State Of Utah
Department of Environmental Quality
Division of Environmental Response and Remediation

Leaking Underground Storage Tank (LUST) Subsurface Investigation Report Guide

A Customer Guide to assist Utah owners and operators of underground storage tanks in their investigation of the extent and degree of petroleum contamination from LUST sites.

May 2014

A petroleum release has been confirmed at your facility, and screening levels have been exceeded. You are therefore required to investigate and remediate the release.

This publication will guide you through the process of preparing the **Subsurface Investigation Report** as required under the state-established compliance schedule(s) for releases of petroleum products from underground storage tank (UST) systems. A subsurface investigation, to define the extent and degree of contamination, is required in order to establish site-specific clean-up levels prior to consideration of closing the release site.

This Subsurface Investigation Report replaces the former versions known as the "Abatement and Initial Site Characterization Report" and the "Subsurface Investigation Report", formally required under the "Phase I" and "Phase II Reporting and Remediation Schedules". The "Corrective Action Plan Report" has been replaced by the "Corrective Action Plan Guide." The former reporting formats should be discontinued immediately.

The former reporti ng formats have been replaced and they should not be used any more.

TABLE OF CONTENTS

REPORT COMPONENTS

ADDITIONAL INFORMATION

State of Utah
Department of Environmental Quality
Division of Environmental Response and Remediation
Leaking Underground Storage Tank (LUST) Section
195 North 1950 West
P.O. Box 144840
Salt Lake City, Utah 84114-4840
Telephone: (801) 536-4100
Fax: (801) 359-8853
TDD: (801) 536-4414

Subsurface Investigation and Clean-up Checklist

The following checklist will provide you with a summary of the steps between discovery of a petroleum release, investigation and remediation (clean-up) of your release and final site closure. It is designed to help you understand the steps involved, to graphically track your progress, and show how near to completion of the process you are.

X	Important Steps to Remember
	Report the release within 24 hours of discovery to the Division of Environmental Response and Remediation (DERR). Stop the source of the release and prevent the spread of further contamination.
	If the leak or release occurred from a tank that is covered by the Utah Petroleum Storage Tank Trust Fund (FUND)*, submit an Eligibility Application for reimbursement of investigation and clean-up costs. Refer to the DERR's publication "Petroleum Storage Tank Fund Claims Packet" for complete eligibility and reimbursement information.
	Prepare and submit a "Subsurface Investigation Report" within **90** days of notification from the DERR. Use this guide for preparing the report.**
	If free product is found, prepare a "Free Product Removal Report" and include it with your Subsurface Investigation report. Use this guide for preparing your Free Product Removal Report (page 9).
	Refer to the APermitting Requirements List≅ contained in this guide (page 10) for any applicable reporting or permitting requirements by other regulatory agencies for the release at your facility.
	Submit a "Corrective Action Plan", as requested by the DERR, to clean up contamination to established or recommended clean-up levels, or conduct a risk assessment to establish site-specific clean-up levels.
	Once work or clean-up at the site is completed as determined by the DERR, request site closure in the form of a "no further action" letter from the DERR.

Frequently Asked Questions

The answer to these questions can help get you started.

Why do I have to submit a Subsurface Investigation Report?

There are two reasons why you must submit this report to the Utah Division of Environmental Response and Remediation (DERR). First, you are required by Utah law to report, control, abate and characterize the release by defining the extent and degree of contamination, and conduct remediation (clean-up) if necessary. And second, it will enable the DERR to help guide you through the investigation and clean-up process to make it as timely, site-specific and cost effective as possible. If information regarding your release site indicates relatively high levels of petroleum contamination, further investigation will help determine if there are risks of contaminating drinking water, indoor air, surface water, sensitive wildlife habitats or other sensitive receptors. This report provides information to help determine these potential risks.

*Even if the tank is not currently on the Fund, the release may be covered by the Fund if the release occurred while the tank was on the Fund and if the tank was on the Fund within the last six (6) months (or one year in some circumstances). If there is any possibility that the release is covered, the eligibility application should be submitted immediately because the claim will be ineligible if it is not submitted on time. See Utah Code §19-6-424.

**Depending on the results of your subsurface investigation, more work may be needed at the release site. This additional work may consist of conducting groundwater monitoring, abatement or cleanup activities, additional investigations or other related

work.

Should I hire a consultant?

Utah law requires that starting on January 1, 1996, contractors or environmental consultants must be certified as a "Certified UST Consultant" to perform work at any UST release site.

You will need to hire the services of a trained and experienced environmental consultant or contractor to assist you with necessary abatement, investigation and clean-up work and associated reports. Environmental professionals with experience in leaking underground storage tank (LUST) site investigations and clean-ups are available to help you with this work in a timely and cost effective manner. It is in your best interest to get several competitive bids before beginning the work. The DERR has a list of contractors and certified consultants available upon request. The State of Utah does not endorse any consultant or company, but maintains this list of contractors who have indicated an ability to perform the required work for your benefit.

Depending on the scope of work to be done at your release site, you may need to use a state-certified environmental consultant.

When do I submit the report?

A Subsurface Investigation Report is due **90** days after receiving this guide from the DERR. Please contact your project manager with any questions regarding your release site or the required report.

How do I file the report?

Submit your Subsurface Investigation Report to your DERR project manager at:

Utah Department of Environmental Quality
Division of Environmental Response and Remediation
Leaking Underground Storage Tank (LUST) Section
195 North 1950 West
P.O. Box 144840
Salt Lake City, Utah 84114-4840
(801) 536-4100

You can deliver or submit the report in person to this address or you may send it by mail.

What information should the report contain?

The remainder of this guide contains the information necessary for putting together the Subsurface Investigation Report. If you use this guide and include the specific information detailed in it, your report will be complete and will minimize the DERR's review and response time. Also, a complete report will help minimize any additional expense or time on your part for the collection of additional data and information.

COMPONENTS OF THE SUBSURFACE INVESTIGATION REPORT

Executive Summary

Create an at-a-glance summary of your report.

The Executive Summary is a brief summary of this report. It may be as brief as one or two paragraphs and should provide a summary of the information contained in this report and your (or your consultant's) conclusions and recommendations for achieving clean-up and site closure.

Table of Contents

A table of contents can work as a checklist assuring the report is complete.

Your Subsurface Investigation Report's table of contents should contain the following:

1. *Introduction*
2. *Site Description and Maps*
3. *Tier 1 Criteria*
4. *Nature of the Release and Abatement Measures*
5. *Methodology*
6. *Results*
7. *Conclusions and Recommendations*
8. *References and Appendices*
9. *Free Product Removal Report (If applicable)*

1 Introduction

Your introduction should include general information about the site.

The Introduction should include the following information:

- Your facility identification number, release site number and location or address of the release site.
- A brief history of land use at the site including a description of how the release was determined.
- A brief description of the work completed at the site, and a brief summary of the conclusions and recommendations for further work (if any) at the site.

2 Site Description and Maps

A picture is worth a thousand words. Prepare a good site map!

A good site description will help determine potential exposure pathways for petroleum contamination to reach or impact people or the environment. This section should consist of a vicinity and site map providing a complete graphical description of the facility and the land surrounding the facility. Each map should be drawn to scale with proper orientation (showing a North arrow) and should be no larger than 11" x 17". This way the maps can be bound into the report. The maps should provide the following information:

- The facility address or location, with an appropriate scale (e.g., bar scale with 1 inch = 20 feet, etc.) and North arrow.
- Existing and removed UST systems including piping, dispensers and fill ports.
- Underground utilities including; culinary water supply, sewer or septic systems, natural gas lines, storm drains, power and telephone lines.

- Property boundaries, on-site buildings and any adjacent buildings.
- Any excavations showing width, length and depth.
- Any known contaminated areas (square footage or volume if known).
- Location and depths of ALL soil and groundwater samples collected during any phase of the investigation of this release. Include closure sample locations, confirmation sample locations, soil boring locations, groundwater monitoring well location and other relevant information. Be sure to include depth (feet below grade) of sample collection.
- Location of soil stockpiles, aeration piles, etc.
- Land features surrounding the site including; lakes, rivers, streams, irrigation canals, wetlands, slope of local land surface, etc.

Identify all sample locations shown on your site map. Make sure your sample numbers and locations are consistent with the identification labels used on the chain-of-custody forms and the laboratory analytical reports.

If the site map becomes cluttered or confusing due to a large number of sample identification labels, you may wish to use more than one sampling map, or use other techniques to identify the sample locations. You may also include additional site maps showing contaminant iso-concentration contours, geologic cross sections and groundwater elevation contours. You should also present the sampling results in a table format so sample data can be easily referenced to the sample locations marked on the site map.

3 Tier 1 Criteria

This section "Tier 1 Criteria", describes the environmental features and possible risks to human health or the environment at the release site. These features help to determine risks presented by your release site and its classification status. Site classification is a dynamic process for prioritizing release sites according to the seriousness of the release. The corresponding response action needed is based on the current and potential degree and severity of hazards to human health or the environment. This process is evaluated on a case-by-case basis and ensures that when maximum contaminant limits are exceeded, appropriate response actions are taken to protect human health and the environment. Site classification is based on the most recent data and reflects current site conditions. Since the risks posed by contamination at any given release site are expected to change as more information is learned about a site, a site may be re-classified. Please provide the following information:

Tier 1 Criteria affects the clean-up level and subsequent closure of your site. Be as accurate as possible.

- Describe the current land use at, and surrounding the release site. It is considered residential if a residence is located on, or adjacent to your site in any direction.
- Describe the naturally occurring soil type and the depth and location where the samples were obtained. Unified soil classification (USC) is preferred; however, a geologic field description is acceptable (e.g., gravel, sand, silt, clay, etc.), if done by a qualified person.
- Indicate if you encountered groundwater at your site during UST closure, investigation activities, or obtained groundwater information from other sources. If so, indicate the groundwater depth (in feet) below the ground surface at or near your site.
- Groundwater flow direction can be determined if you have at least three (3) groundwater monitoring wells properly installed at your site. You may also be able to determine groundwater flow direction from other wells installed at a nearby LUST release site. Describe which method you used to determine groundwater flow direction.

Your site classification will help determine if immediate response actions are needed.

Site classification is a dynamic process and can change as more information is obtained.

- Indicate the distance and estimated depth (in feet) below grade from the source area of petroleum contamination to the following buried utilities; water line, sanitary sewer, natural gas, storm drain, telephone, electrical, other (specify).
- Indicate the distance (in feet) from the source area of petroleum contamination to property lines and buildings (indicate type of building; residential, commercial, industrial, etc.).
- If available, document the water well survey (e.g., Points of Diversion Information) conducted at the release site.

Identify the product released and describe where the leak occurred.

4 Nature of the Release and Abatement Measures

In this section, you provide details about the release, including age, condition and contents of the UST. You are also required to perform and report abatement measures to stop the source of contamination and to prevent further releases of contamination. Describe the following:

Have you stopped the release to minimize future problems?

- Age and condition of the UST system, including piping and tanks, corrosion holes, soil staining or odor, sheen on surface of groundwater or surface water.
- Types and amount of product(s) stored in the USTs, and the type and estimated amount of product released into the environment.
- Cause and location of the release such as the tank, dispenser island, piping, overfills and spills, etc.
- The method(s) used for detecting contamination.
- The location of where the contaminated soil or groundwater was either properly disposed of, or is currently being stockpiled or stored.

On- or off-site soil treatment such as aeration or land farming needs approval from more than one regulatory agency.

All stockpiled or aerated soils should be managed in accordance with the DERR'S "Guidelines for Disposition and Treatment of Petroleum-Contaminated Soils". Prior to aeration, approval must be obtained from the local health department, the Utah Division of Air Quality and the DERR. Contact your DERR project manager for assistance with these aeration requirements.

Don't forget to take confirmation samples!

- If contaminated soils are overexcavated, or if groundwater is removed from the release site, confirmation soil or groundwater samples must be taken to confirm that the levels of contamination remaining in-place are at or below established clean-up levels.
- Determine the total volume, contaminant type(s) and concentration(s) of the removed groundwater or soil, and any soil or groundwater contamination remaining in-place.
- Determine the volume, concentration and disposal method or location used for well development or purge water, groundwater, excavation water or other waste water, etc.
- Collect representative environmental samples (soil, groundwater, etc.) to define the nature, extent and degree of the contamination at the site. Information regarding the results of the investigation and plans for future work, if any, should be included in the "Conclusions and Recommendations" section of the report.
- Consult with your DERR project manager or your environmental consultant prior to any confirmation sampling. There may be site-specific requirements necessary for site close-out. See "Sampling Procedures and Requirements" (page 11) for general descriptions of analytical testing requirements for various types of petroleum contamination.

IMPORTANT: ***You must IMMEDIATELY begin removal of any free petroleum product in excess of 1/8 inch thick. Refer to the enclosed Free Product Removal Report (page 9) for more information.***

5 Methodology

This section describes the methods and procedures used to conduct the investigation and should include the following:

- Document that all the proper agencies have been contacted and that all necessary permits or approvals have been obtained. Refer to the list of agencies in the "Permitting Requirements List" (page 10) to determine if you need their involvement or approval.
- Describe all methods of investigation used to define the extent and degree of soil and groundwater contamination. This may include on- or off-site soil borings by drilling or direct-push methods, groundwater monitoring wells, soil vapor surveys, overexcavation, test pits, etc.
- Describe each of the following for all groundwater monitoring well installations:
  - Method of drilling or other types of placement of wells (such as digging, backfilling or direct-push techniques).
  - As-built drawings to document well construction.
  - How drill cuttings were disposed.
  - Explain the method used to survey all groundwater wells for elevation and their relative location.
- Include the following information to document soil conditions and sampling procedures:
  - Describe the visual appearance of the soil, including odor, staining, depth to static water level, thickness of capillary fringe and other field observations made during the investigation and soil sampling.
  - Describe native soil type (color, grain size, consistency, hardness, moisture content, etc.) and stratigraphy. This information is collected from soil boring logs, test pits and other methods.
  - Describe your field screening methods, analytical sampling results and other relevant sampling procedures.
- Include the following information to document groundwater conditions and sampling procedures:
  - Describe the visual appearance of the groundwater, odor, sheen or thickness of free product, depth to groundwater (in feet) below grade, general site conditions and other field observations made while measuring static water level (SWL), purging and sampling the wells.
  - Describe method used for purging wells, and how many well casing volumes (total number of gallons) were purged from the well(s).
  - Describe how the SWL measurement was determined.
  - Explain how purge, development or rinsate water generated from wells was disposed.

These descriptions, methods and rationale are generally referred to as your "standard operating procedures" (SOP's). If your SOP's don't substantially change between different sampling events and reports to the DERR, you don't need to describe them again. Simply refer to the previous report.

Do you need to notify any other regulatory agencies? Refer to the Permitting Requirements List to see if you do.

You may need to obtain off-site access agreements to determine the full extent and degree of soil and groundwater contamination.

Describe how the subsurface investigation was conducted.

You may need to conduct quarterly monitoring for a year or so to determine trends in flow direction, contamination levels and depth to groundwater.

6 Results

Describe the results obtained from your subsurface investigation which should define the extent and degree of soil and groundwater contamination.

In this section, describe the extent and degree of the contamination from the information you gathered in the field.

- Soil sampling results should include:
  - A description and documentation of the subsurface geology of the site, both soil type and stratigraphy. As part of the documentation, you should include boring logs, excavation or cross-section drawings, test pit information, and any other data you collected.
  - Include any field screening results. Be sure dates, locations, depths and method(s) for soil screening or sampling are clearly identified.
  - A summary of the analytical results developed from laboratory analysis reports should be provided in tabular format. The table should include sample location or other identification number, methods of analyses, depth of sample collection (feet below grade) and results. Copies of the original laboratory analysis reports and chain-of-custody forms must be included in the appendices of the report.
- Groundwater sampling results should include:
  - A groundwater gradient map showing groundwater elevations and flow direction.
  - A summary of the analytical results developed from laboratory analysis reports should be provided in tabular format. The table should include sample location or other identification number, methods of analyses, depth to water (feet below grade) and results. Copies of the original laboratory analysis reports and chain-of-custody forms must be included in the appendices of the report.
  - Dissolved oxygen and any other field parameters (e.g., pH, temperature, redox potential, nitrate, sulfate, etc.) or readings collected in the field, if applicable.
  - Site maps showing current chemical concentration results (e.g., iso-concentration maps) for benzene, naphthalene, etc. Show sampling locations and depths using the same sample ID from the laboratory analytical results table.

Refer to "Sampling Procedures and Requirements" in the Additional Information and Resources section at the end of this guide.

7 Conclusions and Recommendations

Include your recommendations for clean-up if additional work is needed, or if site closure is warranted with no further action needed at the site.

This section allows you the opportunity to summarize the release site conditions obtained during your investigation, the potential risks they present, and to add your perceptions and recommendations on:

- The extent and degree of the contamination, and the volume and highest contaminant concentrations remaining at the release site.
- Whether or not additional work is necessary, underway or planned in the future in order to achieve clean-up goals.
- Further action required on your part for filing claims against the Petroleum Storage Tank Fund for reimbursement of your investigation and clean-up costs.
- Recommendations for DERR action at your site including extensions of deadlines, assistance with resources such as reimbursement of investigation and clean-up costs from the PST Fund, or site closure with no further action required.

8 References and Appendices

Refer to any outside publications or sources you used for information in preparing this report, or references to documents or reports previously submitted.

Additional documents to be added as appendices, include:

- Soil boring logs and stratigraphic cross sections
- Groundwater monitor well construction logs
- Photographs and other supporting information
- Water well surveys (e.g., Points of Diversion Plots)
- Other agency permits or approval letters if applicable

Include any other additional documentation you feel would be helpful in this investigation, clean-up efforts, or to support the conclusions presented.

9 Free Product Removal Report

Free product can be a severe safety hazard as well as a high risk to human health and the environment. If free phase product is observed at any time (e.g., 1/8 inch or more of gasoline, diesel or other petroleum products outside the intended storage system), you must immediately begin source removal. Your free product removal procedures should minimize the spread and migration of contamination into uncontaminated areas and must be removed as completely as possible. This Free Product Removal Report section should include:

- Documentation that you notified the Utah Division of Air Quality at (801) 536-4000 for obtaining approvals or permits related to air emissions from your free product recovery system.
- Documentation that you notified the Utah Division of Water Quality at (801) 538-6146 of free product in contact with groundwater or surface water, and that you obtained the necessary permits or approvals for free product disposal or effluent water discharge related to your free product recovery system.
- Site map and tables showing any information pertinent to free product quantity, thickness, type, extent and other relevant details.
- Construction details and other relevant aspects of the free product removal system such as how much was removed, the disposal location or disposal method used and the current site status.
- If water was extracted in conjunction with free product, sample collection may be necessary in order to characterize the effluent (water) quality and dissolved contamination levels. If so, please include all sampling results in the report. Proper procedures, as detailed in the "Sampling Procedures and Requirements" (page 11), should be followed and documented.

It may be necessary to file a Free Product Removal Report with your Subsurface Investigation Report.

Groundwater shall not be disposed of in a manner placing it in direct contact with the environment or which causes contamination to previously uncontaminated areas.

ADDITIONAL INFORMATION

Permitting Requirements List

You may need the approval of the following agencies during the course of investigating and remediating petroleum releases. If you have any questions about obtaining approval from other agencies, please contact your DERR project manager at (801) 536-4100.

Contact other agencies for necessary approvals or permits.

Utah Division of Air Quality (801) 536-4000

If you anticipate emitting hydrocarbon or petroleum vapors into the atmosphere during any phase of the investigation or clean-up, notify Air Quality so they may determine whether an air discharge permit or approval letter is required. Submit documentation of notification and any permits or approvals to the DERR.

Utah Division of Water Quality (801) 538-6146

If you know that groundwater has been impacted by a free-phase petroleum product, or that surface waters have been contaminated, notify Water Quality. Any required permits or approvals, including groundwater or surface water discharge, pretreatment or injection, must be obtained prior to implementing corrective action or abatement measures. Documentation of the notification and any permits or approvals obtained should be submitted to the DERR.

Utah Division of Solid and Hazardous Waste (801) 538-6170

If you suspect or know the release at your site is a hazardous waste (such as cleaning solvents) or a mixed hazardous/petroleum waste, notify Solid and Hazardous Waste to ensure compliance with permitting, disposal, sampling and other related activities.

Utah Division of Water Rights (801) 538-7240

Contact Water Rights for well installation and abandonment procedures for wells greater than 30 feet below grade, and any other permits required by their Administrative Rules for water well drillers. Submit documentation of the notification and any permits or approvals obtained to the DERR.

Utah Department of Transportation (UDOT) (801) 965-4000

If you need to work in the public right of way for investigation, sampling or any construction activities, call UDOT, city, county or other appropriate agency for the necessary approvals.

Sanitary Sewer District

To discharge petroleum contaminated water or waste water to the local sanitary sewer, check your local listing in the Blue Pages for specific numbers listed under "Public Works" or "Sewer", or call the DERR for more information.

Local Health Department

Contact your local health department or other appropriate agencies (Fire Department, etc.) for any applicable permits, applications or fees they may require for activities related to investigation, construction, corrective action, system operation, disposal or emissions at your release site. These approvals or requirements may vary greatly between different cities or counties.

Blue Stakes (800) 662-4111 or (801) 532-5000

Contact Blue Stakes or other appropriate agency for marking underground public utilities prior to any digging or construction activities.

Sampling Procedures and Requirements

Follow the guidelines and items in this section to ensure that all types of samples collected are of good integrity, are representative of environmental conditions and contaminant levels. Remember that all samples must be collected by an UST Certified Soil and Groundwater Sampler.

Following these sampling guidelines will help minimize the need to re-sample. It's important to do it right the first time, so call the DERR with any sampling questions.

- Describe or document any necessary property access and other permitting requirements.
- All soil, groundwater, surface water, or other types of environmental samples must be collected by a Utah certified sampler and analyzed by a Utah certified laboratory. The name and certification number of the sampler and laboratory must be clearly identified.
- Native soil type can be evaluated using Unified Soil Classification methods. Other detailed lithological descriptions may also be necessary.
- Describe subsurface stratigraphy and continuity of strata beneath the site, such as clay, silt or sand lenses, interbedded strata and other features.
- Chain-of-custody protocols and documentation must be maintained and provided for all environmental samples collected.
- All sample identifications, names and numbers should be consistent throughout the chain-of-custody protocol and documentation, laboratory analytical results, site map, data tables and report text.
- Describe sampling methodology, equipment and decontamination procedures.
- Describe the rationale for selecting sample locations and sampled intervals in excavations, test pits, soil/well borings, soil land farms, soil stockpiles or other sample locations. Describe whether the sample location determination was based on field instrument measurements, pre-selected intervals or other rationale.
- Describe and/or illustrate depths at which all soil and/or groundwater samples were collected and show sample locations on a properly scaled and oriented map.
- Identify the sample type(s) collected such as confirmation, grab, composite, headspace, blanks, duplicates, etc., and rationale for their selection.
- Specify the following sampled features and the applicable media sampled, including but not limited to; excavations, test pits, soil borings, soil stockpiles, soil land farms or aeration piles, groundwater monitoring wells, groundwater injection or extraction wells or other types of water wells.
- Provide descriptions of field screening methods and devices used including organic vapor meters or other test methods for detecting the presence of contamination.
- Sampling procedures must be conducted in a manner which minimizes the loss of volatile organic compounds. Describe the methods used to minimize the loss of volatiles and maintain sample integrity, such as zero headspace in sample containers and preserving the sample at 4^{o} Celsius.
- Samples should be immediately delivered to the laboratory. If not, describe the methods use preserve samples and maintain sample integrity within the applicable holding times.

- Laboratory analytical detection limits must be sufficiently low in order to detect contamiant concentrations at or below their applicable minimum detection levels or state-eshablished clean-up levels.
- Describe the volume removed (gallons), the method used for purging groundwater wells, and location or method used for the disposal of purge water.
- Groundwater well installation and abandonment must be conducted in accordance with the Utah Division of Water Rights specifications if the wells are deeper than 30 feet below grade.
- If soil borings or wells are emplaced, the following information if required:
  - Type of drilling equipment used, and detailed geologic boring logs with an appropriate vertical scale shown.
  - As-built drawings showing: number of wells and/or borings; total depth of well or boring; well construction materials including casing screen type, length, slot size, filter pack material and partical size;
  - Sample locations for soil or groundwater; and, any organic vapor meter measurements.
  - Type and placement of extraction pumps, if applicable.
  - identify the depth of groundwater (feet below grade) encountered at the site during sampling or investigations.
  - Describe the volume generated and the procedures used to dispose of drill cuttings, purge water or other waste materials generated during any phase of the work at the release site.
- Confirmation environmental samples (soil, groundwater, etc.) are required any time contaminant is treated in-place or removed from the subsurface or release site area.
- Analytical Methods and Contamination Determination: The following table shows the constituents for each product type which must be analyzed using approved analytical methods. Other appropriate analytical methods may be used as approved by the Executive Secretary (UST) for any of the methods outlined below. The analysis of additional constituents may be required as determined by the Executive Secretary (UST).

Don't forget to take confirmation samples.

Consult this table to determine the right testing methods to use during your investigation and other sampling events. Other fuel types such as kerosene, aviation fuel, etc., may be able to be determined by some of these analytical methods.

Analytical Methods for Environmental Sampling at Underground Storage Tank Sites in Utah (July 2013)

Substance or Product Type	Contaminant Compounds to be Analyzed for Each Substance or Product Type	ANALYTICAL METHODS1
		Soil, Groundwater or Surface Water
Gasoline	Total Petroleum Hydrocarbons (purgeable TPH as gasoline range organics C_6 - C_{10})	EPA 8015 or EPA 8260
	Benzene, Toluene, Ethyl benzene, Xylenes, Naphthalene, (BTEXN) and MTBE	EPA 8021 or EPA 8260
Diesel	Total Petroleum Hydrocarbons (extractable TPH as diesel range organics $C_{10} - C_{28}$)	EPA 8015
	Benzene, Toluene, Ethyl benzene, Xylenes, and Naphthalene (BTEXN)	EPA 8021 or EPA 8260
Used Oil	Oil and Grease (O&G) or Total Recoverable Petroleum Hydrocarbons (TRPH)	EPA 1664 or EPA 1664 (SGT*)
	Benzene, Toluene, Ethyl benzene, Xylenes, Naphthalene (BTEXN) & MTBE; and Halogenated Volatile Organic Compounds (VOX)	EPA 8021 or EPA 8260
New Oil	Oil and Grease (O&G) or Total Recoverable Petroleum Hydrocarbons (TRPH)	EPA 1664 or EPA 1664 (SGT*)
Other	Type of analyses will be based upon the substance or product stored, and as approved by the DERR Division Director	Method will be based upon the substance or product type
Unknown	Total Petroleum Hydrocarbons (purgeable TPH as gasoline range organics C_6 - C_{10})	EPA 8015 or EPA 8260
	Total Petroleum Hydrocarbons (extractable TPH as diesel range organics $C_{10} - C_{28}$)	EPA 8015
	Oil and Grease (O&G) or Total Recoverable Petroleum Hydrocarbons (TRPH)	EPA 1664 or EPA 1664 (SGT*)
	Benzene, Toluene, Ethyl benzene, Xylenes, and Naphthalene (BTEXN) and MTBE; and Halogenated Volatile Organic Compounds (VOX)	EPA 8021 or EPA 8260

1 *The following modifications to these certified methods are considered acceptable by the DERR Division Director:*

- *Dual column confirmation may not be required for TPH and BTEXN/MTBE analysis.*
- *A micro-extraction or scale-down technique may be used for aqueous samples, but only for the determination of extractable TPH as diesel range organics ($C_{10} - C_{28}$).*
- *Hexane may be used as an extraction solvent.*
- **Silica Gel Treatment (SGT) may be used in the determination of Total Recoverable Petroleum Hydrocarbons.*

***NOTE**: The sample preparation method and any modification(s) to a certified method must be reported by the laboratory.*

Be sure to check with your DERR project manager or your environmental consultant if you have any questions regarding your sampling program or corrective action plan requirements. Some suggestions or ideas to consider when developing your sampling, operation or maintenance plan may include:

- Take both types of samples (e.g., soil and groundwater) if groundwater was encountered during the course of soil sampling.
- Take two or more soil samples in selected locations to better define the vertical extent of contamination. This data will aid in clean-up or closure evaluations.
- Conduct continuous sampling of soil boring(s) or collect multiple samples per location to better define the native soil type, contaminated interval or vertical profile, geological features and related items.
- Upgrade your analytical method(s) to get more complete information during the initial sampling events and minimize re-sampling events.
- Have enough budget set aside to be flexible in the number of actual samples submitted for laboratory analyses, or the number of soil borings or groundwater monitoring wells drilled, etc.
- Check with other regulatory agencies to ensure sampling meets with their requirements for waste disposal or other related items.
- Obtain any necessary off-site access agreements or highway easements for potential work outside your property boundaries in determining the extent and degree of subsurface soil and groundwater contamination.
- For vapor, air, or any other type of environmental sampling, determine the appropriate analytical method and sampling procedures prior to field collection.

Some suggestions to make your sampling more cost effective and to provide more information during the initial sampling event(s).