

# THINK



# ANK

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## New Soil Sampling Guidance

Jill Hall

The Department of Natural Resources and Environmental Control, Tank Management Section (DNREC-TMS) is revising the guidance for soil sampling at underground storage tank (UST) removals, closures in place, changes in service, and changes in substance stored activities.

The Delaware Regulations Governing Underground Storage Tank Systems (the UST Regulations) require a site assessment be performed to measure for the presence of a release when any of the above-referenced activities occur. The UST Regulations do not give a specific number or location of soil samples for a site assessment. The DNREC-TMS therefore created guidance documents to assist tank contractors and consultants in determining the location and number of soil samples that are necessary to perform a satisfactory site assessment.

The DNREC-TMS has determined that the current soil sampling guidance documents do not require an appropriate number of samples to adequately characterize a site, most notably when large USTs are present. The guidances have been revised to require soil samples based on the size of the USTs. In many cases, better site characterization will eliminate the need for further investigation, thus eliminating further costs for the tank owner.

The new sampling guidance documents will become effective October 1, 2012. The new sampling guidance documents are available on the DNREC-TMS website at [www.dnrec.delaware.gov/tanks/](http://www.dnrec.delaware.gov/tanks/).

Three public workshops have been scheduled to discuss the new requirements with interested parties. Staff from the DNREC-TMS will be available at the workshops to explain the new guidance and to answer questions.

### Mark Your Calendar!

#### June 6, 2012

10am – 12pm  
Div. of Watershed Stewardship Building  
901 Pilottown Road  
Lewes, DE

#### June 7, 2012

10am – 12pm  
DNREC R & R Building  
89 Kings Highway  
Dover, DE

#### June 13, 2012

10am – 12pm  
DNREC-TMS Office  
391 Lukens Drive  
New Castle, DE

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# From Lead to Ethanol: How Does It Impact Your Sample Analysis?

Amy Bryson

Underground storage tank (UST) owners, operators, and contractors should pay close attention to the installation dates and in/out of service dates for UST Systems. Changes in the Department of Natural Resources and Environmental Control, Tank Management Section (DNREC-TMS) technical guidance documents include the revision of analysis requirements for lead, ethylene dibromide (EDB), 1,2-Dichloroethane (EDC), and ethanol based on installation and in/out of service dates.

Lead was added to gasoline by the oil industry to boost octane and act as an antiknock agent. The most common antiknock additives contained either tetraethyl lead or tetramethyl lead. However, the use of lead antiknock agents in gasoline caused engine problems due to the formation of lead deposits in the combustion chamber. As a result, “lead scavengers” were added to all leaded gasolines to prevent lead deposits. The use of EDB as a “lead scavenger” began in 1925 and was partially replaced with EDC in 1940 to reduce costs.

Due to health effects associated with lead usage in gasoline, the EPA began a “phasedown” program for leaded gasoline in 1973. By 1986, the EPA standard for lead in gasoline was reduced to 0.10 gram per gallon (Ref. 1 & 2). Gasoline continued to contain some percentage of lead until January 1, 1996, when the Clean Air Act banned the sale of leaded gasoline for on-road vehicles (Ref. 3). Leaded gasoline is still used in some off-road applications such as racing fuels and aviation gas (Ref.8). Table 1 summarizes the allowable gasoline lead content from 1973 to 1996.

Year	Lead Content
1973	2.0 grams per gallon
1982	1.10 grams per gallon
1986	0.10 grams per gallon
1996	Banned for on-road vehicle use
Source: Refs. 1,2	

As a result, the DNREC-TMS requires analysis for Lead, EDB, and EDC for gasoline USTs unless there is conclusive documentation submitted and pre-approved by the DNREC-TMS that all portions of the UST system were installed after January 1, 1996.

With the waning use of lead, gasoline manufacturers began to use methyl tert-butyl ether (MTBE) to add octane and improve vehicle emissions beginning in 1979. The Clean Air Act of 1990 required winter oxygenated gasoline to reduce carbon monoxide and ozone in certain areas nationwide and summer reformulated oxygenated gasoline to reduce ozone in other states. The goal of the oxygenated fuels was to improve air quality, reduce dependence on foreign oil and enhance the rural economy through the production of ethanol (Ref. 5). Congressional leaders believed that ethanol would be chosen as the oxygenate to comply with the Clean Air requirements (Ref. 5). However, oil companies chose MTBE because they could make it themselves and it was easier to transport and blend. The unique characteristics of MTBE plumes and their impacts on the nation’s

Continued — See *Ethanol*, p. 3

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## From the Editor...

Wow, it’s been awhile since we’ve published Think Tank. It seems appropriate that our first issue after our hiatus is being published in the springtime, especially considering all of the new information and changes taking place here. For starters, we’re now the Tank Management Section. Our name has changed, but we’re still doing the same work and providing the same services. We’ve lost a few familiar faces, and gained a few new ones. We’ve adopted some new policies, changed some others, and published a new website to go with our new name.

We’ve also joined the electronic era and are, for

the first time, distributing Think Tank as an e-newsletter. If you would like to subscribe to the TMS’s electronic updates and announcements, including new Think Tank issues, please send a blank email to [join-dnrec\\_tms@lists.state.de.us](mailto:join-dnrec_tms@lists.state.de.us).

Thanks for your patience with the TMS as we’ve worked through the staffing challenges of the past couple of years. Although Think Tank’s future is still uncertain, for the present, we’re happy to be able to produce and share this issue with you.

drinking water are well documented. MTBE plumes are known to travel faster and further than traditional plumes associated with gasoline releases and are resistant to biodegradation. Many states began phasing out the use of MTBE and over 20 states currently have a ban on the use of MTBE (Ref. 5).

As a result, the DNREC-TMS requires analysis for MTBE for gasoline USTs unless there is conclusive documentation submitted and pre-approved by the DNREC-TMS that no portions of the UST system were in service after January 1, 1978.

With the accelerated phase out of MTBE, ethanol is used to a much greater extent in gasoline. Ethanol, a renewable fuel, is an effective oxygenate and improves fuel octane but poses other problems for UST systems including phase separation and metal corrosion (Ref. 6). Ethanol has an affinity for water which makes it even more important to monitor the accumulation of water in USTs and routinely remove water from tank bottoms. An accumulation of water in fuel can lead to “phase separation” which allows the alcohol to drop out of the gasohol and form a layer of gasoline on the top and a layer of ethanol on the bottom (Ref. 7). The ethanol/water mixture at the bottom of USTs encourages the growth of bacteria, which can be detrimental to the gasoline and some fuel systems (Ref. 7). Additionally, this “phase separation” can be problematic for vehicles and other equipment when fuel contaminated with water is distributed (Ref. 7). Additionally, ethanol fuel is conductive and facilitates corrosion between dissimilar metals (Ref. 6). As the ethanol content in fuel increases the conductivity increases and promotes corrosion more easily. Research continues into the impacts of higher ethanol fuel on UST systems and their fuel distribution components.

The passage of the Energy Policy Act of 2005 eliminated the reformulated oxygenate program and required gasoline to contain increasing amounts of renewable fuel. In fact, the Delaware City Refinery proposed to no longer use MTBE as a gasoline blending component effective May 1, 2006 (Ref. 4). Table 2 below outlines the amounts of renewable fuels required per the Energy Policy Act of 2005 (EPACT).

Year	Requirement
2006	4.0 billion gallons of renewable fuel
2012	7.5 billion gallons of renewable fuel

As a result of the increased use of ethanol, the DNREC-TMS requires analysis for Ethanol for gasoline USTs unless there is conclusive documentation submitted and pre-approved by the DNREC-TMS that no portions of the UST system were in service after April 1, 2006.

Based on the above referenced information, the date associated with the analytical requirements for Lead, EDB, and EDC has been revised and Ethanol analysis may be required. UST owners, operators, and contractors should pay close attention to the installation dates and in/out of service dates for UST Systems to determine analytical requirements.

REFERENCES

1. U.S. Environmental Protection Agency (EPA). 1973. “EPA Requires Phase-Out of Lead in All Grades of Gasoline.” Press Release. November 28. On-Line Address: <http://www.epa.gov/history/topics/lead/03.htm>
1. EPA. 1985. “EPA Sets New Limits on Lead in Gasoline.” Press Release. March 4. On-Line Address: <http://www.epa.gov/history/topics/lead/01.htm>
2. EPA. 1996. “EPA Takes Final Steps in Phaseout of Leaded Gasoline.” Press Release. January 29. On-Line Address: <http://www.epa.gov/history/topics/lead/02.htm>
3. Ellis, Patricia. 2006. Ethanol? Good. Yes? Um.... L.U.S.T.LINE , Bulletin 52, 10-13.
4. Ellis, Patricia. (September 2006). The evolution of underground storage tank contamination and regulation. Presentation at the NQWA Focus Conference on Eastern Regional Groundwater Issues, Portland, Maine.
5. English, Edward. 2006. So what about those E10 and E85 fuels? A discussion of material compatibility. L.U.S.T.LINE , Bulletin 52, 1-6.
6. Kuhn, Jeff. 2006. Is your UST system ethanol compatible? L.U.S.T.LINE , Bulletin 52, 7-9.
7. Lead Scavengers Compendium. 2006. Overview of Properties, Occurrence, and Remedial Technologies.

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# Hydrogeologic Investigation Guide

Patrick Boettcher

In 2006, the DNREC-TMS reviewed its corrective action process to more efficiently move projects toward NFA determinations and to lessen the burden of administrative work (report and work plan reviewing, letter writing, etc.). The first step in streamlining the DNREC-TMS's corrective action process was the elimination of the requirement to submit a hydrogeologic Investigation work plan. We have implemented this and some may have noticed that we have not been requiring these work plans. Because we have eliminated the work plan submittal and review steps in the process, the DNREC-TMS has created the Hydrogeologic Investigation Guide to assist consultants, responsible parties, and the public with following the requirements of Part E §4.2. of Delaware's Regulations Governing Underground Storage Tank Systems.

This guide is to be used in conjunction with, and does not replace, the Delaware Risk-Based Corrective Action Program (DERBCAP). The hydrogeologic investigation is perhaps the most important part of the corrective action process because it defines the extent of the confirmed release. The intention of this guide is to elicit complete hydrogeologic investigation to allow for better protection of human health, safety, and the environment. In addition, leaking underground storage tank (LUST) projects will progress more quickly towards a "no further action" (NFA) determination by the DNREC-TMS.

In the past, the scopes of approved work plans were sometimes insufficient in delineating the full extent of the contamination. In these cases, decisions to expand the investigations could have been made in the field to more quickly delineate the plume and provide useful information for the project. However, these "expanded" investigations were not performed because they were

not pre-approved by the DNREC-TMS. As a result, several weeks were added to the project life and additional costs were incurred by the responsible party (RP) through the development of additional work plans, field mobilizations, etc. The DNREC-TMS expects that by eliminating the work plan steps in the corrective action process, a more flexible, field-driven investigation will be performed. Decisions made in real time will allow for an additional field mobilization, if necessary, within the 120 day deadline. Better field time management will permit time for more complete data collection, allowing for more constructive recommendations for a path forward or a warranted request for a NFA determination.

One of the first pages of the hydrogeologic investigation guide is a checklist for completing the hydrogeologic investigation. This checklist must be included with hydrogeologic investigation reports beginning on October 1, 2012. By requiring this checklist, the report preparer and RP will know what the DNREC-TMS will be looking for in the report. It will also act as a quick guide to the DNREC-TMS project officer to see if the investigation is incomplete.

While this guide was created to aid in completing a hydrogeologic investigation for a LUST facility, the general principals are applicable for AST facilities with a confirmed release and this guidance should be followed to complete the investigation required in Part E, § 1.0 in Delaware Regulations Governing Aboveground Storage Tanks.

The hydrogeologic investigation guide can currently be found at the following link: [www.dnrec.delaware.gov/tanks/Documents/LUST/hydro%20guide.pdf](http://www.dnrec.delaware.gov/tanks/Documents/LUST/hydro%20guide.pdf).

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## Swing Joints Policy Clarification

Beginning with the 2008 Delaware Regulations Governing Underground Storage Tank Systems (the UST Regulations), the Department of Natural Resources and Environmental Control, Tank Management Section (DNREC-TMS) disallowed the use of swing joints. The DNREC-TMS received feedback from the regulatory community that this requirement needed further explanation. As a result, in 2011, DNREC-TMS management released a policy statement to clarify the intention of this specific regulatory requirement.

In this policy memo, DNREC-TMS would like to clarify that double elbow swing joints are only prohibited in situations where the swing joint is necessary

to provide flexibility to the UST piping system(s). In general, the prohibition does not apply to situations where flexible plastic piping is present and the flexible plastic piping itself provides the necessary flexibility to the system, or in situations where a flexible connector is attached to an arrangement of galvanized nipples and elbows to facilitate a change in line direction or elevation.

The complete memo is available on our website at <http://www.dnrec.delaware.gov/tanks/Documents/SwingJointPolicyMemo.pdf>. If you have any questions or concerns, please contact Alex Rittberg at 302-395-2500 or [alex.rittberg@state.de.us](mailto:alex.rittberg@state.de.us).

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# QA/QC Changes

Patrick Boettcher

In addition to changes in the number of samples and the analytes required, the DNREC-TMS has updated its quality assurance/quality control (QA/QC) procedures. Without proper QA/QC, the value of the data collected during sampling events can diminish to near worthless. The major changes to our guidance documents include requiring methanol preservation when analysis of volatile organic compounds (VOC) is required and the analysis of a trip blank when samples will be collected for VOCs. VOCs listed on our Tier 0 analytical parameters include: benzene, toluene, ethylbenzene, xylenes, gasoline range organics (GRO), ethylene dibromide (EDB), 1,2-dichloroethane (EDC), methyl tert-butyl ether (MTBE), and ethanol. Essentially, methanol preservation and the analysis of a trip blank will be required when samples are collected in regards to gasoline, kerosene, used oil, or aviation gas UST systems.

## Trip Blanks

When samples are managed properly by all individuals that handle them and the laboratory equipment is free of contamination, a trip blank's analytical results should report no detects of any compound. A trip blank must remain with the other laboratory-issued bottles from the time that the bottles leave the laboratory until the samples are



returned for analysis. If a trip blank's results included detections of volatile chemicals, it can mean that all the samples were exposed to a compromised environment or that there was cross contamination in the laboratory. Upon detection of compounds in the trip blank, you may request that the lab re-run your samples. An impacted trip blank may indicate that the results for the other samples are biased high.

## Methanol Preservation

Collecting soil samples to be analyzed for VOCs in a 4 ounce jar and without preservation can lead to a significant loss of VOC mass and will produce results that may be biased low. To ensure sample integrity, soil samples must be preserved to limit the loss of analyte mass to the environment. When these standards go into effect, the DNREC-TMS may require samples to be recollected if they are not preserved in methanol. The DNREC-TMS will allow the use of EnCore samplers as long as the samples are placed on ice immediately and preserved with methanol within 48 hours of collection.

The QA and QC measures described above are effective for all TMS-required sampling activities that occur on or after October 1, 2012.

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## New Year, New Name, New Website!

Allison Diggins

Many of you have noticed the archaic web design or the faulty links on the current website of the Department of Natural Resources and Environmental Control, Tank Management Section (DNREC-TMS). The DNREC-TMS is pleased to announce that Phase I of its new website launched on January 1, 2012. We have finally joined the rest of DNREC on with the "common look and feel" webpages. Please be sure to update your favorites to [www.dnrec.delaware.gov/Tanks](http://www.dnrec.delaware.gov/Tanks). The website will be updated with information about the section's programs and services and redesigned to achieve a user-friendly experience for tank owners and operators, consultants, contractors, and the public. Each program area in the DNREC-TMS will feature a brief narrative summarizing the services offered to the owners of underground and aboveground storage tank systems along with links to regulations, guidance documents, and forms. The forms include the convenience of electronic completion and submittal. The DNREC-TMS

encourages users to utilize these forms and to submit them electronically to reduce paper waste. Stay tuned for Phase II of the website set to launch in Spring 2012, which will include additional documents and information. In the meantime, please call the office if you need a specific form or guidance document that's currently unavailable online. If you have any comments or questions about the new DNREC-TMS website, please contact Allison Diggins at [allison.diggins@state.de.us](mailto:allison.diggins@state.de.us).

Please be sure to update your favorites to  
[www.dnrec.delaware.gov/Tanks](http://www.dnrec.delaware.gov/Tanks).

Join our email list at  
[join-dnrec\\_tms@lists.state.de.us](mailto:join-dnrec_tms@lists.state.de.us)

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Document #: 40-04-04/12/03/01

## The TMS Environmental Consultant List

Although the Department of Natural Resources and Environmental Control, Tank Management Section (DNREC-TMS) doesn't certify or endorse environmental consultants, it does keep a list of Environmental Investigation & Remediation Consultants. This list is provided to the regulated community to help select an environmental consultant for the investigation and remediation of leaking underground and aboveground storage tank sites. Inclusion on the list does not imply endorsement, recommendation or certification of the consultants by the DNREC-TMS.

If you are interested in being placed on the next update to the DNREC-TMS's Environmental Investigation & Remediation Consultants List, we require your company respond back to this office with a letter of request. Enclose with your letter the following documentation to demonstrate the minimum inclusion criteria:

1. Name, registration number, and copy of certificate of staff professional geologist or engineer;
2. A copy of your firm's State of Delaware Business License; and
3. A brief description of two investigation and/or remedial projects performed in Delaware during the past two (2) years.

Letters of request may be sent to the attention of Patrick Boettcher.

