

# **Georgia Department of Natural Resources**

Environmental Protection Division  
Underground Storage Tank Management Program  
4244 International Parkway, Suite 104, Atlanta, Georgia 30354  
Noel C. Holcomb Commissioner  
Carol A. Couch, Ph.D., Director  
(404)362-2687

## **UNDERGROUND STORAGE TANK (UST) CLOSURE GUIDANCE** **DOCUMENT**

### **--Petroleum Releases--**

#### **IT IS THE RESPONSIBILITY OF THE OWNER/OPERATOR TO SUBMIT THE CLOSURE REPORT.**

***REVIEW THIS GUIDANCE DOCUMENT PRIOR TO REMOVING USTS. For underground storage tanks (USTs) and/or associated piping that are removed or permanently closed in-place, a Closure Report or Corrective Action Plan (CAP)-Part A, as applicable, must be prepared. If the UST Closure Report is submitted alone or as part of a CAP-Part A, follow these guidelines for closure procedures, sampling, excavation, disposal, and reporting.***

***A CAP-Part A must be submitted within sixty days (60) of the date that free product is observed in the environment or that laboratory sample analysis results are received, unless it is demonstrated that groundwater has not been impacted above applicable water quality standards (through clean [below detection limits] soil samples or a groundwater sample) AND soil contamination does not exceed applicable threshold levels and the site is eligible for No Further Action Required. If a CAP-A is required, include a complete closure report form and supporting documentation in the CAP-A.***

***If the site is eligible for No Further Action status, a Closure Report (including the attached Closure Report Form) must be submitted to Environmental Protection Division (EPD) within forty-five (45) days after removal or in-place decommissioning of the USTs, and a copy must be retained by the owner or operator for at least three (3) years.***

***Consult this guidance document to determine which type of report must be prepared and submitted. Adhering to the following guidance will expedite the review of your file.***

***The original signature of the UST owner is required on the closure report form. Original chains-of-custody signed by the sampler and receiving laboratory and original laboratory data sheets signed by the laboratory chemist must be submitted.***

## **CLOSURE ACTIVITIES ARE NOT REIMBURSABLE**

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## **I. PERMANENT CLOSURE OF USTS**

### **A. INTRODUCTION**

USTs may be permanently closed by removing them from the ground or by filling the empty tanks with an inert solid material, such as sand, a mixture of sand and earth, foam, or concrete. The inert material must not react with the UST or its contents or allow leaching of residual petroleum from the UST. Permanent closure of product piping may be accomplished by emptying and removing the piping and capping the ends. If closed in-place, the piping must first be flushed into the UST prior to emptying the UST. In most cases, the EPD recommends removal of the entire UST system. It is recommended that in-place closure should be reserved for situations in which a structure, such as the foundation of a building or roadway, would be jeopardized by removal of the UST(s). (For additional guidance on UST closure, refer to 40 CFR Part 280.71.) **Note: Water is not an inert solid material and cannot be used for in-place closure.**

Because of the inherent dangers in handling tanks (for example, explosive vapors and potentially hazardous petroleum residuals) EPD recommends that only **qualified** and **experienced** personnel close UST systems. The Occupational Safety and Health Administration (OSHA) requires that when it is reasonably possible that personnel may encounter hazardous materials, such as petroleum<sup>1</sup>, and if personnel are conducting corrective actions involving clean-up operations at sites covered by RCRA<sup>2</sup>, such as UST sites<sup>3</sup>, those personnel must complete forty hours of OSHA-approved health and safety training. Petroleum is considered by OSHA to be a hazardous material in regards to OSHA regulations<sup>4</sup>. Knowledge of and experience with EPA sampling procedures, industry standards, and OSHA regulations (29 CFR Part 1910 and Part 1926) are essential. Fatalities have resulted from mistakes made during tank closures. In addition, improper handling of the material in the USTs and piping can result in releases that require costly cleanups. Mistakes in sample collection, handling and analysis can also result in costly re-sampling.

### **B. USTS AND EQUIPMENT REQUIRING PERMANENT CLOSURE**

The Georgia Underground Storage Tank (GUST) Rules define an UST as any one or a combination of tanks, including underground pipes connected thereto." Therefore, all references to a "tank" or a "UST" in this document refer to both the UST and its associated piping, i.e., the UST system.

A tank must be permanently closed if:

- It has been temporarily closed for more than twelve months and does not meet standards for new UST systems or the upgrade requirements for existing systems;

- It has been abandoned and is substandard (not upgraded);
- It was in service on or after January 1, 1974, but taken out of service or abandoned before December 22, 1988 (whether there has been a release or not);
- Some local Fire Safety Codes may not permit an UST to remain in the ground if it is permanently out of service. Consult your local fire safety official about these rules.

### **C. FORMS TO SUBMIT TO THE EPD PRIOR TO CLOSURE**

#### CLOSURE ACTIVITY FORM (GUST-29)

At least 30 days prior to closing the UST, complete and submit an **original** signed GUST-29 to the Underground Storage Tank Management Program (USTMP). The form is included in Appendix A.

### **D. ADDITIONAL AGENCIES TO NOTIFY PRIOR TO UST CLOSURE**

Contact the local fire marshal and the Utilities Protection Center before beginning an UST closure. The fire marshal and sometimes other local governmental agencies have jurisdiction over USTs and may require their oversight during removal. State law requires you to notify the Utilities Protection Center at 1-(800)-282-7411 at least 72 hours before you start to dig.

Contact your local government agency about construction permit requirements.

## **II. SAMPLE COLLECTION AND ANALYSES REQUIREMENTS**

The purpose of sampling soil during UST removal is twofold: 1) to determine if contamination has migrated to the water table and 2) to determine whether soil contamination requires remediation because it poses a future threat or continuing threat to the groundwater quality. In order to obtain representative samples of soil and (if required) groundwater, collect the samples no later than 24 hours after the UST removal. The following sections outline the requirements for sample collection and analysis.

### **A. REQUIRED ANALYTICAL METHODS**

All analyses must be performed by a laboratory, using EPA-approved SW-846 methods (Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, SW-846, Third Edition, as revised). Approved EPA methods require the performance of certain sampling, analysis, and quality assurance and quality control procedures in the field and in the laboratory. Please refer to Appendix B and Section II.B.1. of this document for a brief overview of the requirements for BTEX soil samples.

Method 8260B is preferred for analysis of volatile organics instead of 8021B, since misidentification of compounds and “false positives” are reduced using Method 8260B. However, Method 8021B may be used, if proper SW-846 procedures are followed.

Laboratories must meet the estimated quantitation (detection) limits required by SW846 or provide a brief written explanation for any elevated limits. Since the EPD understands that Method Detection Limits (MDLs) and Estimated Quantitation Limits (EQLs), commonly referred to as “detection limits”, will vary from day to day within an acceptable range, according to the performance of the analytical equipment and the condition of the sample, an estimated quantitation limit range of 1-5 ug/kg will be accepted for EPA Laboratory Method 8021B for soil samples; however, if the analysis indicates that regulated compounds are present above the EQLs calculated for that day, they must be reported even when the concentrations are below 5 ug/kg. Detections of solitary compounds below 5 ug/kg will be considered as possible false positives. However, the presence of several compounds at concentrations of less than 5 ug/kg indicates that petroleum contamination is present in the soil and that groundwater may be contaminated. The laboratory estimated quantitation limits from SW-846 are provided in Table 2 for each compound.

If these laboratory estimated quantitation limits cannot be achieved because the laboratory diluted the sample, but no concentrations of the target compounds are reported above the elevated detection limits, include a brief written explanation from the laboratory for the dilution. If the analytical method used was either EPA Method 8260B or 8270C (GC/MS), include a tentative identification and estimated quantitation of any interfering constituent. If detection limits are elevated by a factor of more than 100 due to matrix interference using Method 8021B, but no target compounds are detected above the elevated detection limits, then identification of the interfering compound will be required by analysis of the sample duplicate using Method 8260B for volatile organics or 8270C for PAHs to identify the interfering compound. Other regulated compounds in addition to the usual target compounds may be present and require corrective action.

Identification of interfering compounds may not be necessary when the only substance stored at the release site was a heavier petroleum distillate, such as diesel, since diesel contains other unregulated hydrocarbons, which sometimes cause matrix interference in analysis of BTEX or PAHs, but does not typically contain other regulated compounds. However, for other more complex petroleum mixtures, such as mineral spirits, identification of any interfering compound will usually be necessary.

If the laboratory over-dilutes the sample in anticipation of high concentrations of organics, but no interfering contaminants detectable are identified and reported above the resulting elevated detection limits, the laboratory should run a duplicate sample at a lower dilution and report the results, in accordance with accepted laboratory procedure. If the EQLs are elevated above the limits cited in Table 2, the EPD may assume that target compounds are present in the sample(s) at the elevated detection limit, and

additional corrective action may be required as a result. Collection of duplicate samples in the field to enable the laboratory to run multiple dilutions is therefore advised. If the contractor is certain that the laboratory will attain the necessary detection limits without requiring multiple dilutions, and that no other problems will occur in transport or analysis of the sample, duplicate samples may be eliminated. Be advised however, that remobilization to resample is usually more costly than collection of duplicate samples. Analysis of all duplicate samples is not required.

Submit the original laboratory data sheets signed by the appropriate laboratory manager or QA/QC manager, and provide the following quality control information:

- 1) Laboratory quantitation limits for each sample and constituent
- 2) Laboratory blank analysis results
- 3) Recovery and precision results of analysis of the laboratory control sample and the matrix spike
- 4) Recovery results of analysis of the surrogate addition to the sample
- 5) A listing of the samples in the batch

In addition, submit an original chain-of-custody, signed by the sampler and the receiving laboratory, which notes the condition and temperature of the samples upon arrival at the laboratory. Also note the method of sample collection if 5035 is used for soil samples (Encore™ or 40 ml vial, for example) and list the type of preservative used for each soil sample if a 40 ml vial is used (i.e., sodium bicarbonate or methanol). The signed laboratory data sheets and chains-of-custody submitted to the EPD must not contain photocopied signatures and laboratory data sheets must be on laboratory letterhead.

All analytical laboratories performing analysis in accordance with SW-846 must have performed and documented a method detection limit (MDL) study within the previous 12-month period that submitted samples were analyzed. The laboratory must also have and be able to document a formal quality assurance program that includes instrument calibration, daily calibration verification, confirmation of analyte identification, formal demonstrations of operator capability, participation in annual performance evaluation by an NIST-approved provider, and comply with other measures as described in Chapter 1, SW-846.

Effective on or after July 1, 2001, laboratory data submitted to the EPD must be analyzed by an approved laboratory, in accordance with the Georgia Rules for Commercial Environmental Laboratories (391-3-26). According to the State of Georgia Code 12-2-9, "all commercial analytical laboratories submitting data for regulatory purposes shall be accredited or approved as specified in the Environmental Protection Division's rules and regulations."

## 1.) SOIL SAMPLES

Soil analysis requirements depend on the type of product stored in the UST during its period of use. The appropriate analyses must be performed for any and all substances the UST has contained or may have contained. If any type of petroleum was stored (gasoline, diesel, aviation fuel, etc), analyze the soil samples for benzene, toluene, ethylbenzene, xylenes (BTEX) using EPA Method 5035-8021B or 5035-8260B; and Total Petroleum Hydrocarbons Gasoline Range Organics and/or Diesel Range Organics (TPH-GRO and/or TPH-DRO), as appropriate (see Table 1). Method 5035-8260B is preferred over Method 5035-8021B because it is less likely to result in misidentification of the compounds that initiate corrective action.

For closure assessments, PAH analysis is only required of soil and groundwater samples collected beneath UST system(s) which once contained a product other than gasoline. **PAH analysis is not required of soil samples collected beneath gasoline USTs that were located in the same excavation as non-gasoline USTs.** For example, if two gasoline and one diesel UST are contained in the same pit, PAHs are only required to be collected under the diesel UST. However, an affidavit will be necessary in such a case to verify that no other product besides gasoline was contained in the gasoline USTs during their use. For PAH analysis, use EPA Method 8270C or 8310. You may also use Method 8100 for PAHs, but if PAHs are detected using this method, you must use Method 8270C or 8310 to determine the concentrations of the individual PAHs.

Consult Table 1 of this document to determine which analytical methods are required for your site. If a substance other than petroleum was stored in the UST, analyze the soil for the substance or regulated constituent that was stored.

If soil from the prescribed sampling locations in the bottom of the UST, piping, and dispenser island excavations **does not contain detectable quantities** of BTEX or PAHs, analyze the soil for Total Petroleum Hydrocarbons (TPH). Continue vertical soil sampling, above the water table, until contamination is no longer detectable. If the water table is encountered before BTEX and TPH (and PAHs if applicable) is vertically delineated to non-detectable levels, collect a groundwater sample and analyze it for both BTEX (and PAHs if applicable), as described in the next section. Sampling of the groundwater for TPH is not necessary.

TPH analysis is used as an indicator of possible groundwater contamination **in addition to** BTEX and PAH analysis. TPH analysis is used as an additional indicator because BTEX constituents leach and volatilize more quickly than other components of TPH, and PAHs are present in lower concentrations than the other components of TPH. The absence of detectable concentrations of BTEX and PAHs in soil often does not provide an accurate indication of whether groundwater is contaminated. In many cases, only the heavier petroleum constituents of TPH can be identified in the soil because the BTEX and PAHs have either already migrated to the groundwater or have biodegraded. Therefore, even if BTEX and PAHs **are not detectable** in the

soil, you must vertically delineate TPH contamination (using the methods outlined in Table 1), or take a groundwater sample in the worst-case location(s). All constituents for which analysis is required (e.g., BTEX, PAHs, and TPH) must be non-detectable in the bottom-most confirmation soil samples in order to be vertically delineated, or a groundwater sample must be collected, as described in Section II.C.4.

**Note:** A vapor monitoring instrument, such as a photoionization detector (PID) or organic vapor analyzer (OVA), may be used **ONLY** for field screening. **Vapor monitoring (field instrument) readings and other non-SW-846 methods cannot be substituted for required laboratory analytical data.** (Be advised that some heavier petroleum products do not give off sufficient vapors to register on field instruments, and that other unregulated organic compounds and moisture can produce false-negative or false-positive readings on such instruments.)

## 2.) GROUNDWATER SAMPLES

If groundwater is encountered during excavation or if soil samples are contaminated with BTEX, PAHs or TPH down to the water table, groundwater samples must be collected. If analysis of soil samples from the bottom of the excavation indicate that soil is contaminated with BTEX, PAHs, or TPH, groundwater samples may be collected from boreholes or monitor wells advanced through the bottom of the excavation or within two (2) feet of the excavation, either before or after the excavation is backfilled, instead of attempting to vertically delineate soil contamination during the closure sampling. Typically one groundwater sample per contiguous UST pit should be collected in order to determine the highest groundwater contaminant concentrations beneath the contaminated area. However, groundwater samples should be collected no more than approximately 25 feet apart horizontally in order to adequately determine the highest groundwater contaminant concentrations beneath multiple contaminated soil samples. If a boring is extended to groundwater, the work must be directed and supervised by a Professional Geologist or Professional Engineer registered in the State of Georgia, in accordance with the Water Well Standards Act<sup>5</sup>.

If petroleum was stored in the UST, analyze the water samples using EPA Method 8021B or 8260B for BTEX. If a substance other than gasoline was stored, also analyze the samples using EPA Method 8270C or 8310 for PAHs. As with soil samples, Method 8100 may be used to analyze for the presence of PAHs, but if PAHs are detected using this method, Method 8270C or 8310 must be used to determine the concentrations of the individual PAHs, in accordance with the EPA SW-846 requirements. Analysis of water samples for TPH is not necessary. Acceptable quantitation limits are provided in Table 2.

If a substance other than petroleum was stored in the UST system, analyze the groundwater for the substances or regulated constituents that were stored.

**Note:** Analysis of soil and groundwater samples for PAHs is not required if affidavits are signed by current and former owners of the facility (or authorized agent thereof) who are familiar with the complete history of the site's petroleum operations. They must certify that, to the best of their knowledge, only gasoline has been stored in the USTs addressed in the closure report. A sample affidavit is attached as Appendix C

**TABLE 1**  
**LABORATORY METHODS FOR SOIL AND GROUNDWATER ANALYSIS**

*Make sure your laboratory is familiar with the requirements of this table and this document*

SUBSTANCE STORED	CONSTITUENT	SOIL SAMPLING & ANALYSIS METHODS	GROUNDWATER SAMPLING & ANALYSIS METHODS
Gasoline or Aviation Gas Only (Affidavit Required)	BTEX  TPH-GRO	5035-8021B <sup>1</sup> OR 5035-8260B <sup>1</sup> ; AND 5035-8015B-GRO	5030-8021B <sup>1</sup> OR 5030-8260B <sup>1</sup>
Jet Fuel A, Jet Fuel B, Mineral Spirits or Unknown Petroleum Contents, Kerosene, Used Oil	BTEX  PAHs  TPH-GRO  TPH-DRO	5035-8021B <sup>1</sup> OR 5035-8260B <sup>1</sup> ; AND 8270C/8310/8100 <sup>2</sup> AND 5035-8015B-GRO AND 8015B-DRO	5030-8021B <sup>1</sup> OR 5030-8260B <sup>1</sup> AND 8270C/8310/8100 <sup>2</sup>
Diesel, Fuel Oil (#2, #4, #5, or #6), Motor Oil, or Hydraulic Oil <sup>3</sup>	BTEX PAHs  TPH-DRO	5035-8021B <sup>1</sup> OR 5035-8260B <sup>1</sup> ; AND 8270C/8310/8100 <sup>2</sup> AND 8015B-DRO	8270C/8310/8100 <sup>2</sup>

- 1) For Methods 8021B, 8260B, and 8015B-GRO (i.e. methods used to test for organic volatiles), use preparation and sampling Method 5035 for soil samples. Consult your analytical laboratory for required field equipment and field procedures. **Method 8260B is usually preferred over Method 8021B because Method 8260B is better able to identify regulated and interfering compounds and Methyl tertiary butyl ether (MTBE), whereas Method 8021B may misidentify some compounds as being regulated when they are not, may not be able to identify interfering compounds, and may provide false-positive results for MTBE.** Please request your laboratory to provide MTBE data if Method 8260B is used.
- 2) Be aware that if PAHs are detected using Method 8100, you must use Method 8270C or 8310 to determine the concentrations of the individual PAHs.
- 3) For example, hydraulic oil stored in USTs not connected to hydraulic equipment. Refer to the GUST Rules for details (391-3-15-.02.2(l)).
- 4) TPH-GRO and TPH-DRO analysis of confirmation soil samples is not required if groundwater samples are collected at the worst-case locations (see Section II.A.1.)
- 5) If 80 Octane Aviation Gasoline was stored, also analyze soil samples for Lead.

**TABLE 2**

**LABORATORY ESTIMATED QUANTITATION LIMITS FOR SOIL AND GROUNDWATER SAMPLES**

*Make sure your laboratory is familiar with the requirements of this table and this document*

<b>METHOD</b>	<b>5035-8021B</b>	<b>5030-8021B</b>	<b>5035-8260B</b>	<b>5030-8260B</b>
<b>SAMPLE TYPE</b>	<b>Soil</b>	<b>Groundwater</b>	<b>Soil</b>	<b>Groundwater</b>
<b>Benzene</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>Toluene</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>Ethylbenzene</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>Xylenes (for each isomer)</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>METHOD</b>	<b>8100<sup>1</sup>, 8270C, or 8310</b>	<b>8100<sup>1</sup>, 8270C, or 8310</b>		
<b>Each PAH Constituent</b>	660 ug/kg	10 ug/l		
<b>METHOD</b>	<b>8015B-GRO OR 8015B-DRO</b>			
<b>TPH GRO &amp; DRO</b>	10 mg/kg			

- 1) Be aware that if PAHs are detected using Method 8100, you must use Method 8270C or 8310 to determine the concentrations of the individual PAHs.
- 2) See Section II.A. of these guidelines for a more detailed explanation of expected estimated quantitation limits.

Note: the above information was obtained from the EPA SW-846 analytical guidelines. Further information on estimated quantitation limits (EQLs), commonly reported as “detection limits” by laboratories, is available in SW-846 on EPA’s website at [www.epa.gov/epaoswer/hazwaste/test/sw846.htm](http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm).

## B. SOIL AND GROUNDWATER SAMPLE COLLECTION PROCEDURES

Failure to follow EPA-approved sampling procedures may cause laboratory results to be invalid. Proper sampling procedures are outlined in EPA's Environmental Compliance Branch Standard Operating Procedures & Quality Assurance Manual (Region IV, revised February 1, 1991), and in SW-846. Decontaminate equipment between samples and provide proper chain-of-custody documentation. Consult your laboratory for detailed sampling directions and required equipment.

### 1.) SOIL SAMPLES

Soil collection procedures for BTEX, TPH-GRO and other volatile organics were revised by the EPA in June, 1997 and were implemented by the State of Georgia EPD on July 1, 1998. These procedures apply to EPA Methods 8021B, 8015B-GRO, and 8260B. These revised sampling procedures provide more than one option for proper soil sample collection. The option you select is directly dependent on your laboratory's set-up and capabilities. You must contact your laboratory prior to collection of the samples to determine their required field sampling procedures. A brief description of the soil sampling options and holding times is outlined in Appendix B. **The description in Appendix B cannot be used instead of consulting with your laboratory; it only provides an overview.**

Never use the same portion of a sample for both screening with field instruments (OVA or PID) and laboratory analysis. Exposing the sample to air and/or allowing the sample to increase in temperature to obtain a representative OVA or PID measurement renders the sample unusable for laboratory analysis. If the sample is not put into an air-tight container and cooled to 4 degrees Celsius immediately after sampling, it will provide inaccurate results and the results will be invalid.

Sampling methods for PAHs and TPH-DRO were not changed substantially in the last update of SW-846 (December 1996). For PAHs and TPH-DRO, you must use clean, laboratory-grade jars with tight-fitting lids, follow proper decontamination procedures between sampling, and keep the samples on ice or refrigerated at all times after collection and during shipment to the laboratory. The maximum holding time for PAH and TPH-DRO samples is 14 days from the date of collection.

### 2.) GROUNDWATER SAMPLES

Collect groundwater samples for volatiles such as BTEX (Method 8260B or 8021B) in clean 40 ml glass vials with Teflon™-lined lids appropriate for

laboratory analysis. These vials may be obtained from scientific or laboratory suppliers. Follow the laboratory instructions and EPA guidelines for filling sample containers and preserving the samples during shipment. The maximum holding time for preserved groundwater samples analyzed with the methods outlined in this document is 14 days.

Sampling methods for PAHs and TPH-DRO are outlined in SW-846 (December 1996). As stated previously, clean, laboratory-grade bottles with tight-fitting lids must be used and proper decontamination procedures must be followed. The samples must be kept on ice or refrigerated at all times after collection and during shipment to the laboratory. The maximum holding time for PAH and TPH-DRO samples is 14 days from the date of collection.

### **C. NUMBER AND LOCATION OF SOIL AND GROUNDWATER SAMPLES**

Follow the guidelines below to demonstrate compliance with the UST closure requirements. It is your responsibility to ensure that a sufficient quantity and quality of samples are taken to determine if a release has occurred.

#### **1.) SOIL SAMPLES FROM UST EXCAVATION**

Upon tank removal, collect at least the following number of soil samples, from native soil, approximately two feet below the estimated tank bottom:

- one sample per tank up to 1,050 gallons
- two samples per tank from 1,050 to 12,500 gallons
- additional sample per tank for every 10,000 gallons, or fraction thereof in excess of 12,501 gallons
- One of the soil samples must be collected from the fill-port end of the UST(s).
- One sample per 200 cubic yards of stockpile of excavated soil, or fraction thereof, or one sample per 200 cubic yards of backfill material if backfill is not excavated.

To estimate the size of the stockpile, multiply the length of the excavation by the width and by the depth in feet, and divide by 27 to obtain a result in cubic yards. Then subtract .005 yards per gallon of capacity of the USTs removed. The formula is:

$$(L \times W \times D) - .005 \times C = \text{Volume of the stockpile in yards}$$

Where L = Length of excavation, W = Width of excavation, D = depth of excavation, C = The total number of gallons contained by the USTs removed

If groundwater is encountered during excavation, one groundwater sample per contiguous UST pit must be collected in order to determine the highest groundwater contaminant concentrations beneath the contaminated soil. See section on “Groundwater Samples” below.

If a tank is being closed in place, take a minimum of one soil sample from each end of each tank, but no less than the appropriate number listed above, at least two feet below the estimated tank bottom. The samples should be taken as close to the tank as possible. Analyze groundwater if encountered in the borings or monitor wells and report the results. See Section II.C.4. for a discussion of groundwater sampling from borings vs. monitor wells.

#### a) BEDROCK CONDITIONS

If bedrock is encountered during excavation or sampling, collect the required soil samples just above the top of bedrock. If contamination is present on top of the bedrock at the soil/bedrock interface, a well will be required in the bedrock at the location of the contaminated soil, to a depth of 20 feet into the bedrock or to the water table, whichever is encountered first. If groundwater is encountered in the bedrock, wells must be installed deeply enough to allow for an adequate screen length. Generally, if these monitor wells are extended to the same elevation (relative to a common datum) as the nearest surface water body, and they do not contain water, it is considered unlikely that the site serves as a recharge area for the nearby surface water body. Exceptions include sites in karst areas in which groundwater flow is much less predictable. Wells must be installed under the direction and oversight of a Professional Engineer or Professional Geologist registered in the State of Georgia.<sup>6</sup>

In cases where nearby water supply wells have been **impacted** by petroleum, additional investigation may be required on a case-by-case basis, in order to protect human health and the environment. The presence of groundwater contamination is one of the conditions under which a CAP-A is required (reference the Rules for UST Management 391-3-15.)

#### 2.) IF OVER-EXCAVATION IS PERFORMED

This section only addresses the location of samples collected after over-excavation. Please refer to Section III “Over-Excavation” for more information on over-excavation.

Following tank removal and over-excavation collect the following confirmation samples:

- one sample every 30 linear feet along the base of the sides (within 1 foot of the bottom of the excavation or at the base of the former UST pit.)

- one sample per 200 square feet along the bottom of the excavated area.

Sample the backfill and excavated material and clearly identify the results as samples from the excavated material in the report. Sampling of excavated and stockpiled soils is discussed in more detail under Section IV, "Disposal of Excavated Material" later in this document. Separation of contaminated soil from relatively uncontaminated soil during excavation may reduce the volume of soil requiring treatment or off-site disposal and reduce costs.

Samples should be taken from the area(s) of worst-case contamination. These areas typically include locations under the UST at the fill neck end or where evidence of spillage or leakage has been observed. When two or more samples are taken from the bottom of the tank pit, they must not be taken from the same location; instead, they should be representative of the tank area. If initial sampling found no contamination in some areas of the UST pit and piping trench, and over-excavation is performed up to the specified dimensions in the remaining contaminated areas, then confirmatory sampling is necessary only in the over-excavated area. Additional confirmatory sampling is not required in areas where no detectable concentrations of BTEX, PAHs (if applicable), and TPH were found during the initial sampling. **Composite sampling for BTEX and TPH-GRO is not acceptable since it does not comply with SW-846 Method 5035.** Sample and handle stockpiled soil in accordance with Section IV, "Disposal of Contaminated Soil" and Section V, "Conditions for No Further Action Required (NFAR) Status."

### 3.) SOIL SAMPLES FROM BELOW PIPING TRENCH AND DISPENSERS

Following piping closure, collect soil samples along the piping trench for a total of at least one sample per 25 feet. In addition, collect at least one sample per 25 feet of contiguous dispenser island. Collect each sample from native soil, beneath a dispenser. If the dispenser is directly above the UST to which it is connected, sample collection beneath the dispenser is not necessary, since the soil above the UST will usually be excavated during closure. Samples should be collected from the worst-case locations, such as the elbows and other line fittings near the dispensers, as well as beneath sample locations where indicators of contamination such as petroleum odors or staining have been observed. Obtain the samples from the **native soil** underlying the backfill material, along the centerline of the trench. Also obtain samples from the backfill and other excavated material after stockpiling to determine the proper method of disposal and clearly identify the results as samples of excavated material in the report. Separation of contaminated soil from relatively uncontaminated soil is recommended to lower disposal costs. See Section IV, "Disposal of Contaminated Soil."

If soil in the piping trench is over-excavated, take the samples from the bottom of the excavation. If piping is less than twenty-five (25) feet from the UST excavation, a piping sample is not necessary, but take at least one sample per 25 feet of contiguous dispenser island, as discussed below. Vertically delineate

any soil contamination to non-detectable levels or obtain a groundwater sample from the piping/dispenser area. See the section below for details on groundwater sampling and Section III., “Over-Excavation” for more details on the limitations for over-excavation of piping trenches and dispenser islands.

Following closure of each dispenser and/or over-excavation of the dispenser island area, take at least one sample per 25 feet of contiguous dispenser island. Collect each sample from native soil beneath a dispenser. Sample any backfill and other excavated material removed from below the dispenser(s) in order to determine the proper method of disposal for the stockpile. Vertically delineate any soil contamination to non-detectable levels unless a groundwater sample is obtained from the piping/dispenser area, as outlined in the section below. In the report, clearly identify the samples as being collected from the excavated material in order to avoid confusion with confirmation samples collected from the bottom of the excavation. Excavated material may be stockpiled together and one sample collected for every 200 cubic yards or fraction thereof as described under section IV., “Disposal of Contaminated Soil.”

#### 4.) GROUNDWATER SAMPLES

##### a) REQUIRED GROUNDWATER SAMPLING

**If groundwater is encountered during closure, groundwater samples must be collected, whether the groundwater samples are obtained during removal of the UST system, or from borings or monitor wells advanced to the watertable in the areas of highest contamination.** If bedrock is encountered before contaminated soil is vertically delineated, then refer to Section II.C.1.a. which discusses this situation. If more than one foot of groundwater covers more than fifty percent of the base of the excavation, a groundwater sample may be taken instead of soil samples from the base of the excavation. If a groundwater sample is taken instead of the soil samples from the base of the excavation because groundwater has entered the excavation, one soil sample per UST must be collected along the sides at the soil-water interface, immediately adjacent to the ends of the former USTs at the fill-port end. Sample groundwater where contamination is most likely to be found; i.e., from worst-case locations.

##### b) GROUNDWATER SAMPLING TO REDUCE SOIL SAMPLING

In lieu of vertical delineation of soil samples in the UST pit, a monitor well or boring to the water table may be installed within two feet of the UST pit, and a groundwater sample collected and analyzed. If groundwater sampling is performed, only one soil sample per UST will be deemed necessary to characterize the soil left in the excavation, in addition to the samples required to characterize the excavated materials, the remaining soils in the piping trench, and beneath the dispenser areas.

Be cautioned that samples collected from open borings instead of properly constructed monitor wells may cause contamination to be dragged from an upper contaminated soil layer above the water table into the groundwater, and lead to a false-positive result of groundwater contamination; therefore installation of properly constructed monitor wells is encouraged when possible. The collection of groundwater samples from borings or piezometers installed by direct-push methods is also discouraged unless previously installed groundwater monitor wells exist at the site to accurately locate the top of the water table. Because borings installed by direct-push methods tend to smear the clay in soils along the sides of the borehole, accurate water levels and water samples representative of the top of the water table are difficult to obtain. Water samples collected by this method without supporting water-level data from on-site groundwater monitor wells are not considered to be consistently representative of worst-case conditions.

If the piping extends more than 25 feet from the USTs to the dispensers, and groundwater sampling is to be performed in lieu of vertical delineation at the piping and dispensers, an additional monitor well at the dispenser island should be installed within two feet of the dispensers, in the estimated downgradient direction of groundwater flow. If more than one dispenser island exists and the direction of groundwater flow cannot be estimated from topography, the monitor well should be situated at a midpoint between the dispenser islands, within 25 feet of each dispenser. If the size of the dispenser area is so great that one monitor well cannot be located within 25 feet of each dispenser, then more monitor wells would be necessary to characterize the area if the direction of groundwater flow is not apparent from topography.

On the other hand, if the dispensers are within 25 feet of the monitor well installed to characterize the UST pit, only one well per contiguous UST pit would be required instead of vertical delineation of soil contamination at the USTs, piping and dispensers.

Please note that a Professional Geologist or Professional Engineer registered in the State of Georgia must direct and supervise the installation of any boring or monitor well advanced to the water table and the interpretation of geologic data. If a boring is advanced to the water table, include a boring log with the closure report, signed and sealed by the PG or PE who supervised and directed the installation and proper abandonment of the boring. If a groundwater monitor well was installed, include a boring log and a well construction diagram for each boring or well, signed and sealed by the PG or PE who supervised and directed its installation and proper abandonment (if abandoned). Field supervision may be conducted by a subordinate to a registered Professional Geologist or Professional Engineer, as outlined in the laws governing registered Professional Engineers and Geologists.<sup>8</sup>

### c) ADVANTAGES OF GROUNDWATER SAMPLING

Groundwater sampling has the advantage of eliminating multiple vertical soil samples, remobilizations, and TPH sampling of confirmation samples. It usually results in speedier resolution of the closure. EPD conducted a review of soil and groundwater data from all closure reports, CAP-As and Phase II site assessments submitted for non-reimbursable sites between October, 1999 and May, 2000. The study found that more than half (55%) of all the closure sites required remobilization to determine whether groundwater was impacted.

The study also revealed that the absence of soil contamination above applicable Threshold Levels (see Appendix D for the Threshold Tables) is not a reliable indicator of the absence of groundwater contamination. Most of the closure sites with groundwater contamination (54%) reported all soil confirmation samples below applicable Threshold Levels.

Furthermore, even when confirmation soil samples are delineated to non-detectable concentrations, approximately 4% of assessments or closures at sites with impacted groundwater may fail to determine that groundwater contamination is present, unless groundwater samples are collected at the source areas. The study found that 4% of sites with impacted groundwater reported no detectable soil contamination in any confirmation sample (Appendix E).

The No Further Action Required (NFAR) status of sites is usually rescinded when groundwater contamination is discovered at a later date. The last owner/operator of the USTs that leaked is often considered the responsible party for corrective action in cases where the USTs have been removed prior to discovery of contamination. A thorough environmental assessment upon UST closure makes it more likely that adequate funds will be set aside for any required corrective action.

A survey performed by the EPD found that the cost of installing one to two groundwater monitor wells to a depth of 25 feet in unconsolidated soil was approximately equal to or less than the cost of re-mobilizing an excavator or drill rig to the site to further vertically delineate soil contamination. Further savings were realized in the elimination of all TPH analysis of confirmation samples and approximately half of the BTEX and PAH samples from the UST excavation, which is possible when a groundwater sample or samples are collected, as outlined above. The difference in cost ranged from a 40% savings (if one monitor well was installed, compared to mobilization of the cheapest excavator), to an 8% increase in cost (if two monitor wells were installed instead of mobilizing the least expensive excavator that responded to the survey).

If a CAP-A is required, the monitor wells may be used towards the three to four monitor wells required for a complete CAP-A and will be considered for reimbursement for GUST-Trust Fund eligible releases.

### **III. OVER-EXCAVATION**

Soil excavation is considered a method of remediation, and when it is performed, it is usually conducted as an interim corrective action during tank closures. Because this is a form of corrective action, the issue of reimbursement for these actions is addressed here as well.

## A. DEFINITIONS

Any soil excavation beyond three (3) feet from the outermost sides and ends of any UST, beyond one (1) foot from the bottom of the deepest UST, or beyond one (1) foot from the piping or dispensers, will be considered “corrective action” and “over-excavation”. If more than one UST is present in the pit, and the USTs are laid side-by-side, measurement will extend from the sides of the outermost USTs and the ends of the USTs. If the USTs are laid end-to-end, measurement will extend from the ends of the outermost USTs and the sides of the USTs. However, if excavation exceeds these dimensions, the site may still receive NFAR status without preparation of a CAP if the conditions outlined in Section V are met. **Over-excavation, as defined here in relation to a UST closure, will not be considered for reimbursement unless the scope, costs, and other pertinent information have been adequately detailed and proposed in a Corrective Action Plan (CAP), and subsequently approved by EPD. Soils or backfill excavated within the three (3) foot or one (1) foot limitations specified above are considered part of the UST closure and are not reimbursable under any circumstances.**

## B. REIMBURSEMENT

If you are trying to obtain a “clean closure”, over-excavation as a part of a UST closure is permitted, but will not be reimbursed. **Reimbursement for such over-excavation WILL NOT be considered unless it has first been proposed in a CAP and subsequently approved by EPD.** As stated previously, soils or backfill excavated within the three (3) foot or one (1) foot limitations specified above are considered part of the UST closure and are not reimbursable under any circumstances.

If soil contamination is present in the excavated material and has been delineated in the excavation to below detectable limits during closure, and the soil contamination is the only factor driving preparation of a CAP-A, off-site disposal is probably the most cost-effective solution instead of placing the soil back into the excavation and preparing a CAP-A and possible CAP-B. **A CAP prepared only to address soils excavated within the three-foot/one-foot limitations described above will not be reimbursed, since remediation of such soils constitutes non-reimbursable closure activities only.**

## C. LIMITATIONS AND REQUIREMENTS

The following limitations and requirements apply when conducting non-reimbursable over-excavation for a “clean closure” without an approved CAP:

- 1) Because soil excavation is typically not a cost-effective method of remediating large amounts of contaminated soil, it is generally discouraged whenever possible. Therefore, more than six (6) feet below and beyond the ends of the UST, more than six (6) feet beyond the sides of the UST, and more than four (4) feet below and beyond the product piping or dispenser island should not be excavated. If more than one UST is located in the excavation, more than six (6) feet beyond the sides of the outermost USTs, and more than six(6) feet below and beyond the ends of the USTs should not be excavated. This limitation is separate from the definition of “over-excavation” for reimbursable sites. Please be advised that in-place remediation methods are usually more cost-effective than over-excavating in excess of these dimensions. In-place remediation requires the preparation of a CAP.
- 2) Because free product is often trapped below the water table, soil excavation is usually not an effective method of removing free product and will not be considered an approved method of corrective action for free product in most cases. Free product must be removed immediately when encountered and the methods detailed and justified in the CAP-Part A.
- 3) Whenever over-excavation is conducted, a site map showing the excavation with a detailed description of the tank pit, piping and dispensers must be provided to the USTMP. This figure must include the dimensions of the UST(s), locations of the UST(s) within the tank pit, the piping, dispensers, over-excavation areas, and the final excavation dimensions.
- 4) Soil excavated for the tank closure, including backfill or over-excavated native soil may be placed back into the excavation if laboratory analysis shows that the concentrations in the excavated soils are less than the applicable threshold levels for BTEX and PAHs and the soil does not contain free product (approximately 10,000 mg/kg TPH. If soils containing contamination above applicable BTEX or PAH Threshold Levels are placed back into the excavation, preparation and submittal of a CAP-A (calculating alternate threshold levels) and/or a CAP-B (detailing in-place remediation methods) is required. See “Disposal of Contaminated Soil” below.
- 5) Excavated contaminated soils cannot be stockpiled on the site for more than 90 days. See “Disposal of Contaminated Soil” below for more information.

#### **IV. DISPOSAL OF CONTAMINATED SOIL**

If the soil is to be temporarily stored on site, place the contaminated soil on plastic sheeting and cover it with plastic sheeting to prevent infiltration, runoff and contamination of surface waters during inclement weather. Soil may also be temporarily stored in 55-gallon drums on site. (Marking

of any drums is suggested to discourage other parties from adding unwanted drums from unknown sources during off-hours.) During excavation, contaminated soil may be separated from relatively uncontaminated soil to reduce the volume of material requiring treatment or off-site disposal. Do not store stockpiled soil on site for more than 90 days.

Collect one sample from each stockpile per every 200 cubic yards of excavated soil or fraction thereof (**composite samples are not acceptable**) and submit the laboratory analytical results in the closure report. Excavated material may be placed back into the excavation if:

the analytical results of samples from the stockpiled soil (including the backfill) are less than the applicable Threshold Levels listed on Table A for BTEX and PAHs (see Appendix D or GUST Rule 391-3-15-.09(3)), and if no visible free product (approximately 10,000 mg/kg TPH) is present in the soil,

**OR**

the analytical results of samples from the stockpiled soil (including the backfill) are less than the applicable Threshold Levels listed on Table B for BTEX and PAHs (see Appendix D or GUST Rule 391-3-15-.09(3)), no visible free product (approximately 10,000 mg/kg TPH) is present in the soil, **and** if it is documented that there are no points of withdrawal for public or non-public water systems within the prescribed radii in Rule 391-3-15-.09(3)(c)(I)&(ii). Refer to Appendix F for acceptable methods and documentation required for water supply surveys.

**OR**

a CAP-A is submitted which demonstrates that the excavated soil is below alternate threshold levels or if the method of in-place treatment of any contaminated soil is outlined and justified in a CAP-A and/or a CAP-B. However, be cautioned that disposing contaminated soil off-site at a permitted treatment or disposal facility is often more cost-effective than placing the soil back into the excavation and preparing a CAP-A and possible CAP-B, if the contaminated excavated material is the only factor driving preparation of a CAP-A. A CAP prepared only to address soils excavated within the three-foot/one-foot limitations described in Section II.A. will not be reimbursed since remediation of such soils constitutes non-reimbursable closure activities only.

Please note that stockpiled soil that does not have detectable levels of BTEX or PAHs, is classified as a recovered material, and may be handled as ordinary soil.

If the stockpiled soil is contaminated with free product (approximately 10,000 mg/kg TPH) it may not be placed back into the excavation. The contaminated soil may be taken to an EPD-permitted treatment or disposal facility, in accordance with the attached guidance document Petroleum Contaminated Soil Disposal/Treatment (GUST-39). Proper disposal of stockpiled contaminated soil should occur as soon as possible, but no later than 90 days after the tank closure. Provide copies of soil disposal manifests with either the Closure Report or CAP-Part A, as applicable.

For on-site soil treatment or in-place remediation, a CAP-Part A **and** CAP-Part B are required.

## **V. CONDITIONS FOR "NO FURTHER ACTION REQUIRED" (NFAR) STATUS**

**Under some conditions**, NFAR status may be obtained through over-excavation of any soil contaminated above threshold levels **if** it is demonstrated that groundwater has not been impacted. This section and Section II, "Sample Collection and Analysis Requirements" outlines the acceptable methods for determining whether groundwater has been impacted.

If the soil is over-excavated, document satisfactory removal of contaminated soil and provide analytical results of confirmatory soil samples obtained from the bottom and sides of the excavation. As stated before, if soil is over-excavated, EPD recommends that a minimum of one grab sample be taken every thirty feet along the base of the excavation sides and one sample per 200 square feet along the bottom of the excavation. No Further Action Required (NFAR) status

may be achieved if the guidelines are followed and the analytical results for samples collected beneath the tanks and piping either prior to or following any over-excavation indicate one of the following:

BTEX, PAHs (if applicable) and TPH are below estimated quantitation (detection) limits (BDL) in the soil in every sample.

**OR**

BTEX and PAHs (if applicable) are BDL in all soil samples **and** TPH in soil is vertically delineated to BDL above the groundwater table;

**OR**

BTEX or PAHs in the initial samples are above estimated quantitation (detection) limits in soil but below the applicable Table A Threshold Levels (listed in the GUST Rules) **and** confirmation soil samples collected beneath the contaminated soil samples are BDL for BTEX, PAHs (if applicable), and TPH; i.e., BTEX, PAHs, and TPH are vertically delineated to BDL above the groundwater table;

**OR**

BTEX or PAHs are above quantitation (detection) limits in initial samples, but below the applicable Table B Threshold Levels, listed in the GUST Rules, a water supply survey indicates that there are no potential receptors within the applicable radii, **and** soil samples collected underneath the contaminated soil are BDL for BTEX, PAHs (if applicable), and TPH; i.e., BTEX, PAHs, and TPH are vertically delineated to BDL above the groundwater table. See Appendix F for acceptable water-supply survey methods and documentation.

**OR**

BTEX and PAHs are less than the applicable Table A Threshold Levels, listed in the GUST Rules, **and** BTEX, PAHs (if applicable), and TPH is not vertically delineated to BDL above the water table because groundwater was encountered in the boring or the excavation, **but** the groundwater sample does not contain BTEX or PAHs above Federal or State Maximum Contaminant Levels (MCLs);

**OR**

BTEX and PAHs are less than the applicable Table B Threshold Levels, listed in the GUST Rules, **and** BTEX, PAHs (if applicable), and TPH are not vertically delineated to BDL above the groundwater table because groundwater is encountered in the boring or excavation, **but** water samples do not contain BTEX or PAHs above In-stream Water Quality Standards, **and** the water supply survey indicates that there are no water supplies within the applicable radii. See Appendix F for acceptable water-supply survey methods and documentation. Samples must have been collected from worst-case (potential source) locations to ensure that soil and groundwater samples are representative of the center of the contaminant plume.

**If one of the conditions for NFAR outlined above is not met, a CAP-Part A is required within 60 days of release confirmation and must include the closure information outlined in this guidance document.**

## **VI. REPORT SUBMITTAL**

Any time a tank or piping is closed in place or removed, you must inform EPD by submitting one of the following reports:

### **A. CLOSURE REPORT**

When analytical results indicate that there are no detectable levels of contamination, i.e., a release has not occurred, a Closure Report (including the completed Closure Report Form) must be prepared and forwarded to the USTMP within forty-five (45) days after tank UST removal or in-place decommissioning. This brief report must address all pertinent information and attachments, as outlined in the attached Closure Report Form. This report must be retained by the tank owner/operator for at least three (3) years. A CAP-Part A should not be prepared in such a case.

If detectable levels of contaminants were present in the soil or groundwater, but the results and site conditions are identical to one of the scenarios for NFAR described above, a CAP-Part A is not required and a Closure Report must be submitted within 45 days of removal or in-place closure of the USTs.

All Closure Reports must meet the following requirements in addition to the other requirements discussed in this document:

- 1) The report must include a completed Closure Report Form (Appendix G) and other required attachments. An updated 7530-1 is not required, since the required

tank notification information and signature are to be submitted on the closure report form.

- 2) The report must be submitted to EPD within 45 days after completion of closure (i.e., UST removal or decommissioning).
- 3) The report must contain a site map constructed in accordance with the attached Closure Report Form. **The map must be to scale OR, as a minimum, distances between the tank pit area, piping trenches, dispenser islands, sewer, water, or other utility lines (or other preferential pathways), roads and main building must be accurately indicated.** It must also include a north (N) directional arrow. Tank IDs must correspond to most recent EPA Form 7530-1 that was submitted to register the USTs, and sample locations with sample numbers and depths must also be shown. Sample numbers must correspond to the attached laboratory analytical data. Although not mandatory, photos may be attached to help clarify the UST system layout in addition to the scaled map.

## **B. CORRECTIVE ACTION PLAN (CAP) PART A**

If free product is encountered, recovery must begin immediately. If free product is present or if contaminant levels and site conditions do not meet the criteria for NFAR outlined above then a CAP-Part A **must** be prepared. If a CAP-Part A is prepared, then the closure information outlined in this document is required as part of the CAP-Part A. In that case, a closure report form should be completed and included in the CAP-A and not be submitted separately. **The CAP-Part A must be prepared in accordance with the GUST Rules and in the format outlined in the CAP-Part A guidance document.**

If a CAP-Part A must be prepared, it must be directed and supervised by a Professional Engineer (PE) or Professional Geologist (PG) registered in the State of Georgia. The professional registration status of an individual is available from the Boards of Registration at (912) 656-2281 or on the web at <http://www.sos.state.ga.us>. If a CAP-Part A is required, it must be submitted to EPD **within 60 days** after release confirmation.

## **VII. REQUIREMENTS FOR RELEASE NOTIFICATION**

The GUST Rules define a release as any spilling, leaking, emitting, discharging, escaping, leaching, or disposing from an UST system into groundwater, surface water or subsurface soils. If contamination is detected in soil or groundwater samples or if a release is detected through other means, the owner/operator **must notify** EPD via telephone at (404) 362-2687 by the next business day explaining what has been found and what steps were taken to eliminate any hazardous conditions and prevent the spread of contamination.

This notification must be made whenever free product is encountered and/or analytical results indicate that BTEX, PAH, or TPH contamination is present in the soil and/or groundwater. If contaminated soil or groundwater is discovered, or if a release is discovered by other means, a CAP-Part A must be prepared in accordance with the GUST Rules and in the format outlined in the CAP-Part A Guidance Document **unless** contaminated soil is successfully excavated within the dimensions discussed in "Over-Excavation," the soil is properly disposed of off-site, and it is demonstrated that groundwater has not been impacted above the water quality standards. Demonstration of clean groundwater may be accomplished by either collection of a groundwater sample or by vertical delineation of soil contamination to non-detectable levels. Collect confirmatory samples in accordance with the Section II.C. "Number and Location of Soil and Groundwater Samples."

If a CAP-Part A must be prepared for the remediation of a soil stockpile only (not in-place remediation of impacted soils), and groundwater has not been impacted, collect the samples required by this guidance document, complete the Closure Report Form and include the attachments and form in the CAP-Part A. Include in the CAP-A a description of the method of soil remediation and what measures will be taken to prevent run-off and leaching of contaminated soil during treatment, in accordance with the CAP-A Guidelines. Installation of three additional monitor wells, collection of groundwater samples and determination of groundwater flow direction would not be required for a CAP-A prepared only to address soil contamination, if it has been determined that groundwater is not impacted through vertical delineation of soil contamination. For more information, please refer to Section IV, "Disposal of Contaminated Soil" and Section V, "Conditions for No Further Action Required (NFAR) Status," and Section VI, "Report Requirements", and the CAP-A Guidelines.

## **VIII. UST CLEANING AND DISPOSAL**

### **A. UST CLEANING**

Petroleum residuals may accumulate in the bottom of the tank, particularly if it has been in use for a long period of time. The residuals may be hazardous because they may contain lead and volatile organic components. Any substances used to clean the tanks, if mixed with the sludge, may be classified as a hazardous waste. These sludges and hazardous wastes should only be handled by qualified personnel, trained and authorized to do this work. Any hazardous wastes must also be handled and

disposed of in accordance with the Georgia Rules for Hazardous Waste Management, which can be obtained by calling (404) 656-7802. Additional guidance for tank cleaning can be found in publications available from:

National Fire Protection Association (NFPA)  
Batterymarch Park  
Quincy, Massachusetts 02269  
617/770-3500

American Petroleum Institute (API)  
1220 L Street, N.W.  
Washington, D.C. 20005  
202/682-8372.

## **B. UST DISPOSAL**

Before the tank is transported for reduction to scrap, it must be made vapor-safe (by inerting or purging) and prepared in accordance with recommended practices of API 1604. If it is transported off site prior to being reduced to scrap, it must be transported in accordance with Part 393.1 of the Federal Motor Carrier Safety Regulations. Because of the extreme danger involved in handling used petroleum tanks, EPD recommends that only qualified and experienced personnel perform this procedure. Every precaution should be taken to prevent a fire or explosion when the tank is handled and/or destroyed. When reducing the tank to scrap, it is recommended that methods be used which reduce the possibility of fire or explosion hazard as much as possible

## **C. RE-USE OF UNDERGROUND STORAGE TANKS**

Although the GUST Act and Rules do not disallow re-use of USTs, EPD discourages this practice. All tanks to be installed, or reinstalled, are subject to state and federal requirements for new UST systems. All used tanks must be recertified by the manufacturer, a manufacturer's representative, or Georgia registered Professional Engineer as meeting new tank requirements before the tank can be re-used, in accordance with USTMP Rule 391-3-15-.05. API Publication 1604, Section 6.1, as referenced in 40 CFR Part 280, states that tanks which previously contained petroleum must not be used for storage of food or liquids intended for animal or human consumption.

## NOTES

<sup>1</sup> United States. Department of Labor. Occupational Safety and Health Administration (OSHA). OSHA Regulations (Standards - 29 CFR) 29 CFR 1910.120 and 29 CFR 1926.65(a)(3)(C).

<sup>2</sup> United States. Department of Labor. Occupational Safety and Health Administration (OSHA). OSHA Regulations (Standards - 29 CFR) 29 CFR 1910.120 and 29 CFR 1926.65(a)(1)(ii).

<sup>3</sup> United States. Subtitle I of the Resource Conservation and Recovery Act (RCRA).

<sup>4</sup> United States. Department of Labor. Occupational Safety and Health Administration (OSHA). OSHA Standards Interpretation and Compliance Letters July 17, 1991 - 1910.120, Application to Petroleum Product Spills or Releases Subject to State Codes. [www.osha-slc.gov/OshDoc/Interp\\_data/I19910717A.html](http://www.osha-slc.gov/OshDoc/Interp_data/I19910717A.html). Clark, Patricia K. Director. Letter to Mr. Lawrence M. Sontoski, Radian Corporation. July 17, 1991

<sup>5</sup> State of Georgia. Official Code of Georgia (OCG). Water Well Standards Act of 1985. OCG 12-5-125, “Except as provided in subsection (f) of Code Section 12-5-127, no person shall drill a water well without first having a water well contractor's license issued by the council. No person, including licensed water well contractors, shall drill any other kind of well, borehole, or corehole unless such person is acting under the direction of a professional geologist or a professional engineer.”

12-5-136.”All water well contractors or other persons drilling boreholes or coreholes are required to conduct their work in a manner that complies with the well construction standards established in this part and are required to be licensed or acting under the direction of a professional engineer or professional geologist as set forth in Code Section 12-5-125.”

12-5-122, "Monitoring well" means any well for which the primary purpose is to collect data for hydrologic, geohydrologic, or ground water quality or quantity evaluations. "Borehole" means a hole made into the earth's surface and extending at least 50 feet into the earth or at least ten feet below the water table..'

<sup>6</sup> *ibid.*

<sup>7</sup> *ibid.*

<sup>8</sup> State of Georgia. Official Code of Georgia (OCG) 43-19-1. "Registration of Geologists Act of 1975." and OCG 43-15-1 (Registration of Professional Engineers).

**APPENDIX A**

**CLOSURE ACTIVITY FORM (GUST-29)**

# Georgia Department of Natural Resources

## Environmental Protection Division

Underground Storage Tank Management Program  
4244 International Parkway, Suite 104, Atlanta, Georgia 30354

Lonice C. Barrett, Commissioner

Harold F. Reheis, Director

(404)362-2687

NOTICE DATE: \_\_\_\_\_

### GEORGIA UNDERGROUND STORAGE TANK (GUST) CLOSURE ACTIVITY FORM

*For underground storage tanks (USTs), which will be permanently closed by removal or in-place, **this form should be completed and submitted to the address above at least 30 days prior to the proposed closure. USTs should be closed within ninety (90) days after the proposed closure date as reported to EPD.***

#### I. FACILITY INFORMATION:

Facility Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Telephone: (\_\_\_\_) \_\_\_\_\_

Address (location; P.O. Box **not** acceptable): \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Facility ID: \_\_\_\_\_

II.

#### UST INFORMATION: ("Contents" refer to last product contained in UST system)

Tank ID	Tank Size (gallons)	Contents	Type of Closure (check one)			Date Last Used
			Removal	In-Place	Piping	
						/ /
						/ /
						/ /
						/ /
						/ /

III.

#### UST OWNER: (Complete this section even if it is the same as Section I)

UST Owner Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

#### IV. CONTRACTOR: (Company secured to actually close UST system)

Company or Organization Name: \_\_\_\_\_

Contractor Representative Name: \_\_\_\_\_ Telephone: (\_\_\_\_) \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

#### V. CLOSURE NOTIFICATION INFORMATION:

As UST owner, I certify that the information concerning permanent closure of the UST system referenced on this form is true to the best of my belief and knowledge, and that the requirements of Subpart G of Title 40 CFR Part 280 and the Georgia Environmental Protection Division Closure Guidance (GUST-9, as revised) will be met. **(Not valid without owner signature.)**

Name (Print): \_\_\_\_\_ Title: \_\_\_\_\_

Organization Name: \_\_\_\_\_ Telephone: (\_\_\_\_) \_\_\_\_\_

UST Owner Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**APPENDIX B**

**SUMMARY OF METHOD 5035 SOIL SAMPLING PROCEDURES**

## SUMMARY OF METHOD 5035 SOIL SAMPLING PROCEDURES

Soil samples may be collected and shipped in one of two ways. One method requires the use of Encore™ samplers (as specified by SW-846), which must be sealed after sample collection, and immediately placed in a cooler in watertight containers on ice or on frozen ice packs. They must be shipped via overnight delivery to the laboratory for preservation and analysis. The Encore™ sample must arrive at the laboratory within 48 hours for preservation. At all times after collection and during shipment, the sample must be cooled to a minimum of 4 degrees Celsius and kept at or below that temperature. If the proper procedures are not followed, the results may not be valid and will not be accepted. (It is recommended if the samples are shipped that they be insured for the cost of re-sampling, since the samples will not be valid if they do not arrive at the laboratory in time to be preserved within 48 hours.) After the laboratory preserves the samples using this method, they may be held for a maximum of 14 days before being analyzed.

The second method requires the use of a small-diameter coring device (such as a 10 ml syringe with the tip removed) to collect the sample. This soil sample must be placed into pre-weighed 40 ml glass vials containing appropriate preservatives and cooled to 4 degrees Celsius immediately. SW-846 requires that the sample containers be “prepared in a fixed laboratory or other controlled environment, sealed, and shipped to the field location”, and that they must be “clean” if analyzed using Method 8021B. The introduction to SW-846 describes a very complex series of steps necessary to clean sampling containers, so cleaning by a laboratory is recommended. Approximately 5 g of sample must be placed in each vial for proper analysis. All sample vials must be laboratory-cleaned following the procedures outlined in SW-846, and weighed in the laboratory prior to sample collection.

Many laboratories have developed procedures to reduce the complexity of the field sampling, such as providing pre-weighed 40 ml vials with pre-measured preservative in each vial. According to a strict interpretation of Method 5035, the vials should be weighed in field again, immediately prior to placement of the sample into the vial. However, it is accepted by the EPD that it has become common practice to omit weighing the sample bottle in the field. The sampler should recognize, however, that not doing so is a modification of the method, and may affect the analytical results. If the laboratory provides pre-weighed vials with preservative in each vial, **no preservative can be spilled from the vial** during sample collection or the analytical results will not be accurate. Also, ensure that no soil has adhered to the exterior of the vial or its cap.

If the samples are preserved in the field at the time of sampling, the holding time is 14 days from the date of collection. If the samples are shipped to the laboratory before being preserved, the laboratory must preserve the samples within 48 hours, as with the Encore™ method. All samples must be preserved within 48 hours in order for the results to be valid whenever using any of the above methods and they must be kept on ice or frozen ice packs in water-tight containers in a cooler or kept in a refrigerator at or below 4 degrees Celsius at all times after collection. Do not allow water to enter the sample container.

When the samples are preserved in the laboratory or in the field, an adequate number of samples must be collected from each location to preserve the samples in two separate vials with two types of preservative: methanol and sodium bisulfate. Additional samples may be necessary for the laboratory to measure moisture content or to analyze the sample at a higher dilution. Consult your laboratory for the number of samples required at each sampling location. Methanol preservative is required in order to detect higher concentrations of BTEX and other volatiles and the sodium bisulfate preservative is required to detect lower concentrations of BTEX and other volatiles. Since the EPD needs to know the concentrations in both ranges, use of both preservatives in separate vials is required for closure sampling.

If the soil sample contains natural carbonates it may “fizz” or effervesce when it comes in contact with the sodium bisulfate. If the sample effervesces when placed into the vial containing sodium bisulfate, you cannot preserve soil samples from that location in sodium bisulfate. If this is the case, you must collect another sample in a 40 ml vial, add no preservative, ship it on ice or ice packs. The laboratory must receive it and analyze it within 48 hours of collection, or preserve the sample using an alternate and equally effective method.

**APPENDIX C**

**SAMPLE AFFIDAVIT**

**--SAMPLE AFFIDAVIT--**

(Retype this form and omit the paragraph that does not apply.)

**OWNER/OPERATOR AFFIDAVIT  
STATE OF GEORGIA**

\_\_\_\_\_  
**(County)**

Personally appeared before me, the undersigned attesting Authority in and for said State and County, the following deponent, who being first duly sworn, on oath deposes and says as follows:

- 1) That I am the (previous) owner/operator, or the \_\_\_\_\_ of \_\_\_\_\_, the owner/operator of the following facility: (title) (company)

Facility Name:

Address:

Facility ID:

**--CHOOSE ONE--**

- 2) That as the owner/operator, or authorized agent thereof, of the facility from \_\_\_\_\_ (month) of \_\_\_\_\_ (year), when the facility was constructed, until the present time, I have knowledge that only gasoline has been stored in and sold from the current or prior Underground Storage Tank(s) (USTs) on site. I also have knowledge that diesel fuel, fuel oil, used oil, or other petroleum hydrocarbons, other than gasoline have never been stored in or sold from the current or prior UST(s) on site.

**OR**

- 2) That as the previous owner/operator, or authorized agent thereof, of the facility from \_\_\_\_\_ (month) of \_\_\_\_\_ (year) when the facility was constructed until \_\_\_\_\_ (month) of \_\_\_\_\_ (year) when the facility was sold to \_\_\_\_\_ (current owner), I have knowledge that, during that period, only gasoline has been stored in and sold from the Underground Storage Tank(s) (USTs) addressed on site. I also have knowledge that during that period diesel fuel, fuel oil, used oil or other petroleum hydrocarbons, other than gasoline, have never been stored in or sold from the UST(s) on site.

Signature:

Name (printed: ) \_\_\_\_\_

Sworn to and subscribed before me this

\_\_\_\_\_ day of \_\_\_\_\_ (Month), \_\_\_\_\_ (Year).

Notary Public

**APPENDIX D**

**TABLE A AND TABLE B SOIL THRESHOLD LEVELS**

**(FROM GEORGIA DEPARTMENT OF NATURAL RESOURCES  
RULE 391-3-15-.09)**

**Table A Soil Threshold Levels**

Petroleum Constituents and Soil Threshold Levels<sup>a</sup>

At UST corrective action sites where withdrawal points for public and non-public water supplies exist within distances defined in GUST Rule 391-3-15-.09(3)

CONSTITUENT	AVERAGE OR HIGHER GROUNDWATER POLLUTION SUSCEPTIBILITY AREA <sup>b</sup> (Where public water supplies exist within 2.0 miles or non-public supplies exist within 0.5 miles)		LOWER GROUNDWATER POLLUTION SUSCEPTIBILITY AREA <sup>c</sup> (Where public water supplies exist within 1.0 mile or non-public supplies exist within 0.25 miles)	
	≤500 feet to withdrawal point	>500 feet to withdrawal	≤500 feet to withdrawal point	>500 feet to withdrawal point
VOLATILE ORGANIC COMPOUNDS				
Benzene	0.005 mg/kg <sup>d</sup>	0.008 mg/kg	0.005 mg/kg <sup>d</sup>	0.71 mg/kg
Toluene	0.400 mg/kg	6.00 mg/kg	0.400 mg/kg	500.00 mg/kg
Ethylbenzene	0.370 mg/kg	10.00 mg/kg	0.500 mg/kg	140.00 mg/kg
Xylenes	20.00 mg/kg	700.00 mg/kg	27.00 mg/kg	700.00 mg/kg
POLYNUCLEAR AROMATIC HYDROCARBONS				
Acenaphthene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Anthracene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benz(a)anthracene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(a)pyrene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(b)fluoranthene	0.820 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(g,h,i)perylene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(k)fluoranthene	1.60 mg/kg	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Chrysene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Dibenz(a,h)anthracene	1.50 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Fluoranthene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Fluorene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Indeno(1,2,3-c,d)pyrene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>
Naphthalene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Phenanthrene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Pyrene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>

a - Based on worst-case assumptions for one-dimensional vadose zone and groundwater contaminant fate and transport models.

b - Based on an assumed distance of 0.5 feet between contaminated soils and the water table

c - Based on an assumed distance of 5.0 feet between contaminated soils and the water table.

d - Estimated Quantitation Limit. The health-based threshold level is less than the laboratory method limit of detection.

e - Not applicable. The health-based threshold level exceeds the expected soil concentration under free product conditions

### Table B Soil Threshold Levels

#### Petroleum Constituents and Soil Threshold Levels<sup>a</sup>

At UST corrective action sites where withdrawal points for public and non-public water supplies do not exist within distances defined in GUST Rule 391-3-15-.09(3)

CONSTITUENT	AVERAGE OR HIGHER GROUNDWATER POLLUTION SUSCEPTIBILITY AREA <sup>b</sup> (Where public water supplies exist within 2.0 miles or non-public supplies exist within 0.5 miles)		LOWER GROUNDWATER POLLUTION SUSCEPTIBILITY AREA <sup>c</sup> (Where public water supplies exist within 1.0 mile or non-public supplies exist within 0.25 miles)	
	≤500 feet to surface water body	>500 feet to surface water body	≤ 500 feet to surface water body	>500 feet to surface water body
VOLATILE ORGANIC COMPOUNDS				
Benzene	0.017 mg/kg	0.120 mg/kg	0.020 mg/kg	11.30 mg/kg
Toluene	115.00 mg/kg	500.00 mg/kg	135.00 mg/kg	500.00 mg/kg
Ethylbenzene	18.00 mg/kg	140.00 mg/kg	28.00 mg/kg	140.00 mg/kg
Xylenes	700.00 mg/kg	700.00 mg/kg	700.00 mg/kg	700.00 mg/kg
POLYNUCLEAR AROMATIC HYDROCARBONS				
Acenaphthene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Anthracene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benz(a)anthracene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(a)pyrene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(b)fluoranthene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(g,h,i)perylene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Benzo(k)fluoranthene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Chrysene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Dibenz(a,h)anthracene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Fluoranthene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Fluorene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Indeno(1,2,3-c,d)pyrene	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>	0.660 mg/kg <sup>d</sup>	N/A <sup>e</sup>
Naphthalene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Phenanthrene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>
Pyrene	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>	N/A <sup>e</sup>

a - Based on worst-case assumptions for one-dimensional vadose zone and groundwater contaminant fate and transport models.

b - Based on an assumed distance of 0.5 feet between contaminated soils and the water table

c - Based on an assumed distance of 5.0 feet between contaminated soils and the water table.

d - Estimated Quantitation Limit. The health-based threshold level is less than the laboratory method limit of detection.

e - Not applicable. The health-based threshold level exceeds the expected soil concentration under free product conditions

**APPENDIX E**

**REPORT REVIEW STATISTICS**

## REPORT REVIEW STATISTICS

Results of Review of Closure Reports received after October 1, 1999:

NFAR	211	53%
CAP-A	44	11%
Unresolved deficiencies	144	36%
N/A (Haz. Waste)	<u>1</u>	<u>0%</u>
<b>Total</b>	400	100%

Closure Review Results Without Unresolved Deficiencies and Hazardous Waste Sites:

NFAR	211	83%
CAP-A	<u>44</u>	<u>17%</u>
<b>Total</b>	255	100%

For Non-Haz Waste Sites -

Closure sites receiving NFAR:

Required remobilization prior to NFAR	82	38%
Did Not require remobilization	<u>129</u>	<u>62%</u>
<b>Total</b>	211	100%

Unresolved Deficiency Sites:

Need or needed vertical delineation	105	73%
Other deficiencies	<u>39</u>	<u>27%</u>
<b>Total</b>	144	100%

Closures requiring CAP-A:

Needed vertical delineation to determine whether CAP-A was needed:	33	75%
Did not require remob. for vert. delineation	<u>11</u>	<u>25%</u>
<b>Total</b>	44	100%

Number of Sites Requiring Remobilization Compared to Total Sites Reviewed:

<b>Total Closure Sites Reviewed</b>	399	
NFARs requiring remobilization	82	
Sites going to CAP-A requiring remob.	33	
Deficiencies requiring remob.	<u>105</u>	
<b>Subtotal</b>	220	
<b>Percentage of total sites requiring remob.</b>	(220/399) x 100	<b>55%</b>

Number of sites where GW impact was found during closure	47	12%
Number of sites where GW was not investigated or $\leq$ 1ppb at closure	<u>352</u>	<u>88%</u>
<b>Total</b>	<b>399</b>	<b>100%</b>

Soil Contamination Below Practical Quantitation Limits (PQLs or "Detection Limits") at GW impact Sites:

BTEX below PQLs; TPH above PQLs	6	13%
TPH below PQLs; BTEX above PQLs	6	13%
Both BTEX & TPH below PQLs	2	4%
No BTEX data reported (Haz. Waste site)	1	2%
No TPH data reported	4	8%
Both BTEX & TPH above PQLs	<u>29</u>	<u>60%</u>
<b>Total</b>	<b>48</b>	<b>100%</b>

Incidence of Soil Contamination Above Threshold Levels at GW Impact Sites:

BTEX above applicable Soil Threshold Levels	21	44%
BTEX less than applicable Soil Threshold Levels	26	54%
No BTEX data reported (Haz. Waste)	<u>1</u>	<u>2%</u>
<b>Total</b>	<b>48</b>	<b>100%</b>

## Discussion

Of the closure reports reviewed for which the future outcome had been determined (i.e., deficiencies have been addressed), 83% resulted in No Further Action Required (NFAR) status and 17% required preparation of a CAP-A, including those sites with no soil contamination and no groundwater sampling. The study was limited to reviews of closure reports received between October 1, 1999 and May 1, 2000 by Corrective Action Unit II (CAU II), after the date that vertical delineation of confirmation soil samples to non-detectable levels was required by the staff of CAU II.

Of the sites that received NFAR after review of the closure report, 38% of all closure assessments required remobilization for sampling to obtain enough information necessary to determine whether a CAP-A was necessary. Of the sites eventually requiring a CAP-A, 75% required remobilization for sampling to determine whether groundwater was impacted and a CAP-A was required. Of the closure sites with currently unresolved deficiencies, 73% need vertical delineation of contamination soil.

The percentage of sites requiring remobilization totaled 55% of all the closure sites reviewed.

Of the closure sites with documented groundwater contamination, 4% reported no soil contamination in the confirmation samples above detection limits (PQLs) for both BTEX and TPH. Of the groundwater-impacted closure sites, 6 sites reported TPH below PQLs and BTEX above PQLs and 6 sites reported BTEX below PQLs and TPH above PQLs.

Of the groundwater-impacted closure sites, 54% reported no soil contamination in the confirmation samples above applicable Threshold Levels.

### Conclusions

Remobilization (and re-submittal and re-review of closure reports) was necessary to determine whether groundwater was impacted in 55% of the closure assessments. This indicates that an opportunity exists for UST owner/operators to save time and money by making this determination during the first mobilization in the majority of the cases.

However, eventually 83% of sites received NFAR status from October 1, 1999 until May 1, 2000, either with no deficiencies or with deficiencies adequately addressed. These NFARs were issued after the date (October 1, 1999) that the project officers began requiring vertical delineation to non-detectable concentrations of BTEX and TPH.

The data indicates that vertical delineation of soil contamination to non-detectable levels (PQLs) is necessary. Of the sites with available subsequent groundwater sample results, 54% of the sites without soil contamination above Threshold Levels in confirmation samples reported groundwater contamination. The data also indicates that even when soil contamination is vertically delineated to below detectable levels, 4% of sites with groundwater contamination will not be identified unless future assessment is performed (e.g., for property transfer purposes).

The majority of the closure reports reviewed, for which the future outcome was determined, eventually received No Further Action Required (NFAR) status without preparation of a CAP-A (83%).

The rate of error of non-detection of groundwater contamination using BTEX analysis of soil samples (13%) equaled that of TPH analysis (13%). In other words, neither parameter alone appeared to be a perfect indicator, and use of both indicators together appear to have lowered the error rate to 4%.

**APPENDIX F**

**LOCAL WATER SUPPLY SURVEY**

## LOCAL WATER SUPPLY SURVEY

This attachment serves to outline the methodology and documentation to be used to identify local water resources. Water resources that must be identified include surface water bodies that may receive groundwater flow and points of withdrawal for public and non-public water supply, such as drinking water wells. The water resources survey is used to determine the appropriate corrective action objectives, in accordance with GUST Rule 391-3-15-.09(4)(a)-(d). When soil contaminant concentrations are between the applicable Table A and the applicable Table B standards, or if groundwater contaminant concentrations are between drinking water standards and In-Stream Water Quality Standards (ISWQS), a water supply survey must be conducted and submitted in the Closure Report to determine whether additional corrective action is necessary.

Documentation of the water resources survey must include, but is not limited to, a United States Geological Survey (USGS) database search, communication logs (telephone or personal), and a field survey summary. It should be included as an attachment to the Closure Report. Include a figure constructed from a **USGS 7.5 minute Topographic Quadrangle Map** displaying the location(s) of all water resources within radii of concern. A legend must identify which points of withdrawal for water supply are public and non-public. The map must be to scale, have the scale displayed, and include a north arrow, and is preferred to be in color. Both water supply and surface water surveys should be verified by a field reconnaissance.

A public drinking water system, as defined by the Georgia Rules for Safe Drinking Water (Chapter 391-3-5, as amended), is one that provides piped water for human consumption to at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. The water system survey includes the identification of all water wells (domestic, commercial, industrial and irrigation), surface water withdrawal points and springs. Identify public/non-public drinking water systems by reviewing federal, state, county, and/or city records as well as conducting a field reconnaissance. Examples of public agencies that may have public and private well information include the USGS, Georgia Geologic Survey, local health departments, and local water and sewer authorities. All adjacent property owners should be contacted via telephone, personal visit, or certified mail. A detailed field reconnaissance should be conducted to verify the presence or absence of water wells within  $\frac{1}{2}$  mile of the site in a high or average susceptibility area and  $\frac{1}{4}$  mile within a low groundwater pollution susceptibility area.

**APPENDIX G**  
**CLOSURE REPORT FORM**

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# Georgia Department of Natural Resources

Environmental Protection Division

Land Protection Branch

4244 International Parkway, Suite 104, Atlanta, Georgia 30354

Lonice C. Barrett, Commissioner

Harold F. Reheis, Director

(404)362-2537

## USTMP CLOSURE REPORT FORM

If a boring or monitor well was extended to groundwater, the Professional Engineer (PE) or Professional Geologist (PG), registered in the State of Georgia, that supervised the work must complete and sign the following statement:

“I have supervised and directed the installation of the boring or monitor well and the interpretation of groundwater data, in accordance with the Water Well Standards Act, the Professional Engineer Act and the Professional Geologist Act. This report complies with the standards of the USTMP Act, Rules, and guidelines and other applicable state and federal environmental regulations. The information presented herein is true and accurate.”

Name (print) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

PG/PE Certification Expiration Date \_\_\_\_\_

Georgia Stamp or Seal

**Facility ID #:** \_\_\_\_\_ **USTMP CLOSURE REPORT FORM**

Complete this form and provide documentation to substantiate information as outlined in the Underground Storage Tank (UST) Closure Guidance Document (GUST-9). Use a separate form for each tank excavation.

**I. GENERAL**

**A. UST OWNER** Company Name (if applicable): \_\_\_\_\_  
 Mailing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Owner's Name (printed): \_\_\_\_\_ Phone: \_\_\_\_\_

I hereby certify that the information in this Closure Report and in all the attachments is true, accurate, and complete, and the Closure Report satisfies all criteria and requirements of Rule 391-3-15-.09 of the Georgia Rules for Underground Storage Tank Management.

**Signature (of owner listed under "Name" above):** \_\_\_\_\_ **Date:** \_\_\_\_\_

**B. REMOVAL CONTRACTOR (Prime Contractor/Prime consultant)**

Company: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Name of Company Representative (printed): \_\_\_\_\_ Phone: \_\_\_\_\_

I hereby certify that I have performed or supervised the work detailed in this report, and have examined and am familiar with the information submitted in this and all attached documents. The submitted information is, to the best of knowledge, true, accurate, complete, and in accordance with the Georgia Rules for Underground Storage Tank Management, revised February, 1995.

**Signature (of same contractor listed under "Name"):** \_\_\_\_\_ **Date:** \_\_\_\_\_

**C. UST Site Facility Name:** \_\_\_\_\_ **County:** \_\_\_\_\_ **Fac. I.D.#:** \_\_\_\_\_

Street Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

**II. TANKS AND PIPING CLOSURE DATA**

**A. LIST USTs THAT HAVE BEEN CLOSED (Use the same tank ID # as on the 7530-1):**

<b>TANK ID#</b>	_____	_____	_____	_____	_____
<b>Product</b>	_____	_____	_____	_____	_____
<b>Size (gals)</b>	_____	_____	_____	_____	_____
<b>How Closed</b>	<input type="checkbox"/> Removed	<input type="checkbox"/> Removed	<input type="checkbox"/> Removed	<input type="checkbox"/> Removed	<input type="checkbox"/> Removed
(check one)	<input type="checkbox"/> In Place	<input type="checkbox"/> In Place	<input type="checkbox"/> In Place	<input type="checkbox"/> In Place	<input type="checkbox"/> In Place
<b>Date Last Used</b>	_____	_____	_____	_____	_____
<b>Date Closed</b>	_____	_____	_____	_____	_____
(Date removed from ground or filled in-place)					

**LIST ANY USTs STILL IN USE AT THE FACILITY (Use same tank ID # as on 7530-1):**

<b>TANK ID#</b>	_____	_____	_____	_____	_____
<b>Product</b>	_____	_____	_____	_____	_____
<b>Size (gals)</b>	_____	_____	_____	_____	_____

**B. PIPING:** How was Piping closed?  Removed.  Emptied, capped, left in place.  
 Emptied, filled with inert material.

If only piping was closed, give date: \_\_\_\_\_ (month, day, year)

**III. SAMPLING AND ANALYTICAL**

**A. Soil/Groundwater Sampling:** The quantity of samples taken should be in accordance with USTMP closure guideline (GUST-9) requirements and all samples must be collected in accordance with current EPA-approved sampling procedures.

**B. Regulated Substance Released:** Whenever free product is encountered and/or analytical results indicate that BTEX, PAH, or TPH contamination is present in the soil and/or groundwater, a release must be reported to EPD via telephone or fax by the next business day explaining what has been found and what steps were taken to eliminate any hazardous conditions and prevent the spread of contamination. Indicate here what substance, if any, was released:

None  Gasoline  Diesel  Kerosene  Used Oil  Other (Name):

Date release reported to EPD: \_\_\_\_\_

**C. Laboratory Analytical Methods Used (check all that were used):**

5035-8021B \_\_\_\_\_ 5035-8015 \_\_\_\_\_ 5035-8260 \_\_\_\_\_ 8100 \_\_\_\_\_ 8310 \_\_\_\_\_ 8270 \_\_\_\_\_  
Other \_\_\_\_\_

If Method 5035 was used to sample, which method was used to collect and contain the samples?  
Encore™ \_\_\_\_\_ Syringe/corer and field-preserved in 40 ml vial \_\_\_\_\_

**IV. TANK EXCAVATION SAMPLES** (see #5 for piping trench samples)

<u>in gallons) of UST</u>	<u># of samples required per UST</u>	<u>Size (capacity</u>
<1,050	1	
1,050 - 12,500	2	
> of equal to 12,501	2 per UST + 1 per additional 10,000 gals	
(Collect 1 sample		
per UST if a groundwater sample was collected within 2 feet of the excavation.)		

**A.** Based on the total number of USTs closed as reported on this form, the total number of tank excavation samples taken for this site was: \_\_\_\_\_

**B.** If over-excavation is performed, take one confirmation sample every 30 linear feet along the base of the sides (within 1 ft of the bottom of the excavation) and one sample per 200 sq ft along the bottom of the excavated area.

- 1) Was over-excavation performed? Yes \_\_\_\_\_ No \_\_\_\_\_
- 2) If "yes", what was the area of the excavation in square feet? \_\_\_\_\_
- 3) Enter total number of over-excavation samples for this site here: \_\_\_\_\_



## **VII. CLOSURE SUMMARY**

### **A. CONCLUSIONS**

\_\_\_ **Soil or groundwater contamination exists in excess of the levels specified in the above situations and this closure report is being submitted within a certified CAP-Part A.**

\_\_\_ **Clean Closure, No Further Action Required because analytical results indicate the condition marked below:**

\_\_\_ BTEX, PAHs and TPH are below detection limits (BDL) in the soil.

\_\_\_ BTEX and PAHs are BDL in the soil and TPH (and BTEX) is vertically delineated to BDL above the groundwater table.

\_\_\_ BTEX and PAHs are above detection limits in soil but below Table A Threshold Levels, and TPH, PAHs, and BTEX in soil is vertically delineated to BDL above the groundwater table.

\_\_\_ BTEX and PAHs are above detection limits but below Table B Threshold Levels, a water supply survey indicates there are no potential receptors within the applicable radii, and BTEX, PAHs, and TPH in soil is vertically delineated to BDL above the groundwater table.

\_\_\_ BTEX and PAHs are less than Table A Threshold Levels and BTEX, PAHs or TPH is not vertically delineated to BDL above the groundwater table because groundwater is encountered in the boring or the excavation, and the water sample does not contain BTEX or PAHs above Federal or State MCLs.

\_\_\_ BTEX and PAHs are less than Table B Threshold Levels and BTEX, PAHs, or TPH is not vertically delineated to BDL above the groundwater table because groundwater is encountered in the boring or excavation, and the water sample does not contain BTEX or PAHs above In-stream Water Quality Standards, and the water supply survey indicates that there are no water supplies within the applicable radii.

**B. SITE MAP** (Attach to report): **The map must be to scale OR, as a minimum, distances between the tank pit area, piping trenches, dispenser islands, sewer, water, utility lines (or other preferential pathways), road and main buildings must be accurately indicated on the map.** These listed features must be depicted on the map in order to accurately interpret the data. The map must also include a north (N) directional arrow. Tank ID's must correspond to EPA Form 7530-1 and sample locations, sample identification numbers and depths must also be shown. Sample numbers must correspond to attached laboratory analytical data. Although not mandatory, photos may be attached to help clarify the UST system layout.

# SOIL/GROUNDWATER ANALYTICAL RESULTS SUMMARY

(Use additional pages as necessary)

Facility Name:

Facility ID #

## Volatile Organic Compounds

(Indicate **S** for Soil and **GW** for Groundwater. GW results must be in ug/l and soil results in mg/kg)

<u>Sample ID</u>	<u>S/GW</u>	<u>Depth</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Ethylbenz.</u>	<u>Xylenes</u>	<u>Total BTEX</u>	<u>TPH</u>	<u>Units</u>
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

## Polynuclear Aromatic Hydrocarbons (PAHs)

(Indicate **S** for Soil and **GW** for Groundwater. Report soil concentrations in mg/kg and groundwater in ug/L.)

<u>Sample ID#</u>	<u>S/GW</u>	<u>Depth</u>	<u>Detected PAH Compounds</u>	<u>Total PAHs</u>	<u>Units</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

## LABORATORY ANALYTICAL REQUIREMENTS FOR UST CLOSURES

**TABLE 1**  
**LABORATORY METHODS FOR SOIL AND GROUNDWATER ANALYSIS**

*Make sure your laboratory is familiar with the requirements of this table and this document*

SUBSTANCE STORED	CONSTITUENT	SOIL SAMPLING & ANALYSIS METHODS	GROUNDWATER SAMPLING & ANALYSIS METHODS
Gasoline or Aviation Gas Only (Affidavit Required)	BTEX  TPH-GRO	5035-8021B OR 5035-8260B <sup>1</sup> ; AND 5035-8015B-GRO	5030-8021B OR 5030-8260B <sup>1</sup>
Jet Fuel A, Jet Fuel B, Mineral Spirits or Unknown Petroleum Contents, Kerosene, or Used Oil,	BTEX  PAHs  TPH-GRO  TPH-DRO	5035-8021B OR 5035-8260B <sup>1</sup> ; AND 8270C/8310/8100 <sup>2</sup> AND 5035-8015B-GRO AND 8015B-DRO	5030-8021B OR 5030-8260B <sup>1</sup> AND 8270C/8310/8100 <sup>2</sup>
Diesel, Fuel Oil (#2, #4, #5, or #6), Motor Oil, or Hydraulic Oil <sup>3</sup>	BTEX PAHs  TPH-DRO	5035-8021B OR 5035-8260B <sup>1</sup> ; AND 8270C/8310/8100 <sup>2</sup> AND 8015B-DRO	5030-8021B OR 5030-8260B <sup>1</sup>

1) For Methods 8021B, 8260B, and 8015B-GRO (i.e. methods used to test for organic volatiles), use preparation and sampling Method 5035 for soil samples. Consult your analytical laboratory for required field equipment and field procedures. **Method 8260B is usually preferred over Method 8021B because Method 8260B is better able to identify regulated and interfering compounds and MTBE, whereas Method 8021B may misidentify some compounds as being regulated when they are not, may not be able to identify interfering compounds, and may provide false-positive results for MTBE.**

2) Be aware that if PAHs are detected using Method 8100, you must use Method 8270C or 8310 to determine the concentrations of the individual PAHs.

3) e.g., hydraulic oil stored in USTs not connected to hydraulic equipment. Refer to the GUST Rules for details (391-3-15-.02).

4) TPH-GRO and TPH-DRO analysis of confirmation soil samples is not required if groundwater samples are collected at the worst-case locations (Section II.A.1.)

5) If 80 Octane Aviation Gasoline was stored, also analyze soil samples for Lead.

**TABLE 2**

**LABORATORY ESTIMATED QUANTITATION LIMITS FOR SOIL AND GROUNDWATER SAMPLES**

*Make sure your laboratory is familiar with the requirements of this table and this document*

<b>METHOD</b>	<b>5035-8021B</b>	<b>5030-8021B</b>	<b>5035-8260B</b>	<b>5030-8260B</b>
<b>SAMPLE TYPE</b>	<b>Soil</b>	<b>Groundwater</b>	<b>Soil</b>	<b>Groundwater</b>
<b>Benzene</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>Toluene</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>Ethylbenzene</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>Xylenes (for each isomer)</b>	1-5 ug/kg	1-5 ug/l	5 ug/kg	5 ug/l
<b>METHOD</b>	<b>8100<sup>1</sup>, 8270, or 8310</b>	<b>8100<sup>1</sup>, 8270, or 8310</b>		
<b>Each PAH Constituent</b>	660 ug/kg	10 ug/l		
<b>METHOD</b>	<b>8015B-GRO OR 8015B-DRO</b>			
<b>TPH GRO &amp; DRO</b>	10 mg/kg			

- 1) Be aware that if PAHs are detected using Method 8100, you must use Method 8270C or 8310 to determine the concentrations of the individual PAHs.
- 2) See Section II.A. of these guidelines for a more detailed explanation of expected estimated quantitation limits.

Note: the above information was obtained from the EPA SW-846 analytical guidelines. Further information on estimated quantitation limits (EQLs), commonly reported as “detection limits” by laboratories, is available in SW-846 on EPA’s website at [www.epa.gov/epaoswer/hazwaste/test/sw846.htm](http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm).