

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY - UNDERGROUND STORAGE TANK BRANCH

# PRELIMINARY SUBSURFACE INVESTIGATION FOR LEAKING UNDERGROUND STORAGE TANK FACILITIES

July 24, 2007

This guidance is for performing a Preliminary Subsurface Investigation (PSI) at an underground storage tank (UST) site with a confirmed release. As the tank owner of the UST system, you are responsible for insuring the PSI is performed in accordance with the following three sections included in this guidance:

## I. Scope of Work for PSI Field Activities

Your ERAC shall follow this scope of work, and you will be reimbursed in accordance with the most recent Limits of Reimbursement for PSI. Your ERAC should have a copy of the most recent Limits of Reimbursement. You may find this document on our web site.

The purpose of the PSI is to define the extent of the contamination on a leaking underground storage tank (LUST) site, if possible. The scope of work includes site reconnaissance, soil investigation, and groundwater investigation. The scope of work includes **drilling 10 borings and converting 5 borings into monitoring wells** (using a conventional drill rig).

## II. Report Format for PSI Field Activities

Your ERAC shall prepare the PSI report for the field activities in this format.

## III. Paperwork After PSI Field Activities

Your ERAC shall submit a complete PSI report to you. Then you shall review and submit a copy of the report to MDEQ. You shall submit your ERAC's invoices along with a Certification Affidavit (attached).

## I. SCOPE OF WORK FOR PSI FIELD ACTIVITIES

The tank owner's ERAC shall follow this scope of work for performing the PSI. The ERAC shall follow the most recent MDEQ- UST Standard Operating Procedure Manual (SOP) when performing all field activities.

### **1.0 SITE RECONNAISSANCE**

The following activities shall be performed as described in the SOP under **I. Pre-Investigation Activities**:

- Site History
- Utility Survey
- Water Well Survey
- Survey of Immediate Vicinity

Pictorial documentation shall be taken of site, adjacent properties, and other potential hydrocarbon sources.

### **2.0 SOIL INVESTIGATION**

#### **2.1 Boring Location**

**Ten (10) soil borings** shall be advanced using conventional drilling at the site. At a minimum, soil borings shall be placed so that each of the following areas are investigated:

- a. Area the release was either confirmed or suspected.
- b. Area topographically upgradient of the confirmed or suspected release.
- c. Area topographically downgradient of the confirmed or suspected release.
- d. Area topographically downgradient next to the property line.
- e. Piping Trench(es).
- f. Dispenser Islands.

NOTE: If any of the borings are hand augured, the reimbursement shall be for the rental of the auger and the time auguring the hole. Also, all borings should be drilled prior to monitoring well installation.

#### **2.2 Boring Termination**

Borings shall be terminated as described in the SOP under **II. Soil Sampling, F. Boring Termination**.

### 2.3 Soil Collection

Soil samples shall be collected as described in the SOP under **II. Soil Sampling, B. Soil Sampling- General.**

### 2.4 Analysis of Soil

Soil samples shall be analyzed for Benzene, Toluene, Ethylbenzene and Xylenes (Total BTEX), methyl tertiary-butyl ether (MTBE), and Poly-Nuclear Aromatic Hydrocarbons (PAHs) **unless otherwise directed by the MDEQ-UST Branch.**

Soil samples collected for Total BTEX and MTBE analysis shall be collected in accordance with EPA Method 5035. **For the high level option, the MDEQ-UST Branch only reimburses for collecting a bulk sample.** *However, if the low level option of Method 5035 is needed, please contact the MDEQ-UST project manager before collecting the soil samples. If the sample is not preserved in the field, the Method requires the use of an EnCore™ or equivalent sampling device.*

NOTE: Remember to collect trip blanks, equipment blanks, and duplicate samples as outlined in the SOP.

## 3.0 GROUNDWATER INVESTIGATION

### 3.1 Installation of Monitoring Wells

Five of the ten borings shall be converted to flush-mounted monitoring wells if groundwater is encountered. The wells shall be installed as described in the SOP under **III. Drilling Operations A. and B. - 1. Well Installation Using Hollow Steam Auger.** The wells shall be strategically and appropriately placed so that groundwater flow direction can be determined and that the groundwater and any floating product will intersect the screened interval of the well at high and low water table conditions. However, the ERAC must not sacrifice the integrity of the well or screen across a confining layer. When a high water table restricts the amount of filter pack, bentonite seal, or grout placed above the well screen, please contact the MDEQ-UST Branch before well installation.

At a minimum the wells shall be installed at the following areas:

- a. Area topographically upgradient of the contamination.
- b. Area with the highest soil contamination or where free product was encountered.
- c. Area downgradient of the contamination.

All wells installed shall be four inches in diameter and installed through a hollow stem auger unless otherwise approved by the MDEQ-UST Branch. After the wells have been installed, they shall be developed until at least three well volumes have been purged and the water is relatively clear, or until the well is pumped dry.

NOTE: When developing the wells, the ERAC should note the recovery of water into the well. This data will be useful when considering whether or not a pump test will be necessary.

### **3.2 Collection of Groundwater and Groundwater Elevation Data**

Each of the five newly installed wells plus any existing wells (excluding line leak detection wells) must be sampled as stated in the SOP under **IV. Groundwater Sampling**.

NOTE: If free product greater than 1/8 of an inch in thickness is encountered in a well, do not collect a groundwater sample from that well, simply record the free product thickness. Describe if the free product is diesel, gasoline or kerosene, and if it is weathered, or if it appears fresh.

### **3.3 Groundwater Analysis**

Groundwater samples collected shall be analyzed for Total BTEX, MTBE, and PAHs, unless otherwise directed by MDEQ-UST Branch.

**NOTE:** Remember to collect trip blanks, equipment blanks, and duplicate samples as outlined in the SOP.

## II. REPORT FORMAT FOR PSI FIELD ACTIVITIES

The tank owner's ERAC shall follow this format for all PSI report submittals.

### **TRANSMITTAL LETTER:**

All reports shall be accompanied with a transmittal letter. This letter shall, at a minimum, contain the following:

- the owner's name, address and phone number;
- the Mississippi UST Facility I.D. Number;
- the signature of the Mississippi Registered Professional Engineer (P.E.) and/or Geologist (P.G.) as stated in the Mississippi Groundwater Protection Trust Fund (MGPTF) Regulations.

Also, all reports **shall** contain the stamp of a Mississippi Registered P.E. and/or P.G. as stated in the MGPTF Regulations.

### **1.0 INTRODUCTION**

- State the name of the tank owner.
- State when the tank owner was authorized to perform the PSI and date field activities commenced.
- State whether MDEQ's PSI format was adhered to. If deviations from the PSI occurred, please describe and explain the deviations and who authorized these deviations
- State the latest version of the MDEQ-UST Standard Operating Procedure Manual (SOP) and whether it was adhered to.

### **2.0 BACKGROUND**

#### **2.1 Site Location and Setting**

- Describe location of the site.
- Discuss any visual signs of environmental impact that might be associated with a release of motor fuel (dead vegetation, sheen on creeks, soil staining, etc.).
- Describe the area surrounding the site (residential or commercial).
- Describe any potential off site sources that may contribute to any hydrocarbon contamination.

#### **2.2 Description and History**

- Discuss the present, past, and future (if known) use of the site.
- Discuss the underground storage tank history. Also, include the history of any aboveground storage tanks, if applicable. Include any tanks that are currently in use and any abandoned or previously removed tanks. State the source of this information.
  - \* Size and age of tank(s)
  - \* Substance stored in tank(s)
  - \* Location of tank(s) and line(s)
- Discuss any past leaks that have occurred at the facility.
- Discuss and submit any data of prior environmental assessments that have been performed at the site.
- Estimate the quantity of the release and any documentation substantiating the quantity calculated.
- Describe any emergency response that was conducted, and include the name of the contractor who performed the work.

### 3.0 SITE CHARACTERISTICS

#### 3.1 Site Topography

- State the Section, Township, Range, latitude-longitude and the mean sea level (msl) elevation.
- Describe proximity of site to sensitive receptors (lakes, creeks, water wells, etc.).
- Describe the topography of the site.

#### 3.2 Hydrogeologic Setting

- Discuss the general geology of the site including all formations between the base of fresh water and the surface.
- Discuss the hydrologic regime.
- Discuss the potential for contamination to impact an aquifer, or nearby water well.

#### 3.3 Area Water Wells

- List all water wells within a one-mile radius of the site.
- Discuss those wells within ¼ mile radius of the site. Provide the type of well (public, private, industrial, etc.), the year of installation, the total depth, the screened interval, the aquifer in which it is screened and verify if the well is in use, or not.
- List the possible wells that could be affected by contamination, if present.

#### 3.4 Field Screening of any Utility Openings

- Discuss the vapor readings of any utility manhole uncovered or storm drain openings.

- State the type of meter used and the latest calibration date.
- State the depth meter was lowered into the opening along with any other pertinent information.

## 4.0 SOIL CONTAMINATION

### 4.1 Soil Exploration, Sampling, and Field Testing

- Discuss the number of boring installed, depths of each boring and if groundwater was encountered.
- Discuss whether hydrocarbon odors or a sheen was encountered during drilling.
- Discuss any unusual conditions or complications encountered during drilling.
- Present the field data collected from the borings in tabular form as shown below:

Sampling Date	Borehole/MW	Sampling Interval	PID (FID) Reading (ppm)
01/01/01	SB-1/MW-1	4' – 6'	125
		9' – 11'	347*
		14' - 16'	140

\* Soil sample sent to the laboratory.

### 4.2 Extent of Soil Contamination

- Discuss the lithologic characteristics of the soils encountered during drilling.
- Discuss the horizontal and vertical extent of soil contamination and whether the soil contamination has been defined. If additional soil borings are necessary, provide justification and locate proposed soil borings on map (refer to Figure 8 on page II-7).
- Discuss if adjacent properties could be affected by soil contamination.
- Estimate the volume (cubic yards) of contaminated soil that is above the MDEQ-UST Branch's regulatory limit.
- Present the results of any Quality Control/Quality Assurance (QA/QC) measures and discuss whether they meet allowable QA/QC standards.
- Provide in tabular form the analytical results of the soil samples. The table should be presented as outlined on page II- 6.

## 5.0 GROUNDWATER CONTAMINATION

### 5.1 Monitoring Well Installation

- Discuss which borings were converted to monitoring wells and why.
- Discuss whether pre-existing wells (leak detection wells, water supply wells, etc.) are located at the facility and if so how many.

- If certain monitoring wells were not sampled, discuss why (i.e., free product, no water, etc.).
- State whether groundwater and/or free product intersect the screened interval of the monitoring well. If not, discuss why.
- Present the monitoring well data in tabular form as shown below

MW	MW TOC elevation	MW Depth (feet)	GW Depth (feet)	GW elevation
MW -1	98.88	28.31	18.21	80.67

**5.2 Extent of Groundwater Contamination**

- Discuss the potentiometric surface, flow direction and gradient.
- Discuss any anomalies in the flow regime.
- Discuss if free product is present on the water table. If so, discuss the areal extent and product thickness, and indicate on map.
- Discuss the potential of contamination impacting sensitive receptors and/or adjacent properties.
- Discuss whether groundwater contamination has been defined. If additional monitoring wells are necessary, provide justification and locate proposed monitoring wells on map (refer to Figure 8 on page II-7).
- Present and discuss the results of the quality control blanks and duplicates and state whether or not they meet quality control criteria.
- Provide in tabular form the analytical results of the groundwater samples. The table should be presented as outlined on page II- 6.

**6.0 RECOMMENDATIONS**

- Discuss in detail what further action, if any, is necessary to address the contamination at the site, such as:
  - (a) There is no need for further action.
  - (b) There is only a need to monitor the site for “\*” months.
  - (c) Soil excavation will be necessary (refer to Figure 8 on page II-7).
  - (d) A remediation system should be installed. If the ERAC states a remediation system should be installed, he shall indicate the type of remediation equipment and the necessary permits for operating such a system.

A Phase II Assessment will be necessary (refer to Figure 8 on page II-7).

- (e) Free product recovery (FPR) activities will be necessary. If the ERAC states that





## FIGURES

The PSI Report shall contain these applicable figures:

1. **Area/Vicinity Map**

- Show location in relation to the city. City maps or similar are acceptable.
- Locate water supply well locations within a 1-mile radius of the site.

2. **Surrounding Area Map** (Approximately 500-ft. radius from the site.)

- Indicate other potential hydrocarbon sources.
- Indicate potential environmental receptors, i.e., lakes, streams, etc.
- Label the adjacent roads and intersections.
- Indicate utility openings.
- Indicate adjacent properties and their zoning.

3. **Site Map(s)**

- Indicate location of fences or retaining walls.
- Indicate property lines.
- Indicate location of all aboveground and underground storage tanks (distinguish between those currently in use or those taken out of service or removed) and associated lines, pumps, and dispensers.
- Indicate location of building.
- Indicate soil boring and monitoring well locations.
- Indicate underground and aboveground utilities on or adjacent to site (sewer, water, telephone, gas, electric, etc.).
- Indicate street names.
- Indicate area where release occurred, if known.

4A. **BTEX Contaminated Soil Contour Map**

- Indicate soil boring locations.
- Indicate location of buildings.
- Indicate location of former and/or existing tanks, product lines, canopies, and roads.
- Soil data should be plotted adjacent to the boring using the following format:

PID/FID Reading	BTEX (ppm)
Depth (ft)	

- Display only those contours of total BTEX of 100 ppm concentrations or greater.

**FIGURES continued**

**4B. PAH Contaminated Soil Map**

- Indicate soil boring locations.
- Indicate location of buildings.
- Indicate location of former and/or existing tanks, product lines, canopies, and roads.
- The PAH constituent above our soil level at 0 feet to a sensitive receptor should be plotted adjacent to the boring using the following format:

Constituent & level (ppm)
Depth (ft)

**5. A Fence Diagram or Cross-Sectional Map**

- Display lithology and hydrologic data.
- Display water levels and screened interval of monitoring wells.

**6. Groundwater Elevation Contour Map**

- Indicate monitoring well locations.
- Groundwater elevation should be plotted adjacent to the well.
- Use arrows to depict groundwater flow direction.

**7A. Dissolved Phase BTEX Contour Map**

- Indicate monitoring well locations.
- Indicate location of buildings.
- Indicate location of former and/or existing tanks, product lines, canopies, and roads.
- Groundwater data should be plotted adjacent to the well using the following format:

BTEX (ppm)	Benzene (ppm)
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- Display only those contours of total BTEX of 18 ppm concentrations or greater.

**7B. Dissolved Phase PAH Map**

- Indicate monitoring well locations.
- Indicate location of buildings.
- Indicate location of former and/or existing tanks, product lines, canopies, and roads.
- The PAH constituent above our groundwater level at 0 feet to a sensitive receptor should be plotted adjacent to the well using the following format:

Constituent & level (ppm)
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**8. Further Action Map (If Necessary)**

- Map showing location of proposed borings and/or monitoring wells.
- Map showing area of recommended excavation.

## APPENDICES

The PSI Report shall include:

A. **Boring Logs**

The presence of hydrocarbon odors and the location of water bearing zones shall be noted and included on the boring logs. Also, PID or FID readings and a qualitative indication of soil saturation (dry, moist, wet, saturated) should be noted on the boring logs. Identify first water and stabilized water levels.

B. **Well Construction Logs**

C. **Laboratory Chemical Data Sheets (including Chain of Custody)**

D. **Photo Documentation**

E. **Adjacent Property Owner's Name, Address and Phone Number**

### III. PAPERWORK AFTER PSI FIELD ACTIVITIES

**As the tank owner of the UST system, you shall follow the three steps below after the field activities have been completed:**

#### **Step One - Final Report Submittal**

After the fieldwork has been completed, the next step is for the ERAC to prepare the final report. Data collected from this scope of work shall be reported as described in Section II of this guidance document.

Once the final report has been completed, the ERAC shall forward a copy to you for your review. The report will detail the findings of the environmental assessment, so the MDEQ strongly recommends that you review this report and ask questions regarding its content and quality.

Once you are satisfied with the final report, a copy shall be submitted to the MDEQ. It is imperative that this report is submitted in a timely fashion. The letter accompanying this package sets a "Due Date" for final report submittal. As stated in that letter, \$100.00 may be deducted from your eligible reimbursement for every calendar day the final report is overdue.

#### **Step Two - Submittal of Certification Affidavit and Invoices**

Reimbursement from the Trust Fund for the PSI can only occur after the MDEQ approves the final report and the MDEQ receives a completed "Certification Affidavit" (copy attached) along with itemized invoices.

Be sure that the "Certification Affidavit" has been completed in its entirety and with accurate information. Please ensure that information such as the Site Name, Trust Fund I.D. number, federal tax I.D. number or social security number, registered tank owner, etc. is correct. All applicable invoices (laboratory services, drilling services, etc.) shall be included along with the completed "Certification Affidavit". You may want to compare the invoices to the Limits of Reimbursement for PSI. The MDEQ shall only reimburse up to these limits, unless previously approved by our office.

Please note that if information on the "Certification Affidavit" is incorrect or omitted or if applicable invoices are omitted, reimbursement will be delayed until the correct information is submitted. If you have any questions regarding the completion of the "Certification Affidavit" or about the reimbursement process, please contact Donna Rogers at (601) 961-5288.

Please submit the "Certification Affidavit" and itemized invoices to:

**Donna Rogers**  
**MDEQ**  
**P.O. Box 2261**  
**Jackson, MS 39225-2261**

**Step Three – Reimbursement of you and your ERAC**

As stated above, reimbursement from the Trust Fund for the PSI can only occur after the MDEQ approves the final report and the MDEQ receives a completed "Certification Affidavit" along with itemized invoices. Normally this process can take from 8 to 12 weeks from the time the Final Report is submitted to the MDEQ. It is up to you to pay your ERAC. As the tank owner/operator, you will be reimbursed directly. Please note that any evidence or discovery of fraud or other misuse of payments received from the Trust Fund may result in referral to the Attorney General for appropriate action.

**Attach**

**Certification Affidavit**