

NOTIFICATION AND SOIL SAMPLING REQUIREMENTS FOR ABOVEGROUND STORAGE TANKS

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INTRODUCTION

The Department of Natural Resources and Environmental Control, Tank Management Section (DNREC-TMS) has developed this guidance sheet to assist tank owners, operators and contractors in complying with DE Admin. Code 1352, Delaware's *Regulations Governing Aboveground Storage Tank Systems* (the AST Regulations) Part B, Section 14, when changing the status of an AST. This is guidance only, the DNREC-TMS may impose additional requirements when deemed necessary.

Part B, Section 14, of Delaware's *Regulations Governing Aboveground Storage Tanks* (the AST Regulations) is entitled, "*Site Assessment Requirements for AST Removal; or Relocation; or Permanent AST Closure in Place; or Permanent Change in Contents of an AST; or Out-of-Service; or Retrofit; or Upgrade; or repair; or maintenance.*" This section applies only to those tanks that are subject to the technical portion of the AST Regulations and the resultant AST registration fees. Tanks that are exempt from the Site Assessment (SA) requirements are described in Part A, Section 1.2, of the AST Regulations.

The SA is required for the following AST activities. See Part A, Section 2 of the AST Regulations for definitions of the following terms:

- Dismantling and "Removal" of an AST;
- "Relocation" of an AST;
- "Permanent Closure in Place" of an AST;
- "Change-In-Service" (i.e., permanent change in contents, converting use, etc.) of an AST; or
- After an AST has been "Out-of Service" for greater than three (3) years.

NOTIFICATION

A completed AST Registration & Notification Form must be received by the DNREC-TMS office ten (10) days prior to making a change in service of any AST. The tank status *may not* be changed unless the DNREC-TMS has received the notification form as required in the AST Regulations, Part A, Section 4.3.2.

Any change in the schedule of work for a Change in Service must be communicated to the Department in writing a minimum of forty eight (48) hours prior to the new scheduled date of work.

A Site Assessment shall not commence without prior approval by the Department.

The owner shall notify the Department in writing of the actual date of completion of any Change in Service.

All AST SAs shall be completed within thirty (30) days following the above activities and the results of the SA shall be submitted to the Department of Natural Resources and Environmental Control, Tank Management Branch (DNREC-TMS) within ninety (90) days of completion of the assessment. The DNREC-TMS will confirm, by a site inspection and/or correspondence, when the above activities are

complete. Any deviation from these procedures and schedule must be submitted in writing to the DNREC-TMS in accordance with Part A, Section 5 of the AST Regulations.

SITE ASSESSMENT PURPOSE

You must receive approval in advance, from the DNREC-TMS for any deviation from these requirements. Requests for deviation must be written, including reason for deviation and a sketch showing proposed sampling locations.

The pre-approved SA criteria set forth in this guidance is primarily for petroleum ASTs that are in contact with the ground. Requirements for SAs for an AST containing any other regulated substance may be found in the section of this document titled **Non-Petroleum ASTs** and shall be pre-approved by the DNREC-TMS.

It is important to note that ***the sole purpose of the SA is to identify any contamination around and/or beneath the AST as a result of leaks, releases or spills.*** Based on the results of the SA, the DNREC-TMS will make decisions regarding whether further action is necessary. Further action may be, but is not limited to, additional investigations or remedial actions if a release is confirmed.

In some cases, it may be beneficial to collect additional samples (in addition to the pre-approved site assessment methodology contained herein) in order to demonstrate that the contamination is of limited extent. Such a demonstration may help facilitate the ultimate goal of a “No Further Action” letter. These are usually field-based decisions made by the owner’s environmental consultant with input provided by the DNREC-TMS.

The DNREC-TMS shall be notified at least five (5) days prior to all sampling activities. The DNREC-TMS may offer guidance throughout all stages of the SA (i.e. planning, scheduling, permitting, field work and reporting). The general concept of the SA is similar to any other environmental investigation.

Very few ASTs are similar in terms of design, containment, volume, access and contents. Therefore, this guidance offers general SA techniques for petroleum ASTs and defines what is “acceptable” by the DNREC-TMS for meeting the requirements stated above.

SITE ASSESSMENT DESIGN

The SA design shall include the area of the regulated AST and all underground piping and underground ancillary equipment and underground dispensing systems.

The SA shall be designed to successfully characterize the perimeter of the AST, as well as beneath the bottom of the AST.

The SA shall be designed to account for all regulated substances that have ever been contained inside the AST that is being assessed.

If there is evidence of soil and/or groundwater contamination from a regulated substance discovered during the SA, or during the tank activity, through visual inspection or field screening, the O/O shall notify the DNREC-TMS immediately as per Part E, Section 2.0 of the AST Regulations.

If non-aqueous phase liquids are identified during the SA, or any other imminently dangerous and previously unknown condition are identified, the O/O shall report such conditions *immediately* to the DNREC Emergency hotline (800-662-8802) and to the DNREC-TMS.

It is always recommended that a site visit be scheduled with the DNREC-TMS prior to the tank activity to pre-plan the SA. The DNREC-TMS may limit, or exclude, sampling around and beneath ASTs that do not meet the general assumptions as described in the section of this guidance document titled **Soil Sampling Protocol**.

NON-PETROLEUM ASTS

The SA approach used for non-petroleum ASTs will be case-by-case and should be proposed by the owner/operator (O/O) or by a consultant for the O/O.

If a SA (i.e., soil and/or groundwater sampling) is not necessary for a particular AST due to design, containment or contents, then the O/O is responsible for providing a detailed report for each AST explaining why it is not necessary. Information to be included in the report may include:

1. Photographs, maps, and/or drawings of the AST and containment area with an explanation of why a release from the AST did not impact the subsurface.
2. Cross sectional maps depicting why an impact to the sub-surface is not feasible.
3. Examples of historic release events documenting the successful recovery of lost product without an impact to the environment thereby demonstrating the success of containment design.
4. Detailed fate and transport analysis of the contained material if it was released to the environment including;
 - a. Volatilization potential; and
 - b. Solubility; and
 - c. Fate and transport, or lack thereof, in soil and groundwater.
5. Existing on-site monitoring well data from the facility's involvement with other environmental programs (i.e. US EPA, DE Solid and Hazardous Waste Branch, DE Site Investigation and Restoration Branch, etc.).
6. If, when released, the non-petroleum material *does* have the potential to impact soil and/or groundwater, the O/O shall submit a SA work plan that includes:
7. Parameters or chemical analyses that will be successful in determining the degree of impact for all materials stored in the tank including proprietary products; and
8. The justification (i.e. references, chemical equations, data) for the parameters and analyses selected above; and
9. Sample locations including maps, diagrams and drawings of the tanks; and
10. What media (soil, groundwater, vapor) is appropriate to be assessed and why.

It is the responsibility of the O/O to include *as much information as possible* in order for the DNREC-TMS to make a decision to move toward no further action and eliminate the need for a SA.

SOIL SAMPLING

All samples are considered “grab” samples and are to be collected using site specific quality assurance and quality control (QA/QC) techniques.

The quantities of samples displayed in the *Sampling Table* are the minimum amount of samples that shall be collected for the corresponding AST.

Perimeter samples, shallow or deep, shall be evenly spaced and collected close to areas where piping enters/exits the AST.

Additional samples shall be collected in areas of obvious staining and odor, regardless of depth.

Shallow samples shall be discrete “grab” samples collected three (3) feet below the ground surface (bgs) or three (3) feet below the bottom of the AST, whichever is deeper.

Deeper samples shall be collected at the groundwater interface or at bedrock, whichever is encountered first.

The requirements for a pre-approved SA, including number, depth and location of samples are included in the *Sampling Table* below. The table assumes the following:

- The AST contained a petroleum product. The sampling requirements for ASTs containing any other regulated substance shall be made on a site-by-site basis and shall be approved by the DNREC-TMS (see **(Non-Petroleum ASTs)** of this guidance document); and
- The area beneath the AST is permeable (i.e. soil, sand, stone, etc.). This includes all tanks that are located on a concrete ring wall; and
- The AST is oriented vertically and is in contact with the ground; and
- There are no existing monitoring wells surrounding, or near, the AST.

For ASTs that are/were on an intact, solid concrete base or geo-synthetic liner, but are within an earthen containment area, only shallow perimeter samples are required.

For ASTs that are contained on and within a concrete containment area or a geo-engineered containment area (i.e., synthetic impermeable membrane, clay, etc.) an AST specific sampling program is necessary and shall be approved in advance by the DNREC-TMS.

For ASTs that are elevated from the ground surface, the O/O shall provide the DNREC-TMS with a SA work plan that is based on size, containment area design, and AST contents. The DNREC-TMS may approve the work plan.

All samples shall be collected in the native soil and not from materials that were installed for the design of the AST (i.e., gravel, stone, clay etc.). Native soil may be select fill or fill material that is common to an area or region.

Sampling Table

Sampling Guidance for Tanks Containing Petroleum Products				
Tank Diameter	<i>Tank Removed/ Bottom is Accessible</i>		<i>Abandoned in Place/Bottom Not Accessible</i>	
	Shallow 3' Perimeter Soil Samples	Shallow 3' Tank Bottom Soil Samples	Shallow 3' Perimeter Soil Samples	Deep Perimeter Soil Samples at water table
< 25 feet	4	1	4	4
25-60 feet	5	2	5	5
61-90 feet	6	4	6	6
>90 feet	Site Specific -Contact DNREC-TMS		Site Specific - Contact DNREC-TMS	

Piping and Ancillary Equipment

- At least one (1) discrete grab sample shall be collected from native soil two (2) feet below each underground swing joint, connector, or elbow.
- When elbows, connectors or swing joints are not known or available, collect at least one (1) grab soil sample two (2) feet below every twenty (20) linear feet of underground piping.
- Collect a minimum of one (1) grab sample three (3) feet bgs grab at the first isolation valve for each run of aboveground piping.

Excavation Sampling

- If contamination appears to be limited in extent, excavation and removal of contaminated soil may be an option in order to obtain a no further action determination and to avoid a full hydrogeologic investigation.
- Contaminated soil may be excavated to attempt an immediate cleanup following the AST removal activity.
- Confirmatory sampling of the excavated material will be a function of the size of the excavation. In general, at least one (1) grab sample shall be collected from every “face” (or sidewall) of the excavation cavity for a total of five (5) samples. One (1) additional “composite” sample shall be collected from the bottom of the excavation and one (1) additional “composite” sample shall be collected from the sidewalls. This is the general sampling plan for any excavation that does not exceed twenty (20) feet of run in any direction.
- All excavations greater than one hundred (100) cubic yards shall be approved in advanced by the DNREC-TMS and a sampling plan shall be approved by the DNREC-TMS.

SAMPLE ANALYSIS

All samples shall be analyzed for the chemicals of concern (COCs) that correspond with the *entire history* of the contents of the AST. Refer to *Appendix 1.0 - Chemicals of Concern (COC)* for the analysis requirements for each petroleum product.

For any AST containing a regulated substance *other than petroleum*, the owner's consultant shall propose a list of COCs that would be appropriate for that specific tank based on the history of its contents. This proposal may be made in the form of a hardcopy work plan, or an email submission to the DNREC-TMS.

The analysis proposal for all non-petroleum ASTs shall consider the following comments:

1. The selected analytical methodology, including the sampling parameters, should be designed to determine if a leak or release from the AST has occurred.
2. Examples of parameters used to assess a non-petroleum release may be:
 - Analysis for the exact non-petroleum COC that was contained in the AST.
 - Concentration of ions (i.e. pH, nitrate, nitrite, etc.).
 - Visual inspection of precipitates, staining, or other indicators of a release.

Refer to *Appendix 2.0* for **Laboratory Analytical Methods**.

REPORTING

- All AST SAs shall be completed within thirty (30) days following the tank activity and the results of the SA shall be submitted to the DNREC-TMS within ninety (90) days of completion of the SA.
- All SA reports should be signed by a Professional Geologist (PG), or Professional Engineer (PE) licensed in the State of Delaware, unless otherwise approved by the DNREC-TMS.
- Alternative procedure requests may be granted by the DNREC-TMS so long as the request is justified and the newly proposed SA schedule is submitted in writing.
- The SA report should include at a minimum:
 1. Two (2) site maps: one (1) of the facility location with respect to the general surrounding area and one (1) of the facility with all former and existing AST locations and AST IDs; and
 2. Sample locations in reference to the former AST; and
 3. Sample results and laboratory analytical sheets with chain of custody; and
 4. Custody chain –of-custody, if applicable

5. Sample collection methods including equipment, depth of collection, soil logs, and photo-ionization detector readings; and
6. Complete description of any interim remedial action such as excavation/source removal; and
7. All appropriate disposal documentation (e.g. disposal of product, sludge)
8. If sampling deviation is approved in the field an amended AST Registration and Notification form must be submitted. The name of the DNREC-TMS project officer who approved the deviation must be clearly indicated and the sampling locations must be noted on the site map.
9. A copy of the **Tank Closure Report** if not already submitted (when applicable).

CLOSURE/RESPONSE

If the results of the SA indicate that there was not a release of a regulated substance, the DNREC-TMS will consider a no further action determination for that particular AST, at that particular time.

If the results of the SA indicate that a regulated substance was released, but is of limited extent, is below DNREC-TMS standards, and does not pose a risk to human health, safety and the environment, the DNREC-TMS will consider a no further action determination based on a certain list of conditions.

If the results of the SA indicate that a regulated substance was released and concentrations of COCs and other measured parameters are above standards and/or action levels, the DNREC-TMS will respond with a letter requiring a **Hydrogeologic Investigation**.

Appendix 1.0 - Chemicals of Concern (COC)

Chemical of Concern (COC)	PRODUCT									
	Gasoline/ Av-Gas		Jet Fuel/Kero		Diesel		Heating Fuel		Used Oil	
	SOIL	GW	SOIL	GW	SOIL	GW	SOIL	GW	SOIL	GW
VOLATILES										
Benzene	X	X	X	X		X		X	X	X
Toluene	X	X	X	X		X		X	X	X
Ethylbenzene	X	X	X	X		X		X	X	X
Xylene (mixed isomers)	X	X	X	X		X		X	X	X
Isopropylbenzene (Cumene)	X	X		X*					X	
ADDITIVES										
Methyl t-butyl ether (MTBE) ²	X	X	X	X					X	X
Lead ^{1,3}	X**(T)	X**(D)							X(T)	X(D)
1,2-Dichloroethane (EDC) ³	X**	X**	X**	X**						
1,2-Dibromoethane (EDB) ³	X**	X**								
PAH-CARCINOGENIC										
Benzo(a)Anthracene			X		X		X		X	
Benzo(a)Pyrene			X		X		X		X	
Benzo(b)Fluoranthene					X		X		X	
Benzo(k)Fluoranthene					X		X		X	
Chrysene					X	X	X	X	X	X
Indeno(1,2,3-cd)Pyrene					X		X		X	
PAH-NON-CARCINOGENIC										
Acenaphthene					X	X	X	X	X	X
Anthracene					X		X		X	
Fluoranthene					X		X		X	
Fluorene			X		X		X		X	
Naphthalene	X	X	X	X	X	X	X	X	X	X
Phenanthrene			X	X	X	X	X	X	X	X
Pyrene					X		X		X	
OTHER										
PCBs									X	X
Semi-volatiles									X	X
Volatiles									X	X
<p>Notes: *JP-4 jet fuel only. ** If leaded gasoline, aviation gasoline, or jet fuel. (D) Dissolved Lead (T) Total Lead ¹Samples collected from point of use must be analyzed for Total Lead; samples collected from the aquifer must be analyzed for dissolved lead. ²MTBE analysis is required, unless conclusive documentation is presented and pre-approved by the UST Branch confirming that the UST was not in service after January 1, 1978. ³For gasoline USTs only, lead, EDB and EDC analysis is required unless conclusive documentation is presented and pre-approved by the UST Branch that the gasoline UST was installed after January 1, 1988. Lead, EDB, and EDC analysis is always required for aviation gasoline USTs.</p>										

Appendix 2.0 – Laboratory Analytical Methods

Analytes	SW-846 Method	Water/ Wastewater Method	Primary Equipment	Sample Preparation ¹
TPHs	4030 ²		Immunoassay	Included in kit
PAHs	4035 ²		Immunoassay	Included in kit
Aliphatic and Aromatic Hydrocarbons; GRO DRO HRO	8015		GC/FID	Extraction (SVOCs); Purge-and-Trap and Headspace (VOCs);
Select VOCs	8021	502.2/602	GC/PID	Purge-and-Trap
VOCs	8260	524.2/624	GC/MS	Purge-and-Trap; Azeotropic Distillation
SVOCs/PAHs	8270	525/625	GC/MS	Extraction
Lead	6010 B 7420	6020 7421	ICP/MS Furnace ICP	
EDB	8260 B	8011		
PAHs	8310	610	High Performance Liquid Chromatography (HPLC)	Extraction

Footnotes:

¹ These are the standard methods of preparation for the corresponding method. They may vary depending upon specific analytical needs.

² Can be used for a screening method for soils only.

NOTE: This table taken from Table B-1 in Appendix B of "Expedited Site Assessment Tools for Underground Storage Tank Sites: A Guide for Regulators" (EPA 510-B-97-001).

For more information, visit: <http://www.dnrec.delaware.gov/tanks/Pages/AST-Program.aspx>