwater and restricted soil standards will be applied as listed.

## 6. Operation and Monitoring Plan

The following sections describe the activities to be conducted during the period after the installation of the engineered cap and collection trench. An air sparging pilot study was in progress during the submittal of this CAP. If an air sparging system is installed as a final remedial measure, a separate plan will be developed for the operation and monitoring of that system.

The sustainability of the remediation systems will be factored into the system design. Conventional system components will be compared to more efficient and potentially more costly sustainable designs. Life cycle cost comparisons will be used for each component and/or system evaluated.

### 6.1 Engineered Cap and Landfill Cover Inspections

#### 6.1.1 Inspections

The engineered cap will be designed to have a minimum infiltration layer thickness of 18 inches and an erosion layer thickness of 6 inches. During installation, the thickness of the infiltration and erosion layers will be verified by conducting topographic surveys of each layer. Once completed, as-built drawings of the engineered cap will be submitted to MDEQ.

After installation, the engineered cap and landfill cover will be inspected quarterly and after major repair events. The inspections will be performed under the supervision of an environmental professional qualified to perform such inspections. The inspection report will include observations such as the date, any unusual cover conditions or defects observed (i.e., erosion of the soil, loss of vegetated or limestone cover, presence of deep-rooted plants or bushes, burrows of small animals, slumping or sliding, rilling) or other damage to the caps. The inspection report will also identify any actions needed or taken to correct the unusual condition or defect. The results of the inspections will be presented to MDEQ annually.

Appropriate repairs will be made to address significant defects encountered in the vegetated covers. Inspections will focus on identifying any area having a significant defect. Significant defects include such items as a section of cover greater than 100 square feet without any vegetation, or which holds standing water longer than 5 days, or which contains desiccation cracks greater than 6 inches deep; an area of the side slope of the cover 10 linear feet long, measured horizontally along the top of the cover, which contains two or more erosional gullies 6 inches deep or deeper; or

an area of the side slope of the cover that has experienced slope failure. However, these dimensions are only guidelines and do not supersede best professional judgment.

Depending on the defects encountered, appropriate repairs will be suggested to MDEQ. These repairs may include filling any eroded gullies or depressions, re-seeding vegetation, or removing deep-rooted plants. Any repairs involving replacement of soil to fill depressions, gullies, etc., or re-grading that disturbs the existing vegetated cover will be temporarily protected from erosion until the grass is re-established, if necessary. Methods of temporary erosion protection may include the use of hydroseeding or similar application methods and erosion protection nets, fabrics, etc., for large areas or sod for small areas. The vegetation cover will be mowed as necessary to prevent the growth of weeds and trees that could damage the cover.

#### 6.1.2 Construction Restrictions

The purpose of the engineered cap is to mitigate the exposure of receptor populations to chemicals located in the subsurface. Restrictions will be placed on construction activities which may require penetration through the engineered cap and in the vicinity of the collection trench. While construction through the cap may be technically feasible, it will be highly discouraged. Construction above the vegetated cover of the engineered cap may be allowed as long as the integrity of the cap is maintained during and verified after the construction process. Any construction in these areas requires prior approval from MDEQ.

### 6.2 Operation and Maintenance of the Groundwater Recovery System

A main component of the collection trench is the groundwater recovery system. The groundwater recovery system will consist of a horizontal collection trench laid with a more permeable material than the native soil. Groundwater will migrate through the more permeable material and into the piping for collection. The collected groundwater will be pumped to the surface directly into the treatment system.

The treatment system will be designed for a minimum flow rate of 6 gallons per minute. The system will consist of a pump or pumps to transmit groundwater to the surface. Once on the surface, the groundwater will be pumped to an initial holding tank. Depending on the CoC concentrations of the recovered groundwater, the water will then be pumped directly to the City of Vicksburg publicly owned treatment works for treatment, or will be pretreated on site.

The system will utilize electrical pumps and piping to transfer the groundwater to the different systems. In addition, a telemetry system will be incorporated into the treatment system. This system will provide information to a remote user on the operational status of the recovery system.

### 6.3 Inspection Form

The quarterly inspections of the engineered cap, landfill cover, and groundwater recovery system will be reported on the appropriate inspection forms included in Appendix B. The inspection forms include the following common items:

- The date and time of inspection;
- The name and signature of the inspector;
- Documentation of the observations performed at site-specific areas (erosion, animals/vectors, vegetation, etc.); and
- Documentation of the presence and functionality of safety and emergency equipment.

In addition to the above items, the inspection forms for the groundwater recovery system will include inspection items pertaining to the recovery systems as outlined below:

- Documentation of recovery well(s) integrity; and
- Documentation of the condition of the recovery system.

In the event problems are encountered during the routine inspections, MDEQ will be notified. Upon approval by MDEQ, appropriate repair actions consistent with the nature of the problem will be initiated. Any action taken will be noted in detail in the annual report of conditions to MDEQ.

### 6.4 Frequency of Inspections

Mississippi Bluffs is proposing to conduct quarterly site inspections. The results of quarterly inspections will be kept on file at ARCADIS' Baton Rouge, Louisiana, office. In addition to the monthly inspections, Mississippi Bluffs will conduct inspections during significant repairs and/or major rainfall events.

Excessive rainfall events are those that exceed a 25-year rainfall event of approximately 3.1 inches in 1 hour or the 24-hour/25-year maximum, which is approximately 7.8 inches for Vicksburg. These additional inspections will occur within 4 to 6 days after the rainfall event. No more than one additional inspection will be performed in any given calendar month. Inspection forms will be completed to document all site inspections.

### 6.5 Annual Reporting

Mississippi Bluffs will submit a summary of the inspection results in the annual report to MDEQ documenting site conditions during the previous year of post-closure. The summary will include a statement of physical conditions of the site, maintenance activities conducted during the post-closure period, and any necessary repair measures taken to correct deficiencies noted during the inspection(s).

### 6.6 Financial Considerations

The long-term funding of the sampling, recovery system operation, and maintenance activities presented in this CAP will be financed with the earnings of money remaining in the MDEQ remediation account after the implementation of the corrective action. It should be noted that a major cost item for long-term operations will be the analytical costs associated with the compliance monitoring plan. This cost should be reviewed and discussed with MDEQ on a regular basis in the future to determine the continued appropriateness of the parameter sets and frequency of analysis to monitor the effectiveness of the remediation.

## 7. Performance Monitoring Plan

The performance of the engineered cap and landfill covers will be monitored at installation. The permeability performance criteria discussed in Section 3.2 will be met prior to the completion of the cap. Visual monitoring for structural integrity will take place quarterly. The visual inspections will be documented on the forms included in Appendix B.

Based on the results of groundwater modeling, the groundwater elevation at the trench should be hydraulically controlled at an elevation of 70 feet (approximately 30 to 40 ft bls) through a pumping rate of 6.2 gpm. This extraction rate is approximately the maximum pumping rate that the formation will support according to the model.

Both the groundwater elevation and pumping rate will be used as performance measures. The performance of the groundwater recovery system will be determined through the monitoring of groundwater elevations and throughput of the recovery system. The groundwater elevations will be used to develop potentiometric maps of the groundwater surface. These maps will show the elevation of the groundwater surface in the vicinity of the collection trench. It should be noted that the maximum extraction rate is a calculated value. During the first year of operation, the throughput capable to be sustained by the formation will be determined. This level will be continually monitored for the duration of operation of the recovery system.

While the potentiometric maps and evaluation of the pumping rate are important, the ultimate goal of the groundwater recovery system is to prevent discharge of CoC concentrations above Tier 1 TRGs to the surface water bodies. Keeping this in mind will help to ensure that appropriate conclusions are drawn from the performance data.

## 8. Compliance Monitoring Plan

The goal of the Compliance Monitoring Plan is to demonstrate that groundwater with CoC concentrations greater than the MDEQ Tier 1 TRGs are not migrating from the site. This will be measured by sampling the groundwater at regularly scheduled intervals.

### 8.1 Monitor Well Network

The existing groundwater monitor well network shown on Figure 6 was installed during the RFI. Based on a review of the well network and the remedial measures presented in this CAP, the RFI well network would have some redundancies and data gaps if applied as the compliance plan well network. The proposed monitor well network shown on Figure 7 will serve to monitor the performance of the engineered cap and collection trench after installation of these remedial measures. The proposed network will utilize many of the existing wells; however, some of the existing wells will be plugged and abandoned (P&A). No wells that are located outside of the boundaries of the engineered cap and have CoC concentrations in excess of MDEQ Tier 1 TRGs will be P&A. In addition, new wells are proposed to fill in gaps in spatial coverage not covered by the remaining wells. A conceptual drawing depicting the well construction details for the proposed wells is included as Figure 8.

The wells will be installed by a well installation contractor licensed by the State of Mississippi. After installation, the wells will be surveyed by a professional surveyor

licensed by the State of Mississippi. The surveyed measurements and depth to water level measurements will be used to develop potentiometric maps. The maps will be included in the annual report.

### 8.2 Sample Parameters

Groundwater sampling of the existing wells and seven temporary wells was conducted in 2007 and 2008. With MDEQ's approval, the CoCs identified for sampling during these events were the volatile organic compounds listed in Appendix IX of 40 Code of Federal Regulations 264, selected semivolatile organic compounds [acetophenone, atrazine, bis(2-ethylhexyl)phthalate, cyanazine, 4-nitrophenol, pentachlorophenol], pesticide (toxaphene), herbicide (dinoseb), and arsenic. These CoC were selected based on the results of the RFI. A review of the soil and groundwater data collected during the 2007 and 2008 sampling efforts detailed in the *Site Characterization Report* indicated that 64 soil CoCs and 48 groundwater CoCs did not have measureable concentrations in any of the samples analyzed during these sampling events. In addition, based on the 2007 and 2008 soil and groundwater results, some CoC were not detected above MDEQ Tier 1 TRGs in any well. The proposed list of CoC for long-term monitoring was developed by removing the CoC that were not detected or were not detected above MDEQ Tier 1 TRGs in any of the wells from the CoC list approved for sampling by MDEQ. Tables 1 and 2 include the proposed list of soil and groundwater CoC for long-term monitoring, respectively.

## 9. Contingency Plan

The actions described below are a guideline on how to implement potential contingency plans. Prior to implementation, approval of any activities considered contingency measures will be obtained from MDEQ.

In the event that a CoC concentration above MDEQ Tier 1 TRGs is detected, the accuracy of the data will be evaluated. If the exceedance is reported for a well that has historically had contaminant concentrations, this concentration will be evaluated within the conceptual understanding of contaminant locations at the site. For wells that have not had prior exceedances of a Tier 1 TRG, the appropriateness of conducting the following activities will be discussed with MDEQ.

The well will be resampled for each CoC out of compliance. Sampling will take place as soon as practical after validating the data. If an exceedance of Tier 1 TRGs is confirmed, the actions below will be implemented.

The well where the exceedance was detected will be evaluated for conversion to a recovery well to be piped to the groundwater recovery system. If conversion to a recovery well is impractical due to incompatibility with the recovery system treatment process, piping layout considerations, etc., regularly scheduled vacuum extraction events may be conducted on the well to remove contaminated groundwater. The frequency and duration of these groundwater extraction events will be determined at that time. During these events, a vacuum truck will be connected directly to the well or a Tremie pipe installed in the well for the removal of groundwater.

If active remediation processes need to be conducted in a sentinel well, that well's status will be reevaluated. An additional sentinel well(s) may be installed at a downgradient location to monitor this area for exceedances of the Tier 1 TRGs. If there is no space to place a downgradient well because of the proximity to the bayou, an evaluation of applicable surface water criteria and a surface water sampling program will be explored with MDEQ.

The newly installed well(s) will be incorporated into the sampling program. Wells that exhibit concentrations below Tier 1 TRGs for a period of 1 year will be reevaluated to determine if recovery operations can be suspended.

## 10. Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP)

A QAPP was submitted to MDEQ for this site on September 14, 2006. The procedures outlined in the QAPP will be followed for the activities required by this CAP.

A HASP was submitted to MDEQ in 2006. Updates to the HASP have been made as necessary for additional work conducted at the site. The HASP is reviewed and amended as necessary prior to construction events or other events that can have an adverse impact on human health or the environment.

## 11. Reuse Planning

Upon completion of the activities described in this CAP, the site will be suitable for a variety of industrial and commercial uses with some limitations. There will be aboveground and underground structures (i.e., small building to house remediation equipment, piping corridors, monitor wells, etc.) remaining at the site that will be necessary to continue the remediation of groundwater. Any activities conducted in the area should be in compliance with the institutional controls placed on the property, especially as they relate to the restricted use of groundwater. Penetrations or removal

of earthen material should not be conducted in the areas of the engineered cap, the landfills (SWMU 2 and SWMU 3), and the collection trench. If development is desired in these areas, placement of material over the final grades of the remediated areas may be acceptable, but must be coordinated with MDEQ. In addition, well structures must not be removed; however, areas where wells exist can be incorporated into any development as long as worker access to the wells is maintained. The storm water ponds may be incorporated into development plans with consent from MDEQ. Depending on the use of the storm water ponds, an MDEQ permit may be required.

One of the goals of the remediation efforts is to provide a site where worker exposure to concentrations of COCs is at an acceptable level as determined by compliance with MDEQ Tier 1 TRGs for groundwater and restricted use of soil. The limitations of the remedial efforts with respect to the usage of a restricted use scenario for soil as defined by MDEQ regulations should be reviewed to ensure that site workers are protected for any reuse project. In addition, the addition of any enclosed structures to areas of the site with known volatile contamination pose particular risks. Any proposed construction over these areas needs prior MDEQ approval.

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Table 1. Proposed Soil Chemicals of Concern, Corrective Action Plan, Former Vicksburg Chemical Company, Vicksburg, Mississippi.

| Parameter | Analytical Method | CAS No. | Soil Tier 1 TRG Restricted (mg/kg) |
|---|---|---|---|
| Arsenic* | SW-846 6020 | 7440382 | 11.8 |
| Toxaphene | SW-846 8081 | 8001352 | 5.2 |

CAS Chemical Abstract Service.
mg/kg Milligrams per kilogram.
TRG Target Remediation Goal.
* 11.8 mg/kg based on Mississippi Department of Environmental Quality approval of the Upper Confidence Limit of the mean of the background concentration.

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Table 2. Proposed Groundwater Chemicals of Concern, Corrective Action Plan, Former Vicksburg Chemical Company, Vicksburg, Mississippi.

| Parameter | Analytical Method | CAS No. | Groundwater Tier 1 TRG (mg/L) | Reporting Limit (mg/L) |
|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane(1) | SW-846 8260B | 630206 | 0.000406 | 0.005 |
| 1,1,2-Trichloroethane | SW-846 8260B | 79005 | 0.005 | 0.005 |
| 1,2,4-Trimethylbenzene | SW-846 8260B | 95636 | 0.0123 | 0.005 |
| 1,2-Dichloroethane | SW-846 8260B | 107062 | 0.005 | 0.005 |
| 1,3,5-Trimethylbenzene | SW-846 8260B | 108678 | 0.0123 | 0.005 |
| Arsenic* | SW-846 6020 | 7440382 | 0.05 | 0.01 |
| Arsenic, Dissolved* | SW-846 6020 | 7440382 | 0.05 | 0.01 |
| Atrazine(1) | SW-846 8270 | 1912249 | 0.003 | 0.01 |
| bis(2-Ethylhexyl)phthalate(1) | SW-846 8270 | 117817 | 0.006 | 0.01 |
| Bromodichloromethane(1) | SW-846 8260B | 75274 | 0.000168 | 0.005 |
| Bromoform | SW-846 8260B | 75252 | 0.00848 | 0.005 |
| Carbon tetrachloride | SW-846 8260B | 56235 | 0.005 | 0.005 |
| Chloroform(1) | SW-846 8260B | 67663 | 0.000155 | 0.005 |
| Dibromochloromethane(1) | SW-846 8260B | 124481 | 0.000126 | 0.005 |
| Dinoseb | SW-846 8151 | 88857 | 0.007 | 0.002 |
| Pentachlorophenol(1) | SW-846 8270 | 87865 | 0.001 | 0.01 |
| Tetrachloroethene | SW-846 8260B | 127184 | 0.005 | 0.005 |
| Toxaphene(2) | SW-846 8081 | 8001352 | 0.003 | 0.002 |
| Trichloroethene | SW-846 8260B | 79016 | 0.005 | 0.005 |
| Vinyl Chloride | SW-846 8260B | 75014 | 0.002 | 0.005 |

(1) When the TRG was less than the Reporting Limit (RL), the RL was used as the screening value.

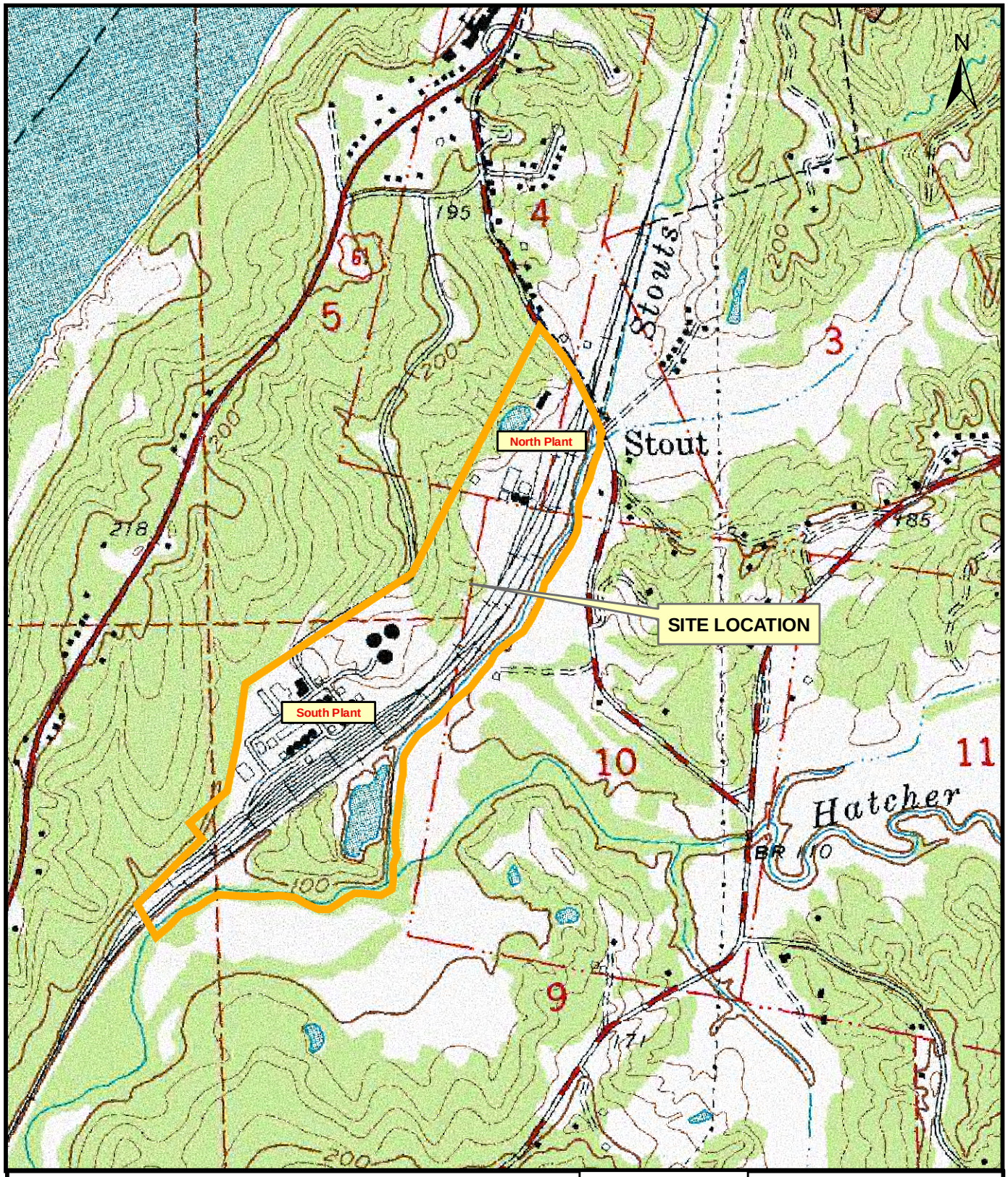
(2) All results are non-detect; however, elevated reporting limits exceeded the Tier 1 TRG in several samples.

CAS Chemical Abstract Service.

mg/L Milligrams per liter.

TRG Target Remediation Goal.

* While the Mississippi Department of Environmental Quality Tier 1 TRG for arsenic is 0.05 mg/L, the U.S. Environmental Protection Agency-mandated maximum contaminant level for arsenic is 0.01 mg/L and was used as the screening value.




Former Plant Site

**Note: Approximate Property Boundary**

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Tel: 225.292.1004 Fax: 225.218.9677

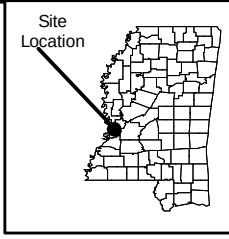
**REFERENCE:**

USGS, Vicksburg West Quadrangle, Mississippi
7.5 Minute Series (Topographic)

# SITE LOCATION MAP

FORMER VICKSBURG
CHEMICAL COMPANY

VICKSBURG, MISSISSIPPI




500 0 500 1,000
Feet

| | |
|---|---|
| Project Manager: JE | Completed By: JC |
| Task Manager: CD | Date: 07/09/2007 |
| Project No.: LA002656.0001 | Figure No.: 1 |

U:\projects\Vicksburg\LA002656.0001.00002\plotfiles\Vicksburg_SiteMap.pdf

User Name : smen

Path\Name : G:□APROJECT□Mississippi Bluffs□LA002656.0001□Figures□CORRECTIVE ACTION PLAN□2656-01-18-02.dwg


LEGEND

- PROPOSED SOUTH PLANT SOIL CAP BOUNDARY (AREA DELINEATED)
- IN-SITU AIR SPARGE PILOT STUDY
- PROPOSED COLLECTION TRENCH

0 200' 400' 800'



| DRAWN BY | CHECKED |
|---|---|
| D. EKINIA | CAD |
| PROJECT MANAGER | DEPARTMENT MANAGER |
| DRE | DRE |
| DATE | TASK/PHASE NUMBER |
| 05-16-07 | 0018 |

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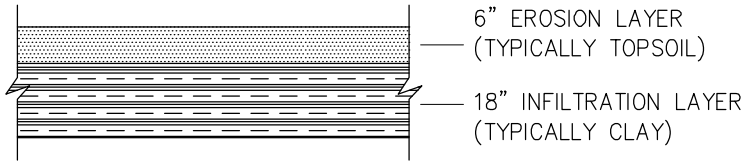
# REMEDIAL OPTION MAP

FORMER VICKSBURG CHEMICAL COMPANY SITE

PROJECT NUMBER
LA002656.0001

DRAWING NUMBER
2




## CAP DETAIL

SCALE: NTS





| | |
|---|---|
| DRAWN BY: S. MEN | CHECKED: CAD |
| PROJECT MANAGER: D. ESCUDE' | DEPARTMENT MANAGER: D. ESCUDE' |
| DATE: 2008 | TASK/PHASE NUMBER: 0018 |

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# CONCEPTUAL DETAILS OF ENGINEERED SOIL CAP

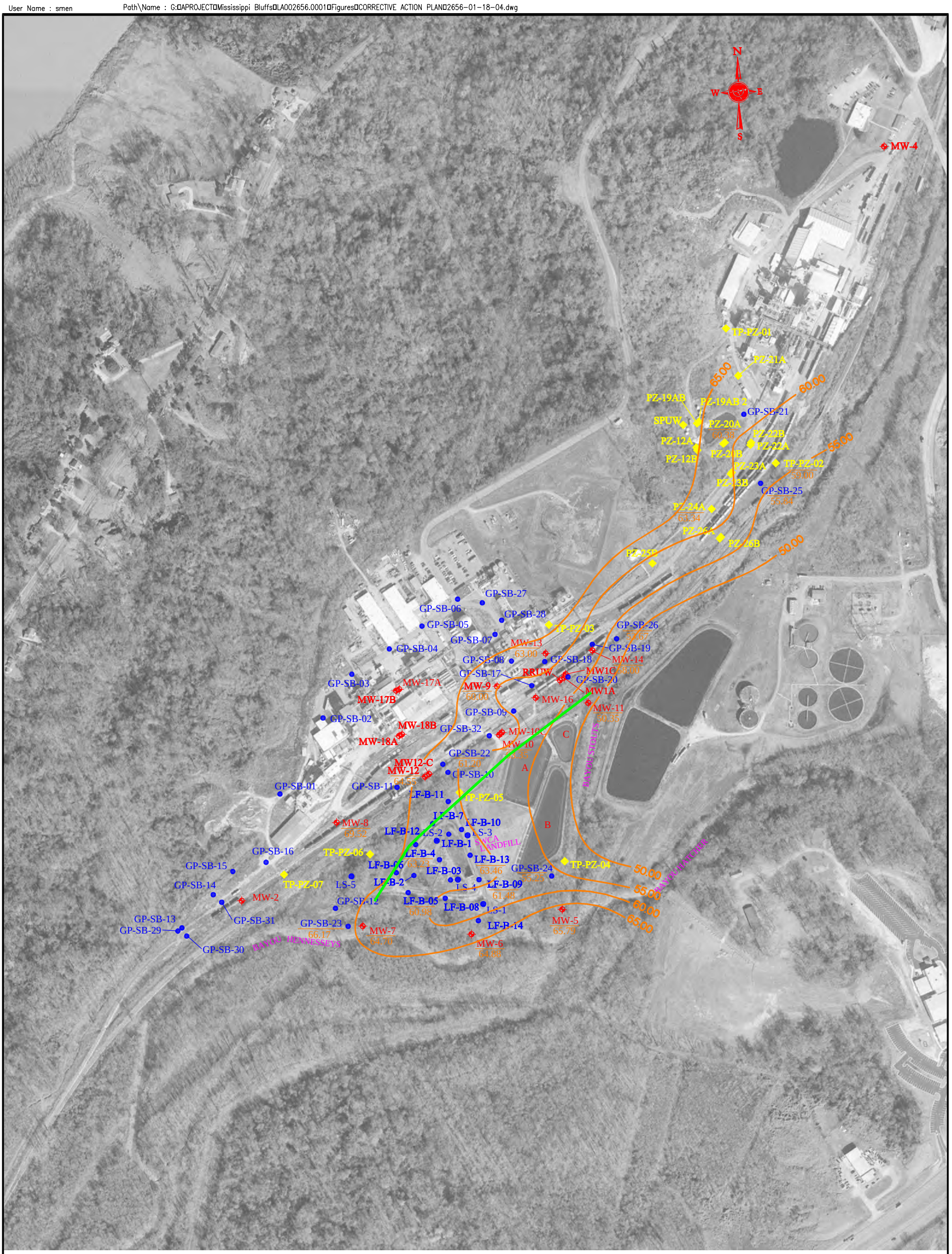
FORMER VICKSBURG CHEMICAL COMPANY SITE

PROJECT NUMBER: LA002656.0001

DRAWING NUMBER: 3

User Name : smen

Path\Name : G:□APROJECT□Mississippi Bluffs□LA002656.0001□Figures□CORRECTIVE ACTION PLAN□2656-01-18-04.dwg




LEGEND

- LF-B-13 — SOIL BORING LOCATION AND DESIGNATION
- MW-6 — MONITOR WELL LOCATION AND DESIGNATION
- TP-PZ-05 — PIEZOMETER LOCATION AND DESIGNATION
- PROPOSED COLLECTION TRENCH
- 55.25 — TOP OF BYRAM MARL (IN FEET MSL)
- 60.00 — STRUCTURE CONTOUR LINE (IN FEET MSL)

NOTES:

1.) BORINGS WITH NO VALUES DID NOT PENETRATE DEEP ENOUGH TO EVALUATE THE BYRAM MARL.

2.) CONTOUR INTERVAL IS FIVE (5) FEET.

0 200' 400' 800'



| | |
|---|---|
| DRAWN BY: SMEN | CHECKED: J. ELLIS |
| PROJECT MANAGER: DRE | DEPARTMENT MANAGER: DRE |
| DATE: OCT 2007 | TASK/PHASE NUMBER: 0018 |

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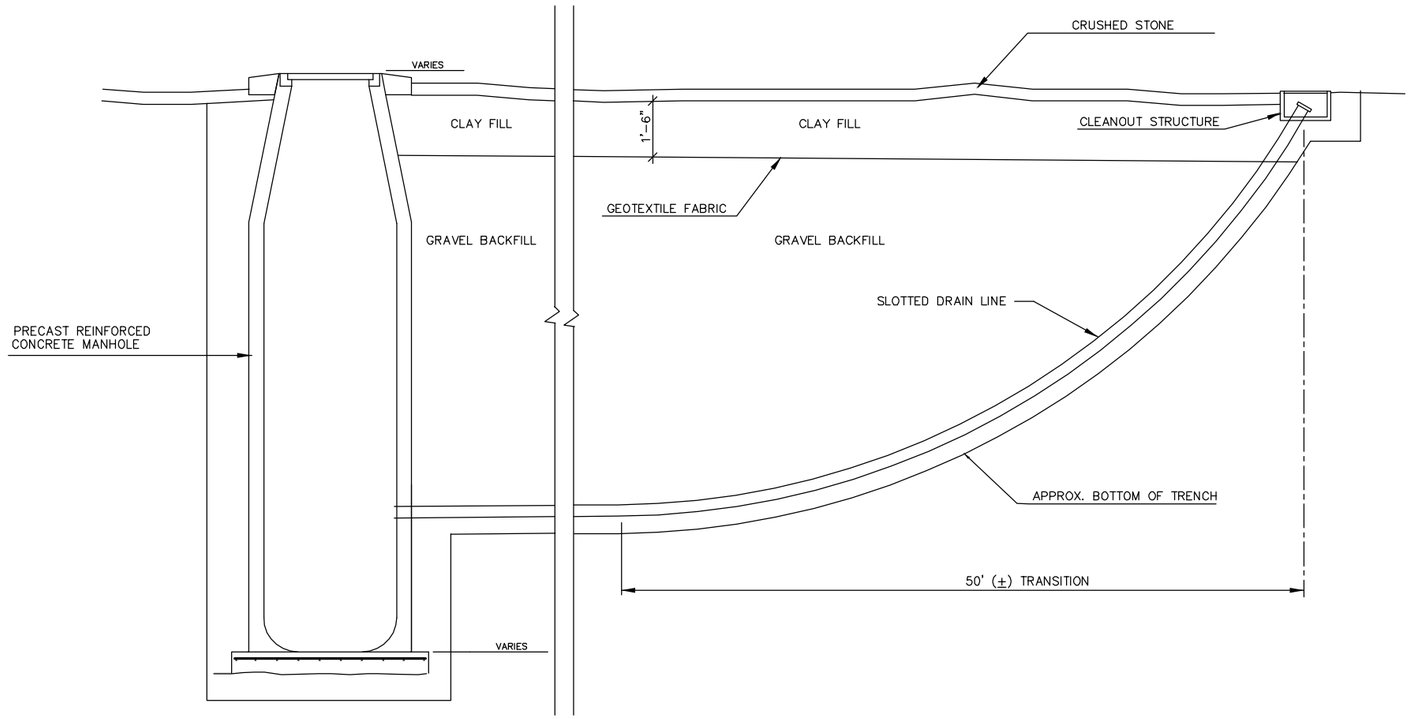
# TOP OF BYRAM MARL STRUCTURE MAP

FORMER VICKSBURG CHEMICAL COMPANY SITE

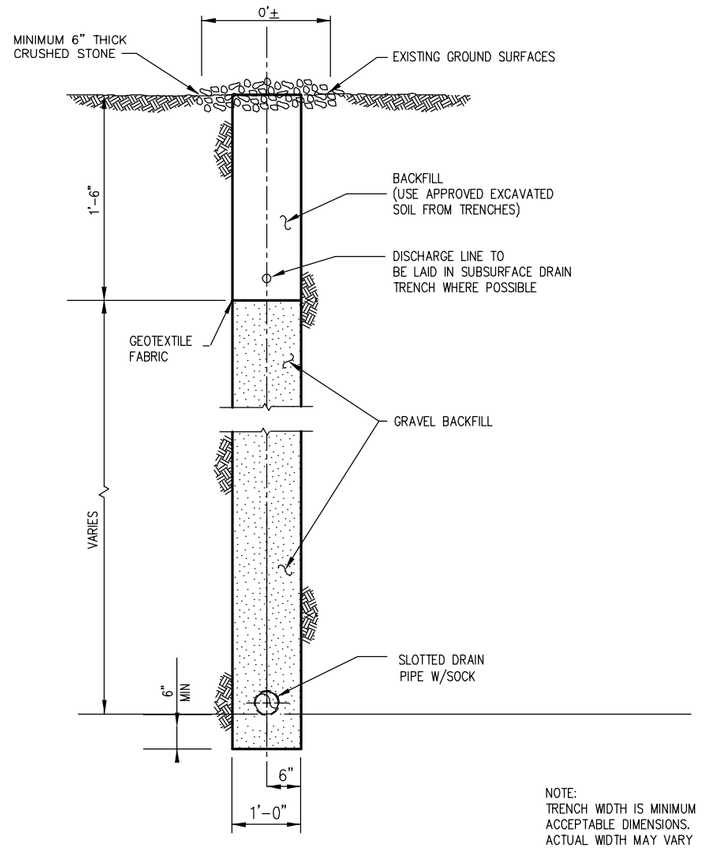
PROJECT NUMBER: LA002656.0001

DRAWING NUMBER: 4




## TYPICAL SUBSURFACE DRAIN SYSTEM PROFILE

NOT TO SCALE




## TYPICAL CROSS SECTION OF SUBSURFACE DRAIN

NOT TO SCALE



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| REV. | ISSUED DATE | DESCRIPTION |
|---|---|---|

SEAL

SHEET TITLE

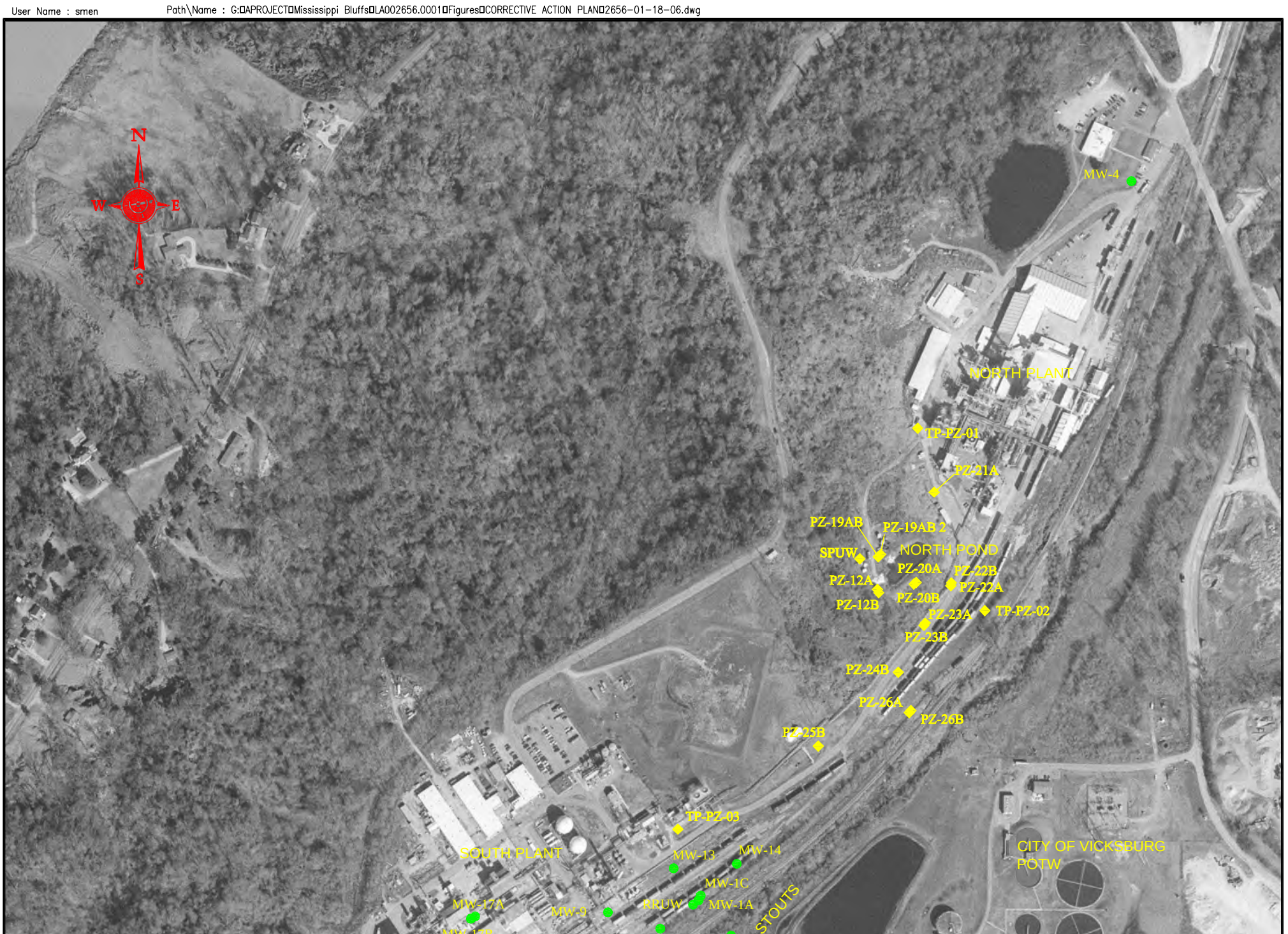
**CONCEPTUAL DETAIL OF COLLECTION TRENCH**

FORMER VICKSBURG CHEMICAL COMPANY SITE

| DRAWN BY | CHECKED | PROJECT MANAGER | DEPARTMENT MANAGER |
|---|---|---|---|
| S. MEN | CAD | D. ESCUDE' | D. ESCUDE' |
| | | TASK/PHASE NUMBER: 0018 | DATE: 2008 |
| | | PROJECT NUMBER: LA002656.0001 | DRAWING NUMBER: 5 |

User Name : smen

Path\Name : G:□APROJECT□Mississippi Bluffs□LA002656.0001□Figures□CORRECTIVE ACTION PLAN□2656-01-18-06.dwg




LEGEND

MW-14 MONITOR WELL LOCATION & DESIGNATION

TP-PZ-05 PIEZOMETER LOCATION & DESIGNATION

0 200' 400' 800'



| | |
|---|---|
| DRAWN BY: SMEN | CHECKED: CAD |
| PROJECT MANAGER: DRE | DEPARTMENT MANAGER: DRE |
| DATE: 3-21-07 | TASK/PHASE NUMBER: 0018 |

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# EXISTING MONITOR WELL NETWORK

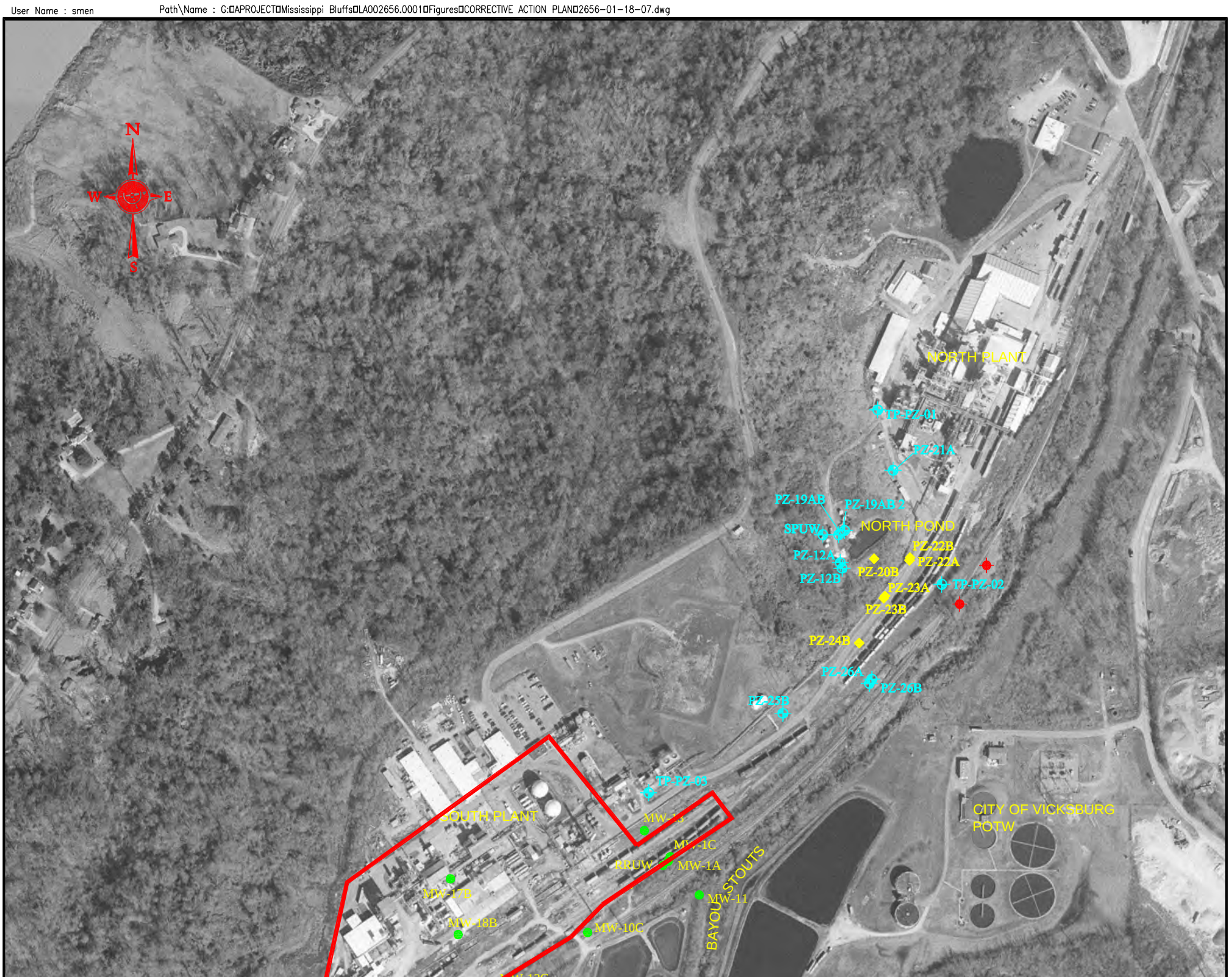
FORMER VICKSBURG CHEMICAL COMPANY SITE

PROJECT NUMBER: LA002656.0001

DRAWING NUMBER: 6

User Name : smen

Path\Name : G:□APROJECT□Mississippi Bluffs□LA002656.0001□Figures□CORRECTIVE ACTION PLAN□2656-01-18-07.dwg




LEGEND

- MW-14 — MONITOR WELL LOCATION & DESIGNATION
- TP-PZ-05 — PIEZOMETER LOCATION & DESIGNATION
- PROPOSED WELL LOCATION
- TP-PZ-04 — WELL TO BE PLUGGED AND ABANDONED

0 200' 400' 800'



| | |
|---|---|
| DRAWN BY: SMEN | CHECKED: CAD |
| PROJECT MANAGER: DRE | DEPARTMENT MANAGER: DRE |
| DATE: 3-21-07 | TASK/PHASE NUMBER: 0018 |

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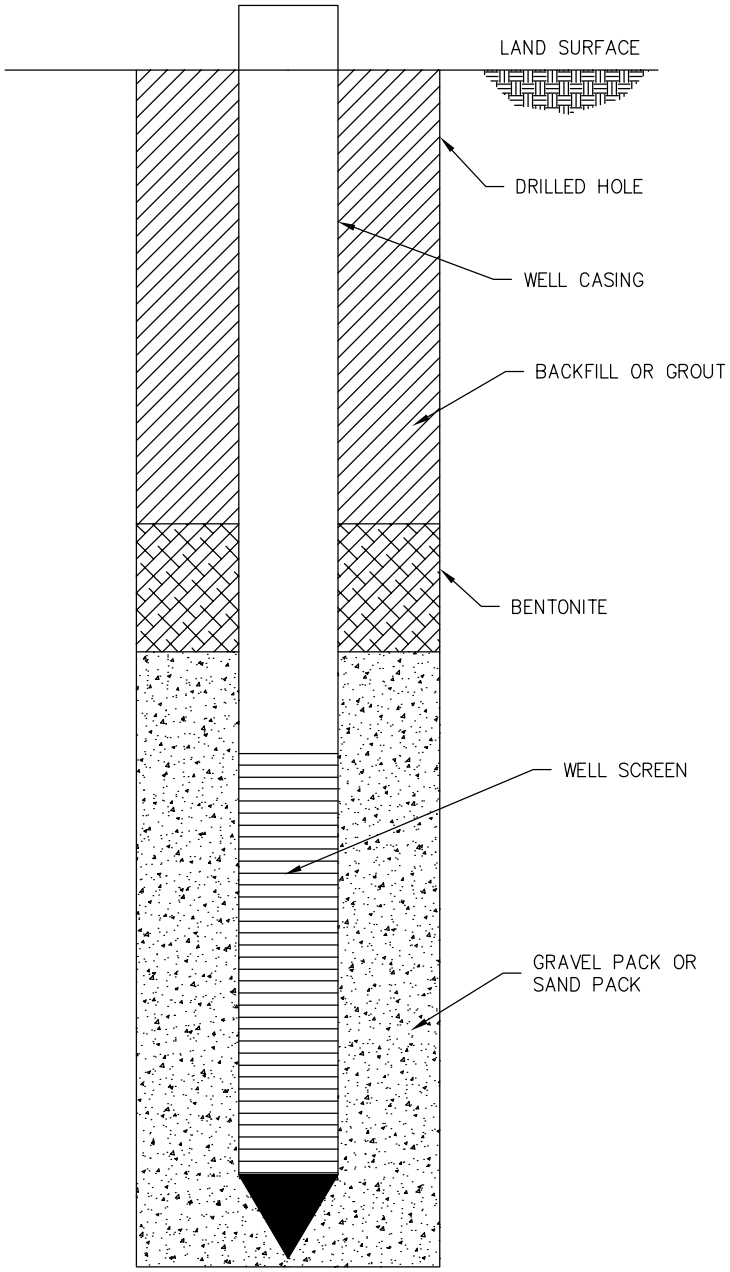
# PROPOSED MONITOR WELL NETWORK

FORMER VICKSBURG CHEMICAL COMPANY SITE

PROJECT NUMBER: LA002656.0001

DRAWING NUMBER: 7






| | |
|---|---|
| DRAWN BY: S. MEN | CHECKED: CAD |
| PROJECT MANAGER: DRE | DEPARTMENT MANAGER: DRE |
| DATE: 2008 | TASK/PHASE NUMBER: 0018 |

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# CONCEPTUAL DETAIL OF WELL CONSTRUCTION

FORMER VICKSBURG CHEMICAL COMPANY SITE

PROJECT NUMBER: LA002656.0001

DRAWING NUMBER: 8

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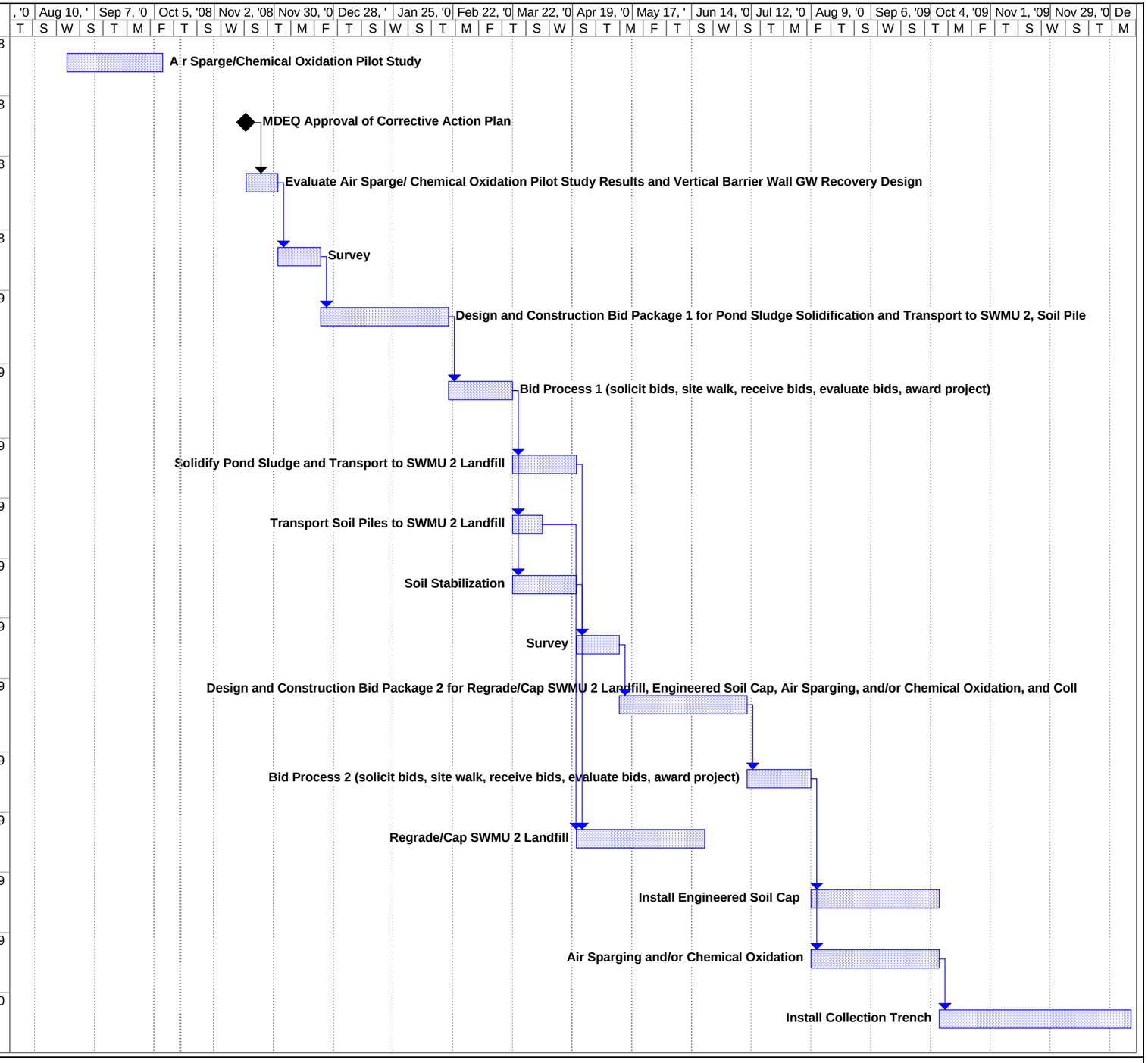
**Appendix A**

Project Schedule

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | Air Sparge/Chemical Oxidation Pilot Study | 45 days | Mon 8/25/08 | Wed 10/8/08 |
| 2 | MDEQ Approval of Corrective Action Plan | 0 days | Mon 11/17/08 | Mon 11/17/08 |
| 3 | Evaluate Air Sparge/ Chemical Oxidation Pilot Study Results and Vertical Barrier Wall GW Recovery Design | 15 days | Mon 11/17/08 | Mon 12/1/08 |
| 4 | Survey | 20 days | Tue 12/2/08 | Sun 12/21/08 |
| 5 | Design and Construction Bid Package 1 for Pond Sludge Solidification and Transport to SWMU 2, Soil Pile Transport, and Soil Stabilization | 60 days | Mon 12/22/08 | Thu 2/19/09 |
| 6 | Bid Process 1 (solicit bids, site walk, receive bids, evaluate bids, award project) | 30 days | Fri 2/20/09 | Sat 3/21/09 |
| 7 | Solidify Pond Sludge and Transport to SWMU 2 Landfill | 30 days | Sun 3/22/09 | Mon 4/20/09 |
| 8 | Transport Soil Piles to SWMU 2 Landfill | 14 days | Sun 3/22/09 | Sat 4/4/09 |
| 9 | Soil Stabilization | 30 days | Sun 3/22/09 | Mon 4/20/09 |
| 10 | Survey | 20 days | Tue 4/21/09 | Sun 5/10/09 |
| 11 | Design and Construction Bid Package 2 for Regrade/Cap SWMU 2 Landfill, Engineered Soil Cap, Air Sparging, and/or Chemical Oxidation, and Collection Trench | 60 days | Mon 5/11/09 | Thu 7/9/09 |
| 12 | Bid Process 2 (solicit bids, site walk, receive bids, evaluate bids, award project) | 30 days | Fri 7/10/09 | Sat 8/8/09 |
| 13 | Regrade/Cap SWMU 2 Landfill | 60 days | Tue 4/21/09 | Fri 6/19/09 |
| 14 | Install Engineered Soil Cap | 60 days | Sun 8/9/09 | Wed 10/7/09 |
| 15 | Air Sparging and/or Chemical Oxidation | 60 days | Sun 8/9/09 | Wed 10/7/09 |
| 16 | Install Collection Trench | 90 days | Thu 10/8/09 | Tue 1/5/10 |




Project: Corrective Action Plan Schedule
Date: Fri 10/17/08

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

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## Appendix B

Inspection Form

**FORMER VICKSBURG CHEMICAL COMPANY**
**QUARTERLY INSPECTION CHECKLIST**

| | |
|---|---|
| **Inspector's Name: (Print Name)** | **Signature:** |
| **Inspection Date:** | **Time:** |
| **Inspections, Recordkeeping, and Corrective Action**: Inspections, including checklist completion, must be completed each quarter at about the same time. Inspections are to ensure that remedial technologies, monitoring equipment, safety equipment, emergency equipment, and security controls are in proper working order to protect human health and the environment. Inspection checklists must be kept for at least 3 years, plus the duration of any enforcement action. Corrective action must be undertaken as soon as possible where the inspection reveals spills, deterioration, or malfunction. Describe observation and give date and nature of any repairs. | |

| Inspection Item | Corrective Action Required? (Circle one) | If Yes, explain why a corrective action is needed. | What corrective action will be done? | When the corrective action was done? |
|---|---|---|---|---|
| **1. Engineered Cap** | | | | |
| Erosion | Yes No | | | |
| Animals/Vectors | Yes No | | | |
| Settlement/Subsidence | Yes No | | | |
| Vegetation | Yes No | | | |
| Drainage/Run-on | Yes No | | | |
| Warning Signs | Yes No | | | |
| **2. SWMU 2 Landfill Cover** | | | | |
| Erosion | Yes No | | | |
| Animals/Vectors | Yes No | | | |
| Settlement/Subsidence | Yes No | | | |
| Vegetation | Yes No | | | |
| Drainage/Run-on | Yes No | | | |
| Warning Signs | Yes No | | | |
| **3. Vertical Barrier Wall** | | | | |
| Erosion | Yes No | | | |
| Animals/Vectors | Yes No | | | |
| Settlement/Subsidence | Yes No | | | |
| Vegetation | Yes No | | | |
| Drainage/Run-on | Yes No | | | |
| Warning Signs | Yes No | | | |

| Inspection Item | Corrective Action Required? (Circle one) | If Yes, explain why a corrective action is needed. | What corrective action will be done? | When the corrective action was done? |
|---|---|---|---|---|
| **4. Groundwater Monitoring and Recovery System** | | | | |
| Well Integrity (Well body, locks, concrete aprons, protection poles, etc.) | Yes No | | | |
| Release to Environment | Yes No | | | |
| Threat to Human Health | Yes No | | | |
| Recovery System (Pumps, valves, controllers, piping, collection drums, air stripper, carbon drums, and/or enclosure) | Yes No | | | |
| **5. Safety and Emergency Equipment** | | | | |
| Safety Equipment (Properly stocked and in good working order) | Yes No | | | |
| Emergency Equipment (In good working order) | Yes No | | | |