

**Addendum 3**

**COLISEUM BOULEVARD  
PLUME SITE**



**DEPARTMENT OF TRANSPORTATION**

October 24, 2001

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DEPARTMENT OF TRANSPORTATION

**ADDENDUM 03—(Revision 3)**  
INVESTIGATION OF ELEVATED  
CONCENTRATIONS OF TCE NEAR PH12  
October 24, 2001

The following Scope of Work is an addendum to the Work Plan for Rapid Response, Interim Corrective Measures and Comprehensive Site Assessment (Work Plan), which was approved on June 8, 2001. The Addendum is a modification to section 4.5.1.1 of the Work Plan to refine the distribution of elevated TCE concentrations near Probehole PH12 for the purpose of evaluating remedial alternatives.

### **Introduction**

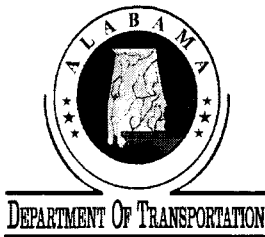
This part of the Coliseum Boulevard Site investigation is to delineate the elevated concentration of TCE both horizontally and vertically in the first saturated zone above the first retarding clay. In general, this investigation area will be located west of Fairground Road, and near the ALDOT Materials and Tests Laboratory.

Previous groundwater screening results obtained in January and February 2001 indicated elevated TCE concentrations in the proposed Probehole PH12 investigation area. It should be noted that the screening methodology used in the previous sampling activity (i.e., membrane interface probe) will not be used for the sampling activities proposed herein based on previous ADEM comments.

### **Screening Criteria**

The criteria for delineating the elevated concentrations of TCE in the Probehole PH12 Area will be based on dissolved TCE concentrations as they relate to the potential presence of NAPL (non-aqueous phase liquid). There is a general rule of thumb (which will be referenced as the 1% rule) that when a chemical is present at a concentration greater than 1% of its solubility limit there is a potential that NAPL is present. The solubility limit of TCE in water is approximately 1,000 milligrams per liter (mg/L), and by applying the 1% rule, an initial target level of 10 mg/L is obtained.

To identify the area of TCE in the first saturated zone at concentrations of 10 mg/L or greater in the vicinity of Probehole PH12, a target screening criteria that is half of the 1% rule, or 5 mg/L, will be used. Application of this screening criteria to the sampling locations is described in the following section.



### **Sample Locations**

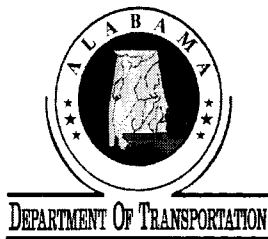
The proposed sample locations are based on a step-out grid sampling approach with its origins near former Probehole PH12 and PH11. Several of the proposed sample locations may overlap with sample locations from previous sampling activities. However, this sampling plan will incorporate up to three groundwater samples collected at each sample location from various depths within the first saturated zone. The sampling locations shown on Figure 1 are intended to encompass the area of suspected elevated TCE concentrations (>5 mg/l). The approximate sample locations are shown on Figure 1 and the sampling methodology is described below. Exact field locations may vary in order to avoid structures, utilities, or inaccessible areas. As described in the following section, up to three groundwater samples will be collected at each location.

1. Twenty (20) primary proposed sample locations are shown in Figure 1.
2. Groundwater screening results from the primary sample locations will be used to evaluate areas where additional probeholes will be placed to define TCE concentrations greater than 5 mg/l.
3. Additional probeholes, or secondary probeholes, will be "stepped in" or "stepped out" to define the area(s) with greater than 5 mg/l. Secondary "step-out" probeholes will be placed about 200 feet from the primary location as needed to define the groundwater TCE concentration at 5 mg/l or greater. Secondary "step-in" locations will be placed mid-point between primary locations if needed to refine the area with greater than 5 mg/l.
4. Sample "step out" or "step in" probeholes will continue until the distribution of TCE concentrations exceeding the 5 mg/L criteria is delineated in the first water bearing zone above the retarding clay.

At each sample location, groundwater samples will be collected, field screened with a GC, and 10% of the samples will be submitted for laboratory analysis (vertical sample intervals are specified in the following section). Soil samples will be screened using a Photoionization Detector or an Organic Vapor Analyzer.

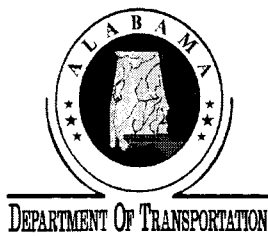
Each probehole location will be surveyed, by GPS, and the land surface surveyed to the nearest 0.01 foot by a Professional Land Surveyor.

### **Collect and Analyze Groundwater Samples**



- Prior to soil or groundwater sample collection activities, a soil conductivity probe will be used to identify the top of the first retarding clay beneath the first water bearing zone. Following the soil conductivity investigation, continuous sediment cores will be collected using a Geoprobe. Sediment core samples will be collected to the top of the retarding clay as defined by the conductivity probe. Based on the elevation of the recovered sediments, groundwater samples will be collected as follows:
  1. Approximately 5 feet below the water table.
  2. Within 5 feet of the top of the first distinct clay.
  3. From the coarsest lithologic unit that is greater than 1 foot thick (e.g.; "sand and gravel unit"), if present.
- Analyze the groundwater samples with a field GC to obtain semiquantitative information about TCE in the groundwater.
- Soil samples will be analyzed using the field laboratory from depths where there is an elevated response with the field screening instrument and at the following additional locations.
  1. Two of the sediment core locations will be near former Probehole PH11 and two will be near the head of the former ditch west of the ALDOT Materials and Testing Laboratory.
  2. From a depth of approximately 1 to 2 feet below the surface.
  3. From a depth of approximately 1 to 2 feet above the top of the water table, as determined from visual inspection of the continuous core.
- Collect a minimum of 5 additional samples or approximately 10 percent of the field GC samples, whichever is greater, for laboratory confirmation. The additional samples will be collected from locations where at least one field GC sample contains greater than 5 mg/L TCE. The additional samples will be analyzed by TTL's laboratory for the constituents listed in the following section.

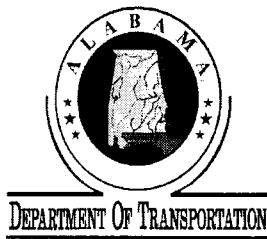
### **Analytical**



- The field GC will be a Shimadzu GC19 with photo-ionization and electron capture detectors in series. The data station for chromatograph manipulation will be a Shimadzu Model LR4A, which acquires, stores, calculates, and prints chromatogram results. All data will be stored on disk and hard copied from the printer.
- The GC will be capable of analyzing for the following compounds during screening of the samples:

Benzene  
Toluene  
Ethyl benzene  
Total Xylenes  
Vinyl Chloride  
1,1 – Dichloroethene  
1,1 – Dichloroethane  
Chloroform  
Carbon Tetrachloride  
cis-1,2- Dichloroethene  
1,1,1-Trichloroethane  
1,2- Dichloroethane  
Trichloroethene  
Tetrachloroethene  
Ethylene Dibromide

- The detection limits for samples screened by the GC will be 1.0 µg/L for water samples and 3.0 µg/kg for soil/sediment samples.
- The GC will be calibrated with standards for each analyte of interest. A three-point calibration curve, which includes a blank, will be prepared for each analyte of interest. Linearity of the calibration curve will be determined by linear regression. A correlation coefficient ( $r^2$ ) of at least 0.995 will be required for each analyte before samples will be analyzed. Aqueous standards will be prepared for water samples. At the beginning of the project, gaseous standards also will be analyzed with aqueous standards. A ratio of gaseous to aqueous response will be determined for each analyte. Since aqueous standards are not easily maintained during a project, the gaseous standards will be used to monitor continuing calibrations. Gaseous standards will be used for soil samples.
- Calibration curves will be prepared within the expected range of the samples. At least one standard near the quantitation limit will be included in the calibration curve. Efforts will be made to dilute samples within the calibration range. If samples cannot be diluted



sufficiently for the calibration curve, results will be flagged with a "J" to indicate that the results are estimates. Calibration checks will be performed with midrange standards once every 10 samples. These checks must fall within 25% of the true value. If this criterion is not met, a second standard will be analyzed. If this standard falls outside the expected range, a new calibration curve will be prepared before additional samples will be analyzed.

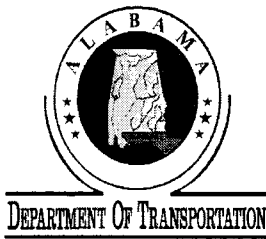
- Confirmation groundwater samples will be placed on ice, in a cooler, and shipped to TTL's laboratory. Analyses of the samples will be in accordance with Method 8260 outlined in Test Methods for Evaluating Solid Waste Physical/ Chemical Methods, EPA, SW-846, 3<sup>rd</sup> Edition, November, 1996.
- In addition to the volatile organics compound analysis, the confirmation groundwater samples also will be analyzed for the following parameters: dissolved oxygen, nitrate, nitrite, iron (II), sulfate, methane, alkalinity, oxidation reduction potential, pH, temperature, conductivity and chlorides. These additional parameters will be used to further evaluate the groundwater quality in the collected samples.

#### **Quality Assurance/Quality Control**

- Duplicate GC and laboratory samples will be collected from 10 percent of the total number of samples collected. All duplicate samples will be collected from a lithologic unit with sufficient permeability to yield the required sample volumes (e.g.; the sand and gravel layer or glauconitic sand layer).
- An equipment rinsate will be collected each day
- A trip blank will be placed in each cooler that contains aqueous VOC samples

#### **Decontamination**

- A decontamination pad will be set up at the central staging area of the ALDOT Complex. Probe rods will be steam-cleaned within the decon pad.
- The following procedures will be used to clean the sampling equipment used to collect the soil/sediment and ground-water samples. The procedures are those published in: *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, EPA, Region IV; May 1996; Athens, Georgia; Section 2.2.3., pages B-1 through 6.



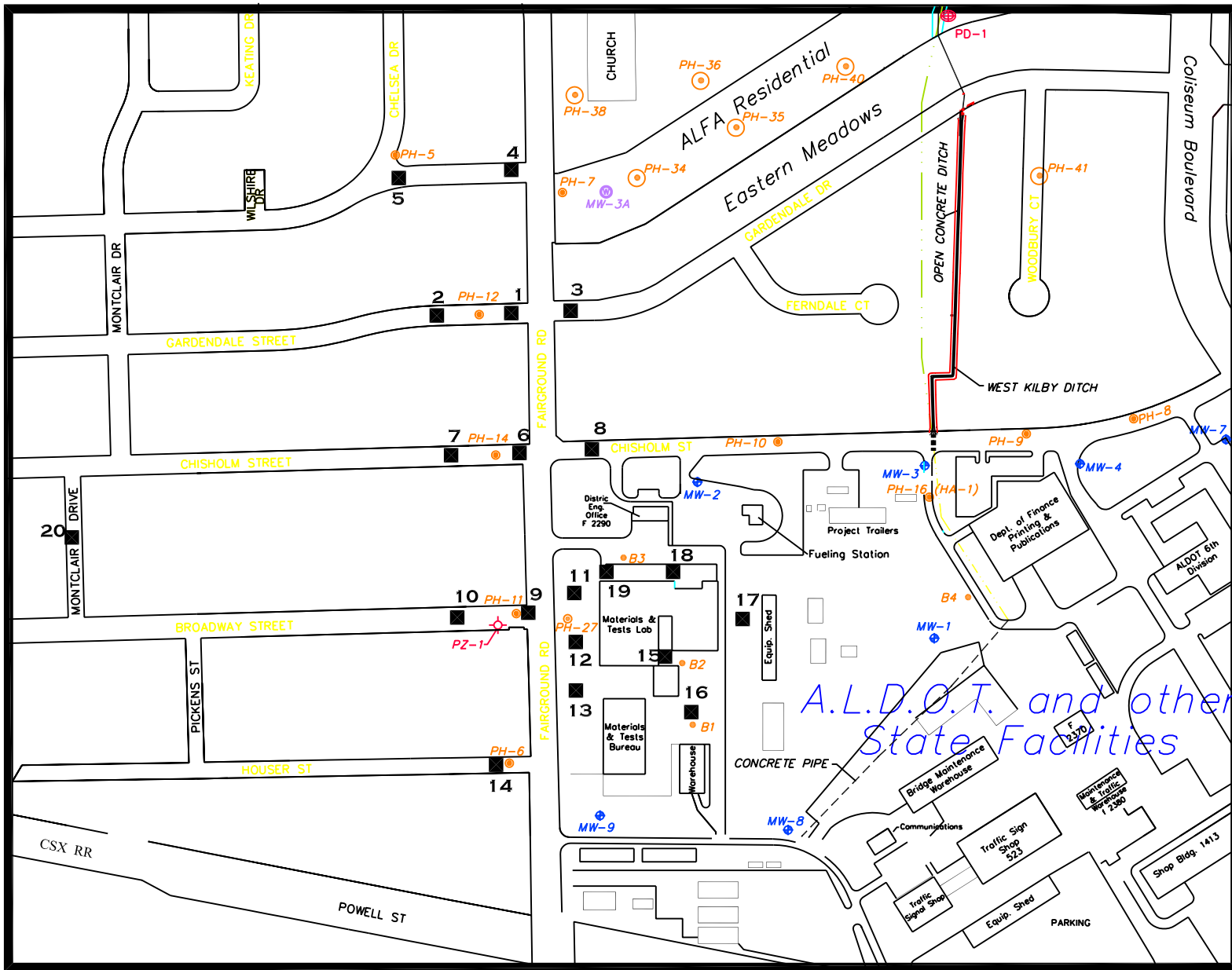
- Probe rods will be cleaned between each probehole. The drive tip that attaches to each disposable plastic sleeve will be cleaned between each sampling.
- Sampling equipment and rods will be cleaned with tap water and soap using a brush, if necessary, to remove particulate matter and surface films. The tap water will be obtained from the Montgomery Water Works and Sanitary Sewer Board public-water supply. The soap will be a standard brand of phosphate-free laboratory detergent (such as Liquinox).
- Equipment will be rinsed thoroughly with tap water; then rinsed thoroughly with organic/analyte free water (deionized water); and then thoroughly rinsed with isopropyl alcohol. After rinsing with the isopropyl alcohol, the equipment will again be rinsed with deionized water. PVC or plastic items will not be rinsed with alcohol.
- A sample of the deionized water will be analyzed to ensure that the water contains no contaminants.
- The sampling equipment will be removed from the decontamination area and covered with clean unused plastic.

### **Probehole Abandonment**

- Each probehole will be pressure grouted through the Geoprobe rods from the bottom of the probehole to land surface with Pure Gold Bentonite grout.
- The surface area of each probehole will be restored, as appropriate, to pre-drilling conditions.

### **Schedule**

- The fieldwork will be completed within 60 days of approval of this Work Plan by ADEM.
- Locations for permanent monitoring wells will be selected and submitted to ADEM for approval within 30 days of completion of fieldwork.



- PH-50 ○ PROBEHOLE AND IDENTIFIER
  - PH-4 ○ PIEZOMETER AND IDENTIFIER
  - PZ-16 ○ PIEZOMETER AND IDENTIFIER
  - MW-2 ○ ALDOT MONITORING WELL AND IDENTIFIER (INSTALLED OCTOBER, 1999)
  - PROPOSED MIP/SOIL CONDUCTIVITY LOCATION
  - FORMER DITCH AND POND (FROM GMC BASE MAP)
  - B2 ○ ADEM PROBEHOLE AND IDENTIFIER
- SCALE: 1" = 375'

TTL, Inc.  
PRACTICING IN THE GEOSCIENCES

Figure 5. Proposed sampling locations. Work Plan Addendum O3—Investigation of Elevated Concentrations of TCE near PH12. Coliseum Boulevard Plume Investigation; Montgomery, Alabama.

Note: Base map is a composite of an initial base map compiled by Goodwyn, Mills & Cawood Environmental Consultants, Inc. and a June 16, 2000 map by Larry E. Speaks & Associates. The June 16, 2000 map of Larry Speaks & Associates was compiled from maps provided by TTL, Inc. and the Montgomery, Alabama Tax Assessor's Office.

Drawing No. 010607.3