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COMMONWEALTH OF MASSACHUSETTS
UNDERGROUND STORAGE TANK CLOSURE ASSESSMENT MANUAL

This Policy is intended to provide guidance on how to fulfill the requirement to measure for the presence of contamination at the time of a closure of an Underground Storage Tank, pursuant to the Massachusetts Fire Prevention Regulations, 527 CMR 9.00.

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When any Underground Storage Tank (UST) is permanently "closed" (removed or closed-in-place), Massachusetts law requires that the presence of contamination in the environment be assessed. If contamination is found, further assessment and cleanup may be necessary. Although some level of contamination is encountered at many UST closures, it is not always adequately measured for or managed. Discovering contamination as early as possible will enable appropriate actions to be taken sooner, thus improving the chances of limiting the impact to the environment

and avoiding increased closure costs, decreased property value, and third party damage claims to the UST owner/operator.

**This document is intended to provide guidance on how to measure for contamination at the time of a closure of an UST containing petroleum fuel oils and gasoline. It is not intended to be used for closures of USTs containing non-petroleum hazardous materials and waste crankcase oil. Procedures for closure assessments at residential fuel oil USTs are provided in a separate guidance document.**

This document contains two major sections:

Section I contains background information including:

- The responsibilities of the different parties involved in the UST closure, i.e., the UST owner/operator, local fire department, tank removal contractor, and Licensed Site Professional;
- A description of applicable regulatory authorities; and
- Recommendations for documenting assessment findings and the appropriate material to include in the UST Closure File.

Section II contains instructions for performing a closure assessment.

This guidance document is intended primarily for parties who are performing the assessment at the time of the UST closure as required by 527 CMR 9.00. These parties may be tank removal contractors or, if the activities required are beyond the expertise of that contractor, environmental consultants, Licensed Site Professionals, or other qualified professionals. However, all parties who are involved in the UST removal (fire department officials, UST owners/operators) are encouraged to become familiar with the content of this document in order to gain a better understanding of what to expect during an UST closure assessment.

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## I. Background Information

### 1.0 Background and Purpose

State regulations require that an assessment be performed at the time of an UST closure to look for possible leaks from the UST and associated piping to and contamination of the environment (*see Figure 1*). Specifically, the Massachusetts Board of Fire Prevention Regulations (527 CMR 9.07(K)(4)) requires that:

**Within 24 hours after the removal of underground tanks and/or underground piping the owner/operator shall measure for the presence of a release of oil or hazardous materials to the environment where contamination is most likely to be present on the site. If contamination is found the owner/operator shall immediately notify the head of the fire department as well as the Department of Environmental Protection Bureau of Waste Site Cleanup.**

This requirement to measure for contamination also applies to UST closures-in-place **before the permanent closure is completed** [see 527 CMR 9.07(J)(1)].

This document is intended to assist the user in planning and executing a successful UST closure assessment by clarifying state requirements and providing guidance related to measuring for contamination at the time of the UST closure.

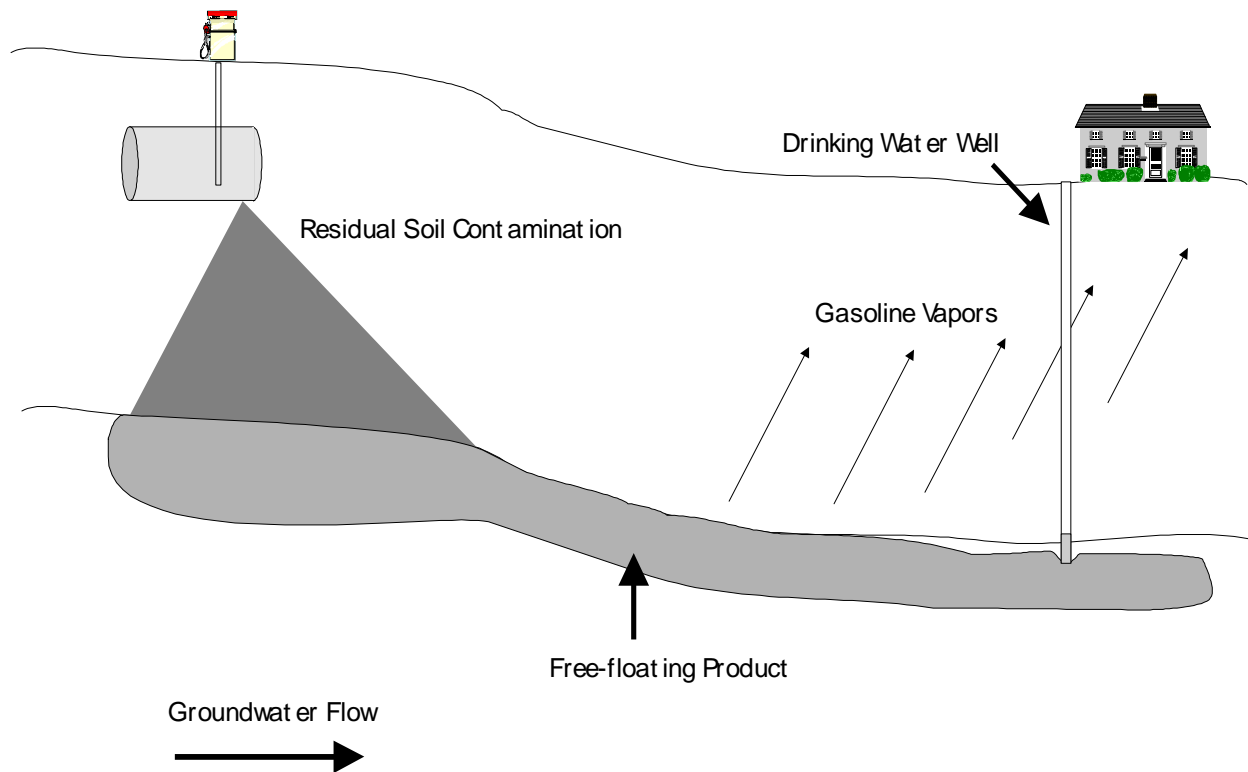
The information contained in this document is intended solely for guidance. This document does not create any substantive or procedural right, and is not enforceable by any party in any administrative proceeding with the Commonwealth. The regulations related to UST closures contain both specific and general requirements. In addition to summarizing specific requirements, this document also provides guidance on what measures the Department of Environmental Protection (DEP) and the Department of Public Safety (DPS) consider acceptable for meeting the general requirements set forth in the Massachusetts Board of Fire Prevention Regulations and the Massachusetts Contingency Plan. Parties using this guidance should be aware that there may be acceptable alternatives to this guidance for achieving compliance with such general regulatory requirements.

Additional copies of this document may be obtained by calling the DEP InfoLine at (617) 338-2255 or 1-800-462-0444, DEP Service Centers, or the State Fire Marshal (617) 351-6010.

### 2.0 Applicability

The guidance in this manual pertains to closing and assessing any **nonresidential UST containing petroleum fuel oils and gasoline** in Massachusetts. It is not intended to be used for closures of USTs containing non-petroleum hazardous materials or waste crankcase oil. Procedures for closure assessments at residential fuel oil USTs are addressed in a separate guidance document. The guidance in this document is intended primarily for the tank removal contractor, environmental consultant, Licensed Site Professional, or other qualified professional who is performing the assessment at the time of the UST Closure as required by 527 CMR 9.00.

## **Figure 1: Petroleum Leakage and Contamination**



This figure depicts the fate and transport of a petroleum UST leak and potential exposure pathways.

### 3.0 Regulatory Authorities

USTs are subject to several sets of regulations implemented primarily by two state agencies, as described below:

**The Department of Public Safety (DPS)** regulates the installation, maintenance, and removal of USTs pursuant to M.G.L. c. 148 and the Board of Fire Prevention Regulations, 527 CMR 9.00. As part of the DPS, **local fire departments** are the primary regulators of UST removals. Specifically, fire departments determine whether it is safe to pull and transport the UST, provide necessary permits, and respond to emergency situations involving threats of fire, explosion, or other public safety hazards.

**The Department of Environmental Protection (DEP)** regulates notification of and cleanup of releases and threats of releases of oil and/or hazardous materials to the environment from USTs and other sources pursuant to M.G.L. c. 21E and the Massachusetts Contingency Plan (MCP) [310 CMR 40.0000]. If contamination is measured at or above thresholds specified in the MCP at the time of the UST closure, then the UST owner/operator is required to notify DEP. Any additional investigation or cleanup that may be needed to address the contamination must be performed in accordance with the MCP and under the oversight of a Licensed Site Professional.

These and other applicable regulatory jurisdictions are outlined in Appendix C.

### 4.0 Responsibilities at UST Closure

In addition to the regulatory authorities described above and in Appendix C, other parties who play a role in an UST closure include the UST owner/operator, the contractor who is removing the UST, and, if contamination is encountered above reporting levels, a Licensed Site Professional. Understanding the extent of each party's responsibilities is beneficial in planning a successful UST closure. In particular, it is important for persons who have experience in measuring and documenting conditions of contamination to be involved **at the time of the actual UST removal or closure-in-place** if contamination is suspected or known to be present.

The responsibilities and roles of parties involved in an UST closure are outlined below.

#### **4.1 UST Owner/Operator**

The UST owner/operator is generally responsible for financing the UST closure and any subsequent cleanup actions that may be necessary, as well as for remaining in compliance with applicable regulations throughout the closure process. Specifically, he/she is responsible for obtaining the required permits prior to UST closure, hiring qualified professionals to perform the UST closure and to measure for and manage contamination, notifying the appropriate authorities of contamination when necessary, and retaining all documentation pertaining to the UST Closure and any subsequent cleanup actions.

Even though the UST owner/operator is ultimately responsible for the UST closure, many UST owners/operators may not be familiar with all of the requirements that may apply to an UST closure. Therefore, tank removal contractors and local fire officials can play an important role in advising the owner/operator of these responsibilities prior to the actual removal.

#### **4.2 Tank Removal Contractor**

The tank removal contractor is hired by the UST owner/operator to perform the UST removal or closure-in-place. This service may include removing and disposing of the UST, excavating and stockpiling soil, replacing the UST and/or backfilling the excavation, and documenting all observations and actions taken during the closure as part of the UST closure file. In addition to ensuring the safe removal and disposal of the tank, contractors may measure for contamination at the time of closure (as described in Section II of this manual). Contractors who provide this service to their clients should be familiar with the proper protocols for measuring and documenting contamination and be able to identify contamination conditions that require notification to DEP. If the contractor is not familiar with these procedures, then an environmental professional should be on-site to perform these actions.

Tank removal contractors may choose to become certified through the International Fire Code Institute (IFCI) Voluntary Underground Storage Tank Certification Program. The purpose of this program is to provide a nationally recognized examination and credential by which individuals can demonstrate their knowledge of various regulatory codes, standards and practices pertaining to USTs. More information on this program can be obtained from the State Fire Marshals Office at (617) 351-6010.

**Please note: Prior to removing the UST, the UST removal contractor should discuss notification obligations with the UST owner/operator and establish the process by which any required notifications would be made (i.e., owner/operator reporting upon receiving recommendation from contractor or contractor reporting on behalf of owner/operator).**

#### **4.3 Licensed Site Professional**

If an MCP notification requirement is triggered during the closure assessment, the UST owner/operator will have to hire a Licensed Site Professional to oversee assessment and cleanup work. If contamination is suspected (e.g., based on tank tightness test results, inventory loss, vapors or other evidence of a leak) it

may be beneficial to have an Licensed Site Professional on site or have arranged for the services of an Licensed Site Professional to commence when and if a notification threshold is triggered. If an Licensed Site Professional is present, he/she can assess the extent of the contamination and oversee cleanup actions concurrently with the UST closure.

## **5.0 Documenting Assessment Findings**

It is critical that the person performing the UST closure assessment adequately documents all findings. The UST owner/operator may need this documentation to demonstrate to the local fire department, DEP, and any potential purchaser of the property that the closure was performed properly and any contamination discovered was managed appropriately.

It is recommended that information documenting the UST closure be incorporated into a single report. This may include the following:

- Results of any investigation performed prior to closure, such as relevant UST and site history information, visual inspection, and characterization results;
- A sketch of the site indicating the location of the UST and associated piping, locations of field screening points and laboratory sample collection, and anything else that may be notable;
- Observations made at the time of closure (e.g., visual, olfactory) with respect to the condition of the UST, piping, soil, and groundwater, including presence/absence of petroleum product (photographs may serve as additional documentation);
- Results of any field screening and/or laboratory analyses (e.g., data reports from lab, chain of custody, etc.);
- Documentation showing how contaminated media (soil, groundwater) were managed, including copies of 21E Bills of Lading or Hazardous Waste Manifests used to transport contaminated media off-site;
- Copy of Form FP 292 (permit for removing UST and for transportation to tank yard);
- Copy of Form FP 290R (change in UST registration); and
- Copy of Form 291 (receipt of the UST at disposal facility, including state license number of facility).

PLEASE NOTE: If notification to DEP is required as a result of encountering contamination, the information outlined above can be incorporated into the required "response action" submittals (i.e., Status Reports, Completion Statements) to meet MCP documentation requirements.

## II. Closure Assessment

This section includes the required and recommended procedures for performing an UST closure assessment (*see also Figure 3*). Activities that are **required** pursuant to 527 CMR 9.00 and/or 310 CMR 40.0000 are noted. **Although many specific activities are not required, this recommended approach satisfies the requirement to measure for contamination [527 CMR 9.07(K)(4)]. Therefore, it is recommended that all procedures be followed.**

The order in which assessment actions are performed will vary somewhat depending on site conditions, complexity of the release, and assessment objectives. This section focuses on determining whether notification and further response actions under the MCP are necessary; however, additional assessment may also be conducted simultaneously with the closure to further delineate the extent of a release or to confirm that any cleanup actions performed have met the MCP standards.

**PLEASE NOTE: Once contamination is found that triggers an MCP notification threshold, follow procedures required by the MCP, under the oversight of an Licensed Site Professional, if necessary.**

*Remember to clearly and thoroughly document all assessment activities and observations.*

### Before the Closure

1. **(Required)** Prior to closing an UST, the owner/operator must notify the local fire department. The tank removal contractor may make this notification on behalf of the owner/operator.
2. **(Required)** At least **72-hours prior to the excavation** , contact DIGSAFE to obtain information on the underground utilities that may exist on the property. DIGSAFE will provide an ID number necessary for the UST removal permit (*see Step #3 below*). DIGSAFE can be reached at **1-800-322-4844** .
3. **(Required)** The UST owner/operator (or tank removal contractor on behalf of owner/operator) must obtain Form # FP-292, the permit for the UST removal, from the local fire department [M.G.L. c. 148, Section 38A].
4. **(Required)** **Within 72 hours of closing the UST** , provide receipt to the local fire department for delivery of UST to the disposal site designated on permit [527 CMR 9.07(K)(1)].
5. **(Required)** **Within 30 days of removing the UST** , send notice to DPS to change registration information for the UST. The form used to give this notice, FP-290R, is available from the local fire department.
6. Review any available UST records and site history. Information to consider which may suggest the possibility that contamination is likely to exist includes, but is not limited to:
  - history of spills
  - tank tightness tests results UST inventory records and/or any unreconciled discrepancies

- age and size of UST
- type of material UST is made of
- fill material surrounding UST
- maintenance records
- the tank has been relined or taken out of service for no apparent reason
- products stored in the UST
- system design information
- amount of time elapsed since UST was emptied, if applicable
- other contaminants that may be present on the property<sup>1</sup>

7. Prepare a health and safety plan to address the following:

- a. **Worker safety:** Air monitoring should be performed in the work area throughout the UST removal to ensure the safety of workers; including, at a minimum, the measurement of explosive vapor levels in work area using a Combustible Gas Indicator;
- b. **Emergency Response:** Should contamination be encountered, protective measures should be taken immediately to protect health, safety, and the environment by containing or recovering free or escaping product. Initially, the most urgent concerns are fire and explosion and the local fire department will direct responses to this threat; and
- c. **Hazard Communications Plan:** This includes Material Safety Data Sheets (MSDS) for all oil and/or hazardous materials that may be encountered.

Having a health and safety plan is strongly recommended if contamination is likely to be present.

8. Prepare contingency plans for all of the following activities prior to the UST closure:

- Notifications and approvals required if contamination is encountered;
- Mobilizing appropriate personnel when necessary;
- Segregating and stockpiling of soil/identify a secure location for temporary storage;
- Managing contaminated soil and groundwater, including disposal/transport of soil; and
- Sampling plans, including contacting laboratory prior to sampling activities.

9. Characterize site conditions before the tank is to be removed or closed-in-place **if a substantial release is known or suspected or if delays caused by the unanticipated discovery of contamination cannot be tolerated**. Characterization involves collecting information on the quality of soil and groundwater in the area surrounding the UST to determine whether contamination is present and if so, the degree of contamination. Characterizing the site will help determine whether or not groundwater is affected, if free product is present, and the approximate volume of soil that may require off-site management. It is specifically recommended in the following cases:

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<sup>1</sup> In addition to researching the likelihood of a release from the tank, it is also prudent to determine whether contamination is otherwise present at the site where the tank is located. The tank may have been installed in an area that was already contaminated (e.g., located in area where a previous tank leaked, or where the backfill/soil in the vicinity of the tank grave is contaminated). This information is important in terms of planning for management of contaminated media excavated during the closure. While the tank itself may not have leaked, if it is surrounded with contaminated soil or if the groundwater is contaminated from another source and needs to be pumped out of the hole during the closure, knowledge and evaluation of these conditions will be necessary to properly manage the contamination at the time of closure.

- **If any available information (site history or prior investigation) suggests the likelihood of significant contamination.**
- **UST removal operations are likely to involve groundwater pumping:** Characterization efforts can confirm the presence or likelihood of groundwater contamination and the depth of the water table. This information will indicate whether free product recovery, tank pit dewatering or measures to prevent buoying of the UST during excavation may be necessary. It will also enable the contractor to secure any necessary water discharge permits prior to closure operations.

**Characterization of the site should be performed by a qualified environmental professional (i.e., Licensed Site Professional or environmental consultant).**

### Measuring for Contamination

10. **(Required) Within 24 hours after the removal of the UST, measure for the presence of contamination at locations where it is most likely to be present, as required by 527 CMR 9.07(K)(4).** Steps 13 through 15 describe DEP and DPS recommendations for fulfilling this requirement.

### Visual Inspection of UST and UST Location

11. Visually inspect the area where the UST is located throughout the closure.
- A. **Before the UST is uncovered** , check for broken or patched pavement, stains around fill pipes and pumping islands, free product, sheens, and petroleum odors in nearby storm sewers, drainage ditches, basements, wetlands, etc. If deteriorated pavement, stained soil, or areas of petroleum odors are found, note these areas for future field screening and/or sampling during the UST removal.
  - B. **While the UST and its piping are being uncovered** , note any obvious signs of corrosion, breakage, or loose fittings in the system connections. Look for soil staining around the fill pipe where overfills and spills may have occurred. Check pipe joints and UST connections and note the soil or backfill conditions around any areas that are questionable. To the extent possible, brush off and examine the attached soil for signs of contamination. **When the UST is being removed, place containers and/or sorbent pads under pipe openings or at points where piping is cut to catch any drips and discharges so that any product remaining in the system does not spill and contaminate clean areas .**
  - C. **After the UST is removed** , clean off any remaining soil adhering to the UST and inspect the USTs surface. Inspect steel USTs for corrosion and staining such as dissolved asphalt coating, and check fiberglass USTs for wear, staining, indentations, or cracks. Because most leaks actually occur in piping and not USTs, it is critical to also check the condition of the piping and fittings. The excavation should also be carefully examined for signs of contamination. If the UST is temporarily stored on the ground surface, place the UST on a polyethylene liner.
  - D. **Throughout the closure** , look for saturated or discolored soil, especially around the fill pipe and under the drop-tube where the practice of dipsticking over time often weakens or even punctures an older UST. Examine piping trenches carefully, concentrating in areas where fittings or unions were located. Soils that appear gray-green or gray-black in color may be an indication of mineral leaching caused by a petroleum release. As the excavation proceeds, segregate all stained or

discolored soils from clean soils and store separately on 6 mil. (or higher gauge) polyethylene liners (*see Step #18*).

- E. Check for a sheen or floating "free" product on any water that appears in the excavation. **The presence of free product represents a health and safety hazard and should be removed immediately using sorbent pads, a vacuum truck or pump. Methods exist for cost effective/removal treatment of contaminated groundwater; consult an Licensed Site Professional or an environmental consultant. Free product also triggers notification of the local fire department and DEP (*see Step #16*).**

### Field Analytical Screening and Laboratory Analyses

- 12. Perform field analytical screening.

Field screening techniques are fast and economical for gathering large amounts of analytical data. These techniques can be used to: (1) identify areas of contamination and the relative degree of contamination, (2) segregate contaminated soils from clean soils, and (3) select locations for collecting samples for laboratory analysis. Screening results can also be used to limit the number of samples collected for laboratory analysis or, in the case of a "clean closure", eliminate the need for laboratory samples altogether.

The procedures described below focus on the use of the *jar headspace analytical screening method*. Measurements should be made of sample headspace according to the procedure described in Appendix A. While waving the probe of the Photoionization Detector or Flame Ionization Detector over the excavation may be useful for gross identification of contaminated areas, it is not considered to be a headspace reading for the purposes of measuring contamination and segregating soils. Although other screening methods are not discussed in this document, Appendix B provides a description of some of the commonly used instruments that are available.

Follow one of the screening procedures described below; procedure A for UST removals and procedure B for closures in place:

- A. Field screening locations for UST removals:
  - 1. Locations targeted for screening based on sight or smell during visual inspections.
  - 2. **Before Excavation:** Use field instruments in collaboration with knowledge obtained during preclosure activities (i.e., areas where contamination is likely to be encountered) to check nearby areas for signs of contamination. Long term, continuous releases of products such as gasoline- or kerosene-based fuels can cause areas of stressed vegetation, therefore such areas should also be investigated.
  - 3. **During Excavation:** While the UST is being uncovered, take headspace readings from the soil being removed, paying particular attention to screen soil from around the fill pipe. Retrieve soil samples for screening a few inches from the surface of the pipe, from the floor, and all sidewalls of the excavation. Use these readings to segregate contaminated soil from clean soil into discrete stockpiles of soil.

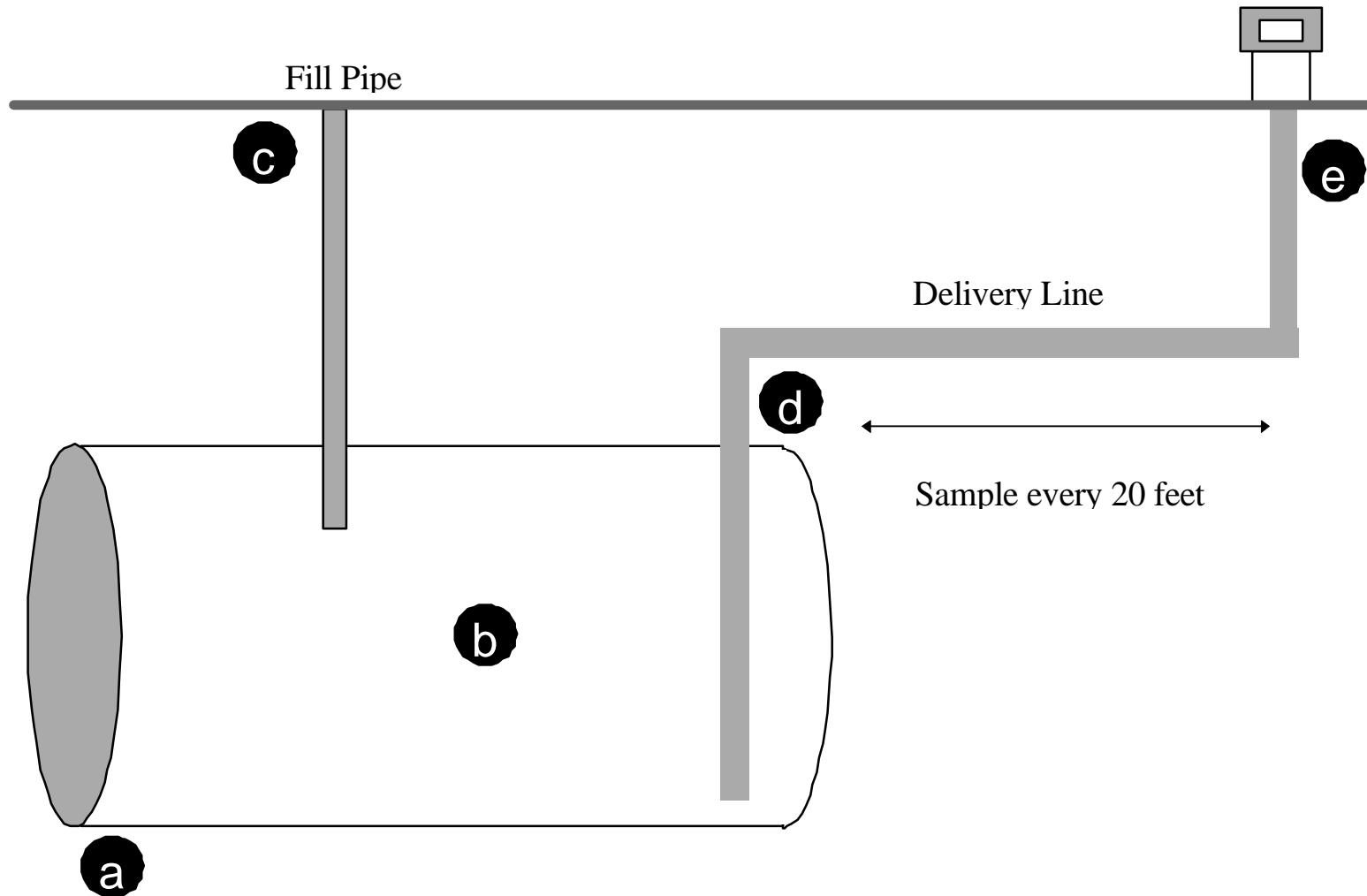
The decision to collect groundwater samples and the method by which such samples are to be obtained will depend upon variables that are specific to the site. In general, an attempt should be made to obtain a groundwater sample if:

- Any available information (e.g., the results of the screening of soil samples or the UST and site history) suggests that groundwater contamination may be present;
- The UST was located near a private drinking water well, public well or reservoir, or wetlands, ponds, or streams; or
- Groundwater is present in the excavation.

4. **After Excavation:** Screen for contamination beneath the UST bottom, pumping islands, and along piping runs. Additionally, discrete samples from the following locations should be screened in addition to areas where contamination is observed by sight or smell (*see Figure 2*):

- a. Soil from under each end of the UST and immediately under the drop tube.
- b. Soil from each sidewall of the UST.
- c. Soil surrounding the fill pipe.
- d. Soil along piping runs (at a set interval, e.g., every 20 feet). The piping run samples should be taken from beneath the piping and near elbows and joints, if possible.
- e. Soil under each pumping island should be obtained. The pumping island samples should be taken from beneath the supply line side of the islands.
- f. If more than one UST is being closed during one excavation and the USTs lie in a series next to each other comprising the same tank grave, only two additional samples per additional UST (one from under each UST and one from around each fill pipe) are recommended.
- g. If groundwater is encountered, screen soil samples collected from just above the water table at the ends of each UST, and screen samples of the water itself.

**Figure 2: Sampling Locations**



B. Field screening locations for Closures-in-Place (*see Figure 4*)

The local fire department determines whether an UST may be closed-in-place. USTs which were NOT used as fuel oil tanks may be closed in place only if the removal jeopardizes a building or another UST in use AND if approved by the local fire department. Fuel oil tanks may be closed in place if approved by the local fire department.

For closures-in-place, the recommended procedure and locations for obtaining field screening samples is as follows:

1. Install a minimum of three soil borings per UST or UST grouping (at each end of the UST and on one side) and collect and screen soil samples from each boring below the UST bottom. If practical, install monitoring wells or use existing wells to collect a groundwater sample for screening. Test pits near and downgradient of the tank excavation can also be used to obtain a groundwater sample.

Alternately, soil samples from below the UST may be obtained by cutting through top of the UST, cleaning the inside of the UST, and cutting through the UST bottom. **Please Note: This procedure poses an explosive hazard. Make sure that the tank is adequately cleaned to ensure safety.**

2. Install additional borings to allow collection and screening of soil from no more than two feet beneath each pumping island and every 50 feet where piping was located.
3. Where USTs are located within or beneath a structure, install a minimum of three borings downgradient from, but as close to the UST as possible, outside of the building. Borings should be located at each end of the UST and on one side, whenever possible. Collect and screen soil samples at or below the UST bottom.
4. Where gasoline USTs are located within or beneath a structure, install a minimum of three soil gas probes through the floor, with at least one probe located downgradient of the UST.

**Collect soil samples for procedure A or B as follows:**

1. Collect samples from soil that remains in the excavation sidewalls, not from removed backfill material. Obtain them from the backhoe bucket. **For safety reasons, do not enter the excavation to collect samples.**
  2. Because volatilization of exposed soils will occur, take samples at least six inches beneath the exposed surface of the excavation. Scrape away the top few inches of soil in the backhoe bucket and collect the sample from the newly exposed soil.
  3. Analyses should be performed as soon as possible after the sample is collected to ensure an accurate reading.
  4. For closures-in-place, collect soil samples from soil borings using a Split Spoon or Thin Walled (Shelby) sampler.
13. Perform follow-up based on field screening and visual/olfactory results (also summarized in Table I):

- A. **(Required) If headspace readings of soil or groundwater samples indicate total organic vapors equal to or greater than 100 parts per million by volume (ppmv), notify DEP and the local fire department as required by Board of Fire Prevention Regulations and the MCP.**

This notification threshold applies to screening performed during closure on samples taken two feet below the ground surface (to distinguish contamination caused by an UST leak from surficial contamination caused by overfilling incidents). In the event that this threshold is exceeded, notification to DEP must be made by the UST owner/operator and Immediate Response Actions must be performed under the oversight of a Licensed Site Professional.

- B. **If headspace readings of soil or groundwater samples indicate total organic vapors less than 100 ppmv but greater than ambient air readings (readings made at locations outside of the area of the excavation and unaffected by a release of oil or hazardous materials), take a minimum of one sample for laboratory analysis.**

If the headspace results indicate the presence of volatile compounds, but at levels below the 72-hour notification threshold, then at a minimum, one sample from the location of the highest headspace reading should be collected for laboratory analysis to determine whether concentrations at that location (while below the headspace trigger) may exceed an applicable MCP Reportable Concentration. If all of the headspace readings are of a comparable level, a composite sample may be collected and submitted to the lab.

- C. **If headspace readings do not indicate the presence of volatile compounds or if the readings at the screening locations are equivalent to ambient air readings:**

1. **For UST closures where only gasoline was stored, it may be assumed that no contamination is present (i.e., "clean closure").**
2. **For UST closures where fuel oil was stored, it is recommended that a minimum of one composite sample (from the sidewalls and floor of the excavation) be collected and submitted for laboratory analysis of petroleum constituents (see Table II).** Because fuel oil is comprised of compounds which would not be detected by a headspace measurement of volatiles, it is prudent to collect a soil sample for laboratory analysis to obtain a measurement of non-volatile or semi-volatile constituents which may be present, especially where visual or olfactory evidence of a release exists.
3. **For UST closures where the tank is located in an area of known contamination (history of past spills, contaminated fill, other), it is recommended that a composite sample from the sidewalls and floor of the excavation be collected and analyzed for those constituents that are known or suspected to be present, based on site history information.** Again, the headspace procedure will not indicate the presence of non-volatile contaminants, such as metals or polychlorinated biphenyls (PCBs). If there is reason to suspect the presence of other contaminants at the site, a minimum of one composite soil sample should be collected and analyzed for the suspected constituents.

**Table I: Summary of Follow up Procedures to Headspace Screening**

<b>Result</b>	<b>Action</b>
Readings greater than 100 ppmv	<ol style="list-style-type: none"> <li>1. Notify DEP within <b>72 hours</b></li> <li>2. Notify local fire department</li> </ol>

Readings less than 100 ppmv, but greater than ambient air	Obtain a minimum of one sample for laboratory analysis ( <i>see Table II for appropriate analytical methods</i> )	
Readings less than or equal to ambient	Gasoline only?	Assume "clean"
	Fuel oil only?	Obtain a minimum of one composite sample ( <i>see Table II for appropriate analytical methods</i> )
	Other contaminants?	Obtain a minimum of one composite sample for known/suspected contaminants

Procedures to further delineate contamination can be found in the ***Policy for the Investigation, Assessment, and Remediation of Petroleum Releases - Interim Site Investigation Protocol Document*** (Policy #WSC-401-91) and any revised versions of that document.

14. Submit samples for laboratory analyses, if appropriate.

A. **A laboratory should be contacted before the date of UST closure to:**

1. Obtain specific laboratory requirements for quantity of sample required for each analysis, sampling containers, necessary preservatives, and other specifications;
2. Inform laboratory of sampling date, quantity of samples, delivery date, etc.;
3. Ensure that the lab can conduct the needed analyses in the required timeframe;
4. Arrange to obtain materials necessary to perform sampling, such as sample jars, labels, and Chain of Custody form.

B. Never submit "spent" samples (soil or groundwater used for field screening) for laboratory analysis as contaminants may have volatilized from the sample during the screening procedure.

C. Samples must be transported in a manner that will maintain their integrity, as well as protect them from leaking or breaking.

1. Label all samples immediately and record date, sample number, and location from which sample was obtained.
2. Store samples, tightly sealed, on ice, and transport to laboratory as soon as possible and within time frame specified by the laboratory based on analyses to be performed and sample medium.
3. To track the handling of samples from collection to the laboratory, include a Chain of Custody form with each sampling shipment. This form can be obtained from the laboratory and should include the sampler's name, the container number, the date and time of collection, sample location, analyses to be performed, dates, times, and signatures of the persons releasing and receiving the sample.

D. Analytical Procedures

Table II describes common methods utilized for identifying contamination. The choice of analytical methods is dependent upon site specific conditions as well as budget.

If other contaminants are likely to be present on the site (PCBs, metals, etc.), collect laboratory samples to be analyzed for those parameters in addition to those listed in Table II.

**Table II: Analytical Methods for Petroleum Products**

Petroleum Product	Soil or Water Matrix	
	Analytes	Analytical Methods
Gasoline and Similar Weight Products	VOCs	8020, 8240, 8260, or DEP-VPH method* ( <i>see note below</i> )
Fuel Oils (No. 2, 4, 5, 6) Diesel, Lubricating Oils and similar weight products	VOCs	8020, 8240, 8260, or DEP-VPH method*
	PAH	8100, 8270, or DEP-EPH method*
	TPH	GC/FID or 418.1
Unknown Petroleum Product	VOCs	8240, 8260, or DEP-VPH method*
	PAH	8100, 8270, or DEP-EPH method*
	TPH	GC/FID

\* The DEP has designed two methods for determining the concentrations of petroleum hydrocarbons in water and soil to complement and support the toxicological approach to evaluate human health hazards that may result from exposure to such compounds. The Method for the Determination of Extractable Petroleum Hydrocarbons (EPH) collectively measures the concentrations of extractable aliphatic and aromatic hydrocarbons, and individual concentrations of PAHs. The Method for the Determination of Volatile Petroleum Hydrocarbons measures collective concentrations of volatile aliphatic and aromatic hydrocarbons, such as BTEX (Benzene, Toluene, Ethylbenzene, Xylene).

**Initial Actions if Contamination is Encountered**

15. **(Required) If contamination is encountered, immediately take the following steps:**

- A. **Ensure the safety of workers and surrounding populations.** The most urgent problem is the presence of free gasoline product and/or gasoline/explosive vapors. The fire department will direct responses to these threats (*See C below*).
- B. **If necessary, contain or recover petroleum liquids that have been released to the environment.** This may include removal of remaining product from the UST, collection of readily retrievable product (using sorbent pads for sheens/thin layers of product or vacuum trucks for thick layers of product), or containment of release to minimize immediate threat to the public and environment.
- C. **Assess the potential impact on safety and determine if conditions require notification to the local fire department. Additionally, determine if a notification threshold under the MCP is triggered and advise UST owner/operator to notify DEP, if appropriate.** (*See Appendix E and F for telephone numbers and addresses for providing notification.*)
- D. **Proceed with the UST removal/closure, if appropriate, with proper worker health and safety precautions and/or under the oversight of the local fire department or Licensed Site Professional.**

#### DEP/DPS Notification Requirements

16. **(Required) If any of the following conditions occur at any time during the UST closure, inform the UST owner/operator immediately and advise of his/her obligation to notify the local fire department and DEP within the appropriate timeframe. PLEASE NOTE: When an MCP notification threshold is triggered, the only response actions that may be performed prior to notifying DEP are emergency containment procedures and the stockpiling of up to 100 cubic yards of contaminated soil.** (*See Table III and IV for summaries of MCP notification thresholds.*)
- A release resulting in vapors in a building, structure, underground utility conduits at concentrations **equal to or greater than 10% of the Lower Explosive Limit** requires notification to DEP **within 2-hours** [310 CMR 40.0321(1)(a)].
  - A petroleum release of a quantity that is **equal to or greater than 10 gallons within a 24 hour period** requires notification to DEP **within 2-hours** [see 310 CMR 40.1600].
  - A measurement of **equal to or greater than 100 ppmv in the headspace of a soil or groundwater sample obtained greater than 2 feet below the ground surface** [see 310 CMR 40.0313(2)], using the headspace screening method described in Appendix A, requires notification to DEP **within 72-hours**.
  - The presence of subsurface free product (also referred to as "non-aqueous phase liquid") having a measured thickness of **equal to or greater than 1/2"** requires notification to DEP **within 72-hours** [see 310 CMR 40.0313(1)].
  - Concentrations in groundwater **greater than the applicable Reportable Concentration** (*see Table III of this manual and 310 CMR 40.1600 of the MCP*) within 400 feet of a public water supply or within 500 feet of a private drinking water supply well requires notification to DEP **within 72-hours** [see 310 CMR 40.0313(3)].

- A measurement within groundwater of concentrations **equal to or greater than 5 mg/L total Volatile Organic Compounds (VOCs)** within 30 feet of a school or an occupied residential structure, and where the groundwater table is less than 15 feet below the ground surface requires notification to DEP **within 72-hours** [see 310 CMR 40.0313(4)].
- The presence of subsurface non-aqueous phase liquid oil and/or hazardous material **less than 1/2" and greater than 1/8"** requires notification to DEP **within 120 days** [see 310 CMR 40.0315(4)].
- Concentrations in soil or groundwater in an amount **equal to or greater than the applicable Reportable Concentration** as listed in Table IV and 310 CMR 40.1600 requires notification to DEP **within 120 days**, unless a Limited Removal Action can be performed (*see Step #17 and 310 CMR 40.0315*).
- **Failed Tank Tightness Test** is considered to be a Threat of Release [see 310 CMR 40.0314]. To satisfy the requirements of DPS and DEP regulations, the following procedures should be followed in the event that a tank test fails:
  - A) If leakage is detected **above 0.05 gallons per hour but below 0.10 gallons per hour, then notification to DEP must be made within 72 hours** [see 310 CMR 40.0314]. Further assessment must be performed to determine if a release has occurred. The assessment may include, but is not limited to, the retesting the tank, soil gas and groundwater monitoring, and sampling in the area of the UST. If UST is retested within 72 hours and the retest confirms that the first test was in error, notification is not required. If a leak is confirmed, the UST must be emptied within 24 hours. If the source of the leak is determined to be from the piping of a particular UST, the UST system must be taken out of service immediately [see 527 CMR 9.00]. The guidance provided in this document for UST closures should be followed in addition to any cleanup actions that may be necessary pursuant to the MCP [310 CMR 40.0000].
  - B) If the leakage is detected **above 0.10 gallons per hour, notification must be made to within 72 hours to DEP and immediately to the local fire department and the UST must be decommissioned immediately** [527 CMR 9.07(H)]. In addition, all requirements necessary for leakage above 0.05 gallons per hour, as described above, must be performed. The guidance provided in this document for UST closures should be followed in addition to any cleanup actions that may be necessary pursuant to 310 CMR 40.0000.

**Table III: Summary of MCP Reportable Conditions and Requirements for Notification to DEP**

<b>Condition</b>	<b>Timeframe</b>
Greater than 10% LEL	2 hours
Release of greater than 10 gallons in 24 hours	2 hours
Headspace greater than 100 ppmv	72 hours
NAPL at greater than or equal to 1/2"	72 hours
Concentrations greater than RCs in groundwater within 400 ft of public water supply or 500 ft of private water supply	72 hours
VOCs in groundwater at 15 ft below ground surface => 5 mg/L within 30 ft of school/occupied residential structure	72 hours
Concentrations in soil greater than RCs*	120 days

\* Notification to DEP may not be required if a Limited Removal Action can be taken.

**Table IV: MCP Reportable Concentrations for Selected Petroleum Constituents <sup>2</sup>**

Analyte	Soil (mg/kg)		Water (mg/L)	
	RCS-1	RCS-2	RCGW-1	RCGW-2
Benzene	10	60	0.005	2
Toluene	90	500	1	6
Ethylbenzene	80	500	0.7	4
Xylenes (total)	500	500	6	6
Total Petroleum Hydrocarbons (TPH)	500	2500	1	50

When reporting a release, provide as much of the following information as possible:

1. Address of release;
2. Name and telephone number of UST owner/operator;
3. Number, size and contents of USTs removed or found to be leaking;
4. Name of contractor removing USTs, hazardous waste contractor pumping out USTs, and environmental consultant/Licensed Site Professional performing assessment, if any;
5. Actions taken thus far; and
6. Any nearby areas of concern, such as public or private drinking water wells/sources, and environmentally sensitive areas, such as surface waters, shellfish beds, other wetlands

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<sup>2</sup> Please note: This is a partial list of chemical constituents which are commonly measured for and found at a petroleum release. For a complete list of MCP Reportable Concentrations and Quantities, see the MCP [310 CMR 40.0300 and 40.1600].

17. Depending on which MCP notification requirements apply, one or more of the following risk reduction measures may need to be initiated:
- A. **Limited Removal Actions** [see 310 CMR 40.0318]: When a release or site condition is encountered which would require notification to DEP within 120 days of obtaining knowledge of the release, Limited Removal Actions may be taken to remediate localized areas of contaminated soil. By doing so, notification to DEP that a Reportable Concentration has been exceeded may be avoided. These actions are done voluntarily by the UST owner/operator and, with the exception of the required Licensed Site Professional or DEP certification on the Bill of Lading (BOL) when transporting soil off-site, do not require DEP approval or Licensed Site Professional oversight. With a Limited Removal Action, up to 100 cubic yards of petroleum contaminated soil can be excavated and removed from the site. If the action is successful in removing all contamination above applicable reporting thresholds, notification to DEP is not required. If soil contains hazardous materials in addition to petroleum, then the Limited Removal Action cannot exceed 20 yards of soil. All Limited Removal Actions must be completed within 120 days of obtaining knowledge of a release as described in 310 CMR 40.0315. **PLEASE NOTE: The 21J reimbursement fund only covers costs of work performed after notification to DEP (i.e., after a Release Tracking Number has been assigned). Therefore, Limited Removal Action costs are not eligible for reimbursement from 21J Fund.**
  - B. **(Required) Immediate Response Actions** [see 310 CMR 40.0410]: When there is a release or site condition which requires reporting to DEP within 2 or 72 hours, Immediate Response Actions are required. **Immediate Response Actions require Licensed Site Professional oversight and prior approval from DEP.**

#### Management of Contaminated Soil and/or Groundwater

18. **(Required)** Manage contaminated soil and/or groundwater.
- A. Managing Contaminated Soil
    1. **Do not dig up large volumes of contaminated soil if the UST owner/operator is not prepared to manage and properly dispose of stockpiled soil within 120 days. The costs of managing large volumes of soil can be substantial and should be taken into account before excavating too much too soon.**
    2. **Store petroleum contaminated soil at the site of excavation, at another property owned by the same UST owner, or at a facility permitted to store such materials.** All soil being stored must be placed on a base lined with 6 mil. (or higher gauge) polyethylene and be completely and securely covered with the same material. Public access must be minimized, and the soil must be removed from the site within 120 days of initial excavation.
    3. **Do not mix clean soil with contaminated soil, or grossly contaminated soil with lesser contaminated soil.** The level of contamination has a direct bearing on the options and associated costs of managing the soil. Provisions should be made for three soil stockpiles:
      - a. Soil presumed to be clean;
      - b. Soil believed to be contaminated; and

- c. Soil observed to contain significant levels of contamination.
4. **Transport petroleum contaminated soil off-site using either a 21E Bill of Lading or a Massachusetts Hazardous Waste Manifest as a MA01 Hazardous Waste [310 CMR 40.0030 and 310 CMR 30.252(2)].** Petroleum contaminated soil may be transported off-site under a 21E Bill of Lading provided an Licensed Site Professional or, if an emergency situations, DEP has adequately characterized the soil and signed the 21E Bill of Lading. Petroleum contaminated soils transported under a Hazardous Waste manifest are subject to the MA transporter fee and must be shipped by a licensed hazardous waste transporter. An Licensed Site Professional signature is not required for shipping materials under a Hazardous Waste manifest.
5. **The off-site transport of contaminated soil which does not trigger any applicable MCP notification thresholds** does not require prior notification or approval from DEP. These soils may be transported off-site provided that:
- a. The soil is not disposed of or reused at locations where the concentrations of oil or hazardous materials in the soil being reused would be greater than the applicable notification threshold at the receiving location; and
  - b. The soil is not disposed or reused at locations where existing concentrations of oil or hazardous materials at the receiving site are significantly lower than the levels of oil or hazardous materials present in the soil being reused or disposed [310 CMR 40.0032(3)].
6. **When backfilling contaminated soil into an excavation** , consider long term cleanup goals. Returning contaminated soil that would contribute to the ongoing migration of the contaminants should be avoided. Specifically, the following should be kept in mind:
- a. Dripping or saturated contaminated soil should not be backfilled, unless a liner is placed in the excavation before backfilling. A liner composed of suitable gauge polyethylene can temporarily prevent the continued migration of contaminants to soil and the groundwater. Placement of a liner before backfilling the excavation is recommended when public safety issues warrant backfilling the excavation as quickly as possible, or when the extent of site contamination is unknown and the likely cleanup actions to be taken have not been determined.
  - b. Contaminated soil containing higher levels of oil and/or hazardous material should not be backfilled into areas with lower levels of contamination.
  - c. Contaminated soil containing oil or hazardous materials should be backfilled as close as reasonably possible to their point of origin.
  - d. The backfilling of contaminated soil off-site is prohibited, except as provided for in 310 CMR 40.0032(3).

Procedures for managing petroleum contaminated soil, including storage and reuse/disposal requirements, are found in 310 CMR 40.0030, 310 CMR 30.252(2), and DEP Policies #WSC-94-400 and #BWP-94-

037. These documents, as well as other relevant DEP policies, should be consulted for a complete understanding of DEPs requirements and recommendations.

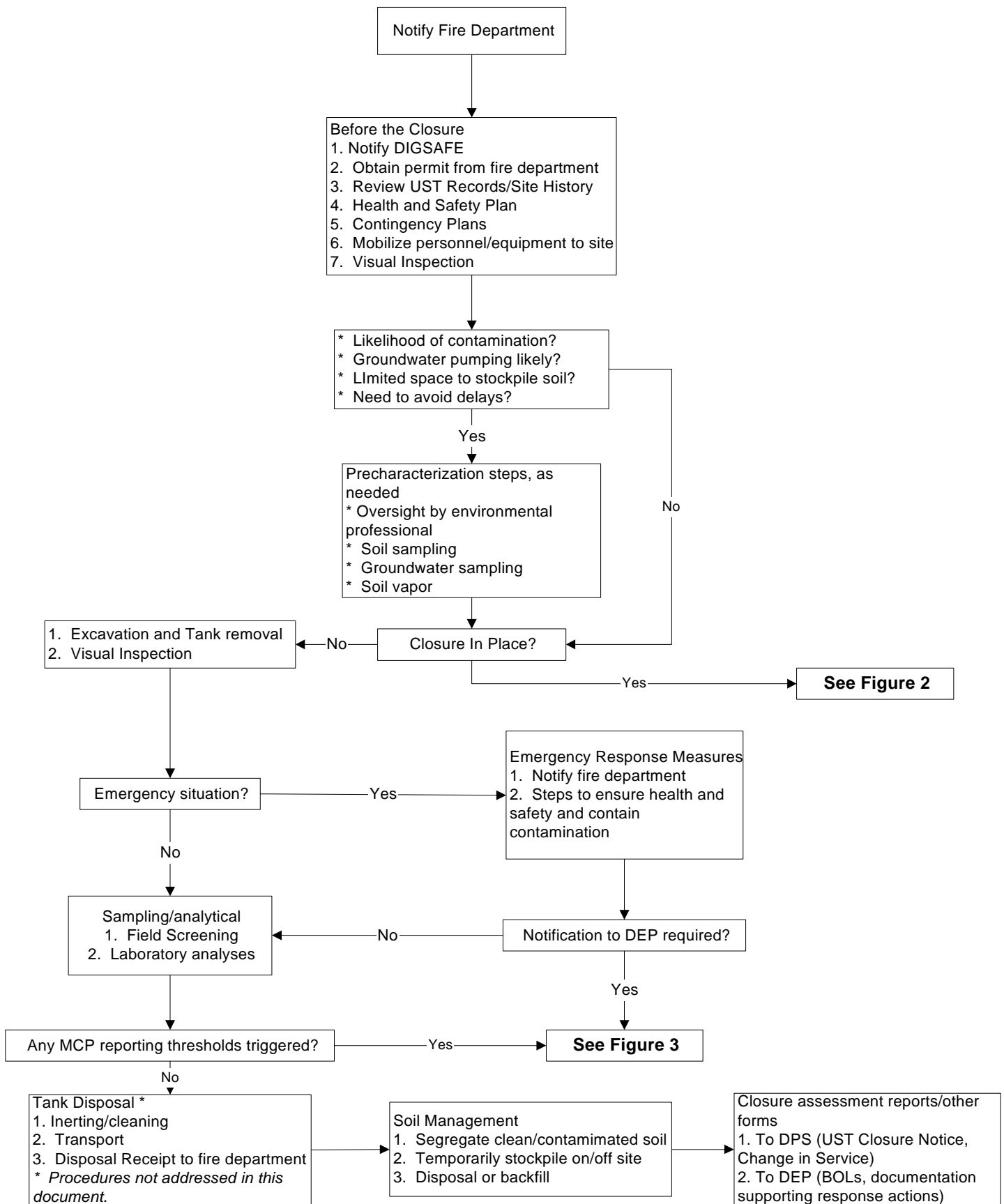
B. Managing Contaminated Groundwater

At an UST closure, groundwater may be encountered in areas where the depth of the tank excavation is below the groundwater table. In such cases, UST excavation dewatering and possible management of contaminated groundwater may be necessary. An Licensed Site Professional must be hired to oversee the management of contaminated groundwater except for the following situations:

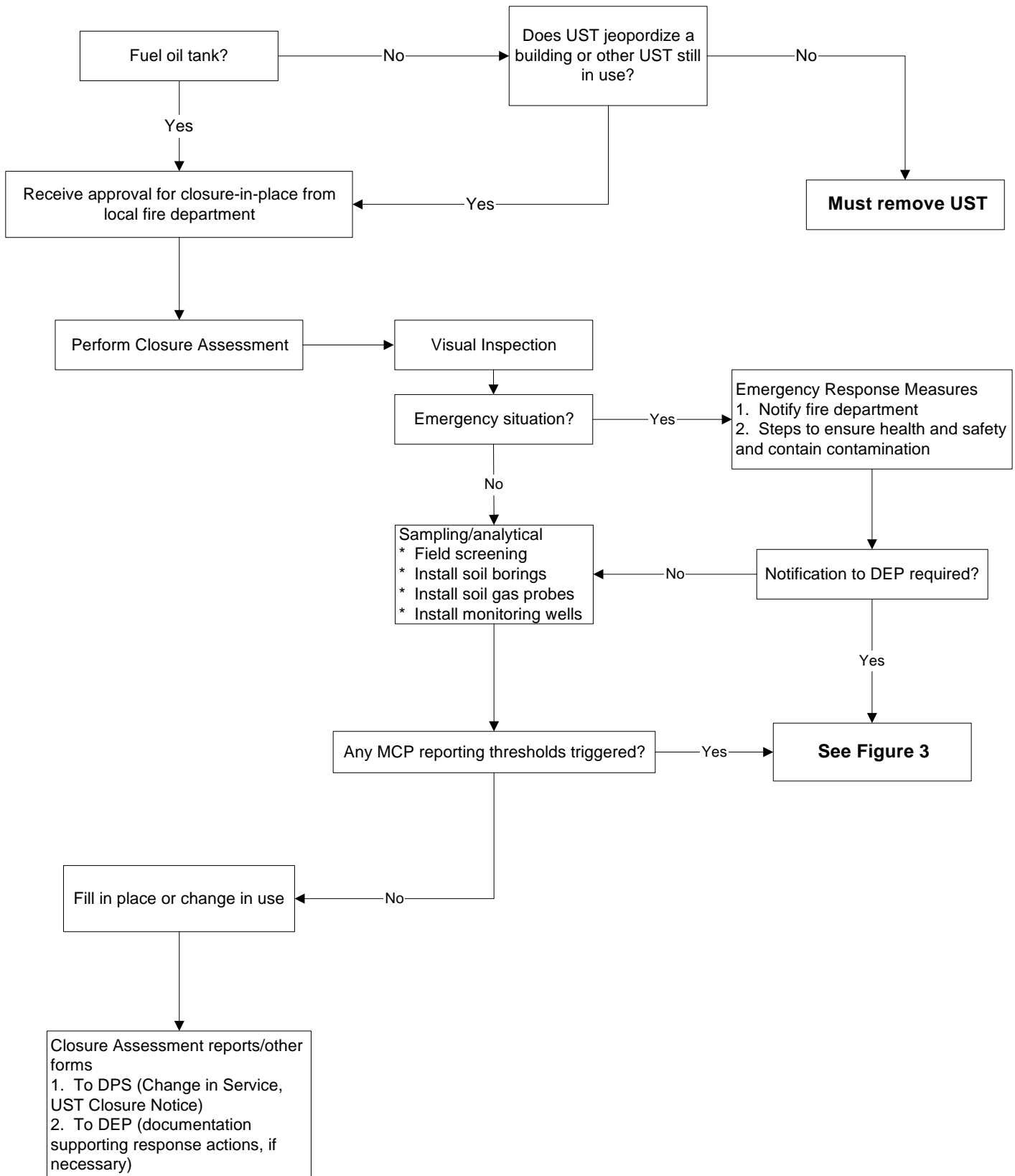
1. When groundwater is determined to contain levels of oil and/or hazardous material below applicable MCP notification thresholds and the discharge is made to the ground within 100 feet of the point of withdrawal;
2. When contaminated groundwater is pumped to a container or other temporary on-site storage container, or into a "vacuum" truck operated by a licensed Massachusetts hazardous waste transporter, with ultimate disposal at an approved off-site location; or
3. When parties performing the UST removal choose to work "in the wet", and do not remove groundwater from the UST excavation.

An Licensed Site Professional is required when contaminated groundwater (above notification thresholds) is discharged to a sewer system, surface water or returned to the ground surface or subsurface. These discharges must be performed in accordance with 310 CMR 40.0040 (portion of MCP related to "remedial discharges"). There are significant penalties for discharging contaminated water to a catch basin, surface water body, sewer, or onto or into the ground when such a discharge is not performed in compliance with 310 CMR 40.0000, and 314 CMR 3.00, 5.00 and 7.00.

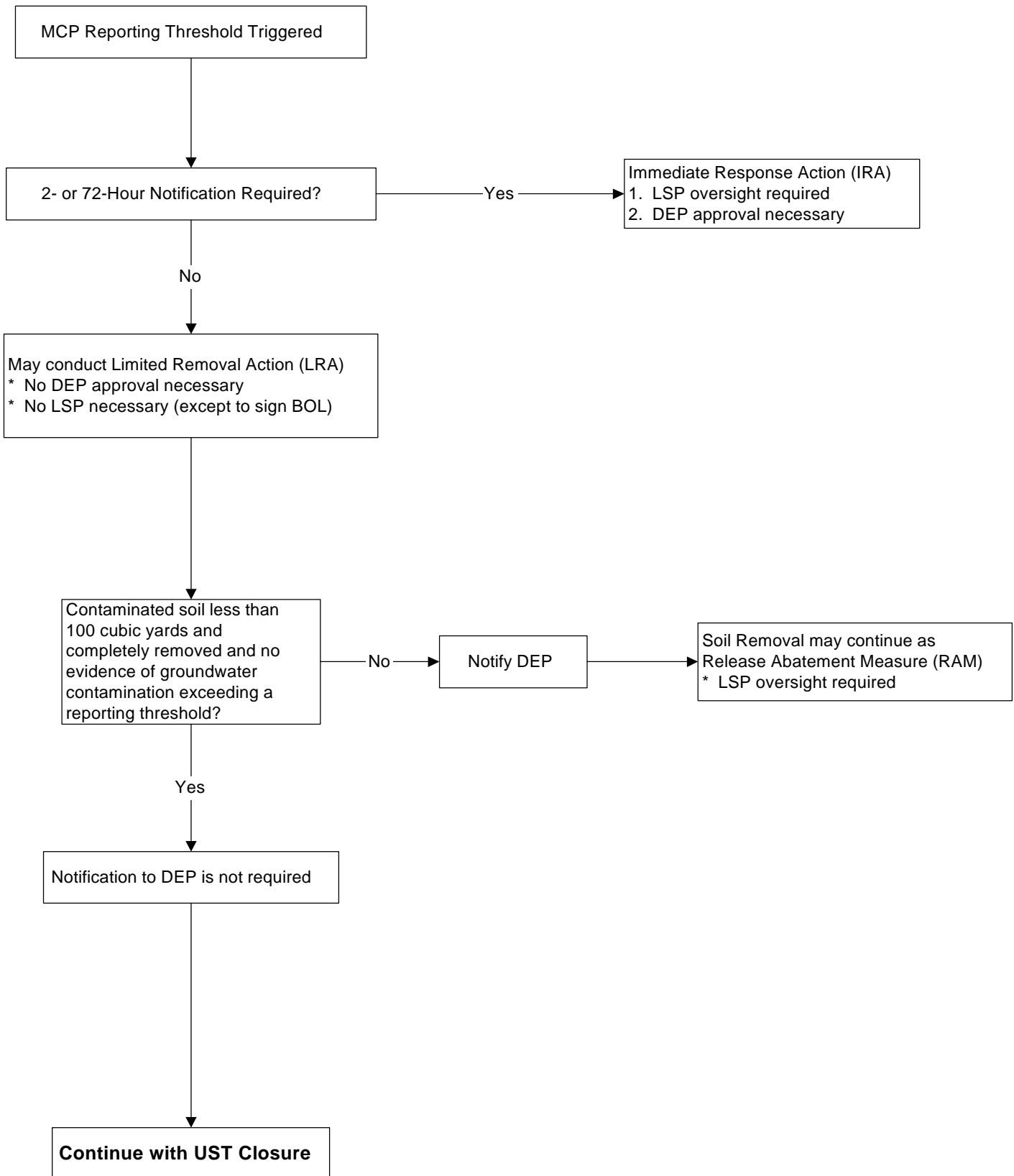
**Figure 1**  
**UST Closure Assessment Steps**



**Figure 2  
UST Closure In Place Steps**



**Figure 3  
Notifications and Preliminary Response Actions**



## References

- [1] New York Division of Water. Memorandum: Division of Water Technical Guidance Series (4.1.14); Site Assessments at Bulk Storage Facilities. December 21, 1990.
- [2] Environmental Protection Agency. Underground Storage Corrective Action Technologies; EPA/625/6-87-015. January, 1987.
- [3] New England Interstate Water Pollution Control Commission. What Do We Have Here? An Inspector's Guide to Site Assessment at Tank Closures. October, 1990.
- [4] EPA. Processes Affecting Subsurface Transport of Leaking Underground Tank Fluids. June, 1987.
- [5] American Petroleum Institute. Underground Spill Cleanup Manual. First Edition; publication # 1628. June 1980.
- [6] Conservation Law Foundation of New England, Inc. Underground Petroleum Storage Tanks: Local Regulation of a Groundwater Hazard. 1984.
- [7] EPA. Oh No! EPA/530/UST-88/004, December 1988.
- [8] DEP, Bureau of Resource Protection, Division of Water Pollution Control. Management Guidance For Underground Storage Tanks, 1991.
- [9] ABB-Environmental Services, Inc. Compilation of Data on the Composition, Physical Characteristics and Water Solubility of Fuel Products. December, 1990.
- [10] EPA. Removal Program; Representative Sampling Guidance; Volume 1: Soil (OSWER Directive 9360.4-10); November 1991.
- [11] Department of Engineering Professional Development. Underground Tank Technology Update; Volume 2, Number 3; June, 1988.
- [12] New Hampshire Department of Environmental Services. Memorandum: Revised Underground Storage Tank (UST) Closure Env-Ws 411.18 Sampling & Reporting Guidance; November 14, 1994.
- [13] American Petroleum Institute. RP-1604. "Recommended Practice for Removal and Disposal of Used Underground Petroleum Storage Tanks," Second Edition, 1987.
- [14] Petroleum Equipment Institute. PEI-100. "Recommended Practice for Installation and Removal of Petroleum Underground Storage Tanks,"

## **Massachusetts Department of Environmental Protection Publications**

### Regulations:

310 CMR 40.0000 Massachusetts Contingency Plan

### Policies/Guidance:

WSC-94-400. Interim Remediation Waste Management Policy for Petroleum Contaminated Soils, April 21, 1994.

WSC-401-91. Policy for the Investigation, Assessment, and Remediation of Petroleum Releases - Interim Site Investigation Protocol Document.

WSC-310-91. Standard References for Monitoring Wells.

Laboratory Guidance Manual for Petroleum Contaminated Media, August 1991.

BWP-94-037. Reuse and Disposal of Contaminated Soils at Landfills, April 26, 1994.

**Massachusetts Department of Public Safety Publications:**

Regulations:

527 CMR 9.00 Board of Fire Prevention, Tanks and Containers

Guidance:

UST Owner/Operators Tightness Test Guide, September 30, 1994.

UST Owner/Operators Compliance Guide, September 30, 1994.

UST-21J-001. Board Acceptable Site Assessment Policy, Draft, October 1992.

## Appendix A

### Jar Headspace Analytical Screening Procedures

The following is the recommended procedure for conducting analytical screening of contaminated soil or groundwater utilizing a portable Photoionization Detector (PID) or Flame Ionization Detector (FID):

- (1) Half-fill two clean glass jars with the sample to be analyzed. Quickly cover each open top with one or two sheets of clean aluminum foil and subsequently apply screw caps to tightly seal the jars. Sixteen ounce (16 oz.; approximately 500 ml) soil or "mason" type jars are preferred; jars less than 8 oz. total capacity (approximately 250 ml), should not be used.
- (2) Allow headspace development for at least 10 minutes. Vigorously shake jars for 15 seconds both at the beginning and end of the headspace development period. Where ambient temperatures are below 32 F (0 C), headspace development should be within a heated vehicle or building.
- (3) Subsequent to headspace development, remove screw lid/expose foil seal. Quickly puncture foil seal with instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulate.

As an alternative, syringe withdrawal of a headspace sample with subsequent injection to instrument probe or septum-fitted inlet is acceptable contingent upon verification of methodology accuracy using a test gas standard.

- (4) Following probe insertion through foil seal and/or sample injection to the probe, record highest meter response as the jar headspace concentration. Using foil seal/probe insertion method, maximum response should occur between 2 and 5 seconds. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case headspace data should be discounted.
- (5) The headspace screening data from both jar samples should be recorded and compared; generally, replicate values should be consistent to plus or minus 20%.
- (6) PID and FID field instruments should be operated and calibrated to yield "total organic vapors" in ppm (v/v) as benzene. PID instruments must be operated with a 10.0 +/- eV lamp source. Operation, maintenance, and calibration should be performed in accordance with the manufacturer's specifications. For jar headspace analysis, instrument calibration should be checked/adjusted no less than once every 10 analyses, or daily, whichever is greater.
- (7) Instrumentation with digital (LED/LCD) displays may not be able to discern maximum headspace response unless equipped with a "maximum hold" feature or strip-chart recorder. Deviations, departures and/or additions to the above procedures should be consistent with 310 CMR 40.0017. In such cases, compelling technical justification must be presented and documented by the methodology proponent.

The following are some portable direct reading instruments are available for air monitoring and field screening:

- **Combustible Gas Indicators (CGI)/Oxygen meters:** The CGI is used in field investigations for the purpose of detecting explosive atmospheres. The indicator measures the concentration of a flammable vapor or gas in air, registering the results as a percentage of the lower explosive limit (LEL) of the calibration gas. Oxygen level measurements are taken concurrently with CGI measurements. The normal ambient oxygen concentration is 20.8%.
- **Photoionization Detectors (PIDs):** The PID is a portable gas analyzer designed to detect the presence of vapors on the principle of photoionization. Positive identification of suspect compounds is based on correlation of the known ionization potential of the suspect compound with that of the appropriate probe. A direct-concentration readout provides results in parts per million. The PID is used for on-site headspace analysis as well as general screening of excavated soil. While it is sensitive to a wide range of organic and some inorganic compounds, as a general rule, these instruments are only useful for certain products that have volatile components, such as gasoline, and are less effective for products with lower volatility, such as fuel oil or where the released material has been weathered (i.e., much of volatile fraction has volatilized). PIDs are susceptible to humidity effects and its impact may vary among different manufacturers.
- **Flame Ionization Detectors (FID):** The FID uses ionization as the detection method, much the same as the PID, except that the ionization is caused by a hydrogen flame, rather than by a light source. The flame has sufficient energy to ionize any organic compound with an ionization potential of 15.4 or less. The FID can be used for the same purposes as the PID and possesses similar limitations. Some differences are that the FID detects methane while the PID does not and that the FID is not as susceptible to humidity effects.
- **Colorimetric Indicator Tubes:** Direct-reading colorimetric indicator tubes are useful in quickly identifying a specific chemical. A known volume of air is pulled through the tube and the contaminants in this sample react with the indicator chemical in the tube, producing a color change whose length is proportional to the contaminant concentration in parts per million (ppm). It should also be noted that the "true" concentration versus the "measured" concentration may vary considerably among manufacturers.
- **Gas Chromatograph (GC):** The GC can make quantitative and qualitative field measurements. Advantages include near-laboratory results much faster and cheaper than a laboratory, many contaminants can be identified, and sample degradation during storage time is almost eliminated. The GC is used to analyze light petroleum products, such as gasoline, diesel, and fuel oils. While these instruments are capable of generating large amounts of data in a relatively short period of time, the quality of data generated by analytical field instruments is dependent upon the experience of the operator and QA/QC methods.
- **Infrared Spectrophotometer (IR):** A modification of EPA Method 418.1 is used to measure TPH concentrations in samples. This method can result in a loss of volatiles and is therefore ineffective for VOC analysis. It is recommended for heavier petroleum fuels and products, such as heating and lube oils. As with the GC, the quality of the data depends on the experience of the operator and QA/QC methods.

- **Immunoassay Soil Test Kits:** These test kits are designed to quantitatively detect the presence of specific compounds in extracts of soil as an indicator of contamination. Test kits for Total Petroleum Hydrocarbons (TPH) allow for the screening of fuels (e.g., home heating oil, gasoline, aviation fuel, diesel fuel, and kerosene) in soil at specified action levels. This screening method can not identify the type of fuel residue that is present. Additionally, the effectiveness of this method decreases when weathering has occurred and for heavier petroleum products. It should be kept in mind that standards are adjusted to read false negatives (5% chance); also there is inconsistency among manufacturers as to what specific TPH compounds their kit is designed to measure.

U.S. Environmental Protection Agency (40 CFR 280, 281)

- Requires closure assessment
- Requires notification to appropriate authority if contamination is discovered (notification to DEP fulfills this requirement)

Occupational Safety and Health Administration (29 CFR 1926 and 1910)

The following is a general explanation of the specific citations from the Occupational Safety and Health Administration (OSHA) regulations which are applicable to UST Closures:

- **Excavation Standard (29 CFR 1926.650 -652)** - establishes safety requirements for any excavation more than five feet deep.
- **Hazardous Waste Operations Standard (29 CFR 1910.120)** - applies to any involvement with hazardous materials whether removing hazardous sludge from a UST or discovering and responding to a leak that has occurred. It requires a written plan be in place detailing procedures for the work being done, a health and safety plan, emergency response procedures that will be followed, a medical surveillance plan, personal protective equipment, and certified training for the employees at the site.
- **Hazard Communication Standard (29 CFR 1926.59)** - This standard requires that a written hazard communication program be established including Material Safety Data Sheets for all materials that might be encountered. In addition, the standard specifies labeling requirements, training for all workers on their rights to information on the materials on-site, and plans for sharing this information with all other involved contractors and their workers. This standard applies to any materials used during a UST closure including gasoline for the backhoe, hydraulic fluid, sampling equipment cleaning solutions, UST inverting chemicals, etc.
- **Safety Training and Education (29 CFR 1926.21)** - This standard governs the use of equipment, emergency equipment, safety procedures, and risk characterization for all contractor operations. It also includes emergency exit procedures, air testing, and risk characterization whenever a worker enters a confined space. If UST cleaning is to be performed on site, there must be a confined space entry procedure in safety plan.

Massachusetts Department of Public Safety

- (1) **Board of Fire Prevention (M.G.L. c. 30A, s. 6 and c. 233, s. 75 and 527 CMR 9.00)**
- (2) **State Fire Marshal (M.G.L. c. 148, s. 38A-H and 502 CMR 3.00)**

- Primary regulatory authority of USTs (unless contamination is encountered)
- Requires abandoned USTs to be removed from ground
- Requires closure assessment
- Requires permit from local fire department
- Requires that leaks be reported to fire department and DEP/BWSC
- Local fire departments have direct jurisdiction over USTs, explosive vapors, and all matters involving public safety

- Closures in place: can only be performed if a removal will jeopardize a building or another UST in use [527 CMR 9.07(J)]
- Directs procedures for disposal of tanks

**UST Petroleum Product Cleanup Fund** (M.G.L. c. 21J ("Claims Reimbursement Regulations") and 503 CMR 1.00)

- Provides reimbursement to eligible claimants for allowable costs, expenses, and obligations incurred by taking cleanup actions, meeting claims of third parties, or otherwise incurring expenses, as a result of releases of petroleum products from UST systems. Only cleanup costs incurred after 4/2/91 eligible. This fund and program is overseen by DPS.

**DEP/Bureau of Waste Site Cleanup** (M.G.L. c.21E and 310 CMR 40.0000)

- Requires notification if contamination above reporting thresholds is found
- Requires notification if leak is detected (during tank test)
- Regulates activities related to assessment and cleanup of contamination

**DEP/Bureau of Waste Prevention** (M.G.L. c.21C and 310 CMR 30.00)

- Regulates storage, transport, and disposal of hazardous wastes, including certain petroleum wastes generated from tank removals (e.g., sludges, discarded petroleum products, treatment residuals and other waste materials) [see 310 CMR 30.254(6)]
- Petroleum contaminated soils are not subject to the requirements of 310 CMR 30.000 if they are managed in conformance with 310 CMR 30.252(2), 310 CMR 40.0030, and BWSC Policy #WSC-94-4000, "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils". However, note that contaminated soil that did not originate from an UST corrective action may be subject to the provisions of the TCLP rule.

**Local Bylaws/Board of Health** (MGL c.40 and 40A/MGL c.111)

- Local officials should be contacted to determine if any local bylaws apply to UST closure and/or assessment
- Local Boards of Health have jurisdiction over all matters involving public health.

## Appendix D

## List of Acronyms

BOL	Bill of Lading
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BWSC	Bureau of Waste Site Cleanup
CFR	Federal Register
CGI	Combustible Gas Indicator
CMR	Code of Massachusetts Regulations
DEP	Department of Environmental Protection
DPS	Department of Public Safety
EPH	Extractable Petroleum Hydrocarbons
FID	Flame Ionization Detector
GC	Gas Chromatograph
IR	Infrared Spectrophotometer
IRA	Immediate Response Action
LEL	Lower Explosive Limit
LRA	Limited Removal Action
LSP	Licensed Site Professional
MCP	Massachusetts Contingency Plan
MGL	Massachusetts General Law
NAPL	Nonaqueous Phase Liquid
OSHA	Occupational Safety and Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PPM	Parts per Million
PPMV	Parts per Million Volume
RAM	Release Abatement Measure
RAO	Response Action Outcome
PID	Photoionization Detector
RC	Reportable Concentration
RQ	Reportable Quantity
TPH	Total Petroleum Hydrocarbons
21E	M.G.L. Chapter 21E
21J	M.G.L. Chapter 21J
UST	Underground Storage Tank
VOC	Volatile Organic Compound
VPH	Volatile Petroleum Hydrocarbons

**Appendix E**

**DEP Emergency Response Phone Numbers**



**Federal Agencies**

**U.S. Environmental Protection Agency**

Region 1 Field Office  
Westview Street, Lexington, MA 02173  
(for emergency NPDES permit) .....(617) 566-4500

**U.S. Coast Guard**

National Response Center  
USCG 400 Seventh Street, SW  
Washington, DC 20590  
(to report an oil spill).....1-800-424-8802

Marine Safety Division, Boston (24 hours) .....(617) 223-8444  
Territory: Salisbury to Manomet Point, Plymouth

Marine Safety Office, Providence (21 hours).....(401) 528-5335  
Territory: Manomet Point, Plymouth to points south, Cape Cod and Islands

**Occupational Safety and Health Administration, Regional Office**

Technical Support Section .....(617) 565-7164

**Federal Bookstore , Boston.....(617) 720-4180**

**Other**

New England Interstate Water Pollution Control Commission, 255 Ballardvale Street, Wilmington, MA 01887(508) 658-0500

Petroleum Equipment Institute, P.O. Box 2380, Tulsa, OK 74101 .....(918) 743-9941

American Petroleum Institute, 1220 L Street, N.W. Washington, D.C. 20005.....(202) 682-8375

**Appendix G**      **Notification for Removal or Closure of Storage Tanks Regulated Under 527 CMR 9.00 (FP-290R)**

**Appendix H Notification of Storage Tanks Regulated Under 527 CMR 9.00 (FP-290)**