

ASTSWMO's Mission: To enhance and promote effective State and Territorial programs for waste and materials management, to encourage environmentally sustainable practices and to affect relevant national waste and materials management policies.



FINAL WORKSHOP PROCEEDINGS
2010 LUST Technical Training Workshop
“Tools for Petroleum Remediation Project Managers”
June 8-9, 2010
San Diego, CA 92101

LUST Technical Training Workshop
“Tools for Petroleum Remediation Project Managers”

Tuesday, June 8, 2010

Welcome and Opening Remarks Session

ASTSWMO: Jeff Kuhn, MT DEQ, ASTSWMO LUST Task Force Chair

EPA OUST: Adam Klinger, Director, Implementation Division, EPA OUST

Vapor Intrusion Session

Moderated by: Jeff Kuhn, MT

This session will cover the latest developments in the appropriate evaluation of the petroleum vapor intrusion exposure pathway.

The Vapor Intrusion Risk Pathway: Regulatory Updates and Practical Strategies for Assessing the Pathway

Presenter: Blayne Hartman, Hartman Environmental Geoscience

Vapor intrusion has continued to be the environmental box-office blockbuster in 2010. EPA-OSWER is attempting to upgrade their 2002 vapor intrusion guidance with even tighter requirements, many States have released their own guidances, and the ASTM vapor intrusion standard was released in March 2008. The primary ramification of all these guidances is that more and more sites will require assessment of the vapor intrusion pathway. Assessment of the pathway is complicated due to inconsistent and contradictory regulations, ultra-low screening levels, inexperience throughout the environmental community, and legal liability. The keys to effective vapor intrusion assessments are selecting the proper assessment approach, determining the correct screening levels, sample & analyze correctly and efficiently, know when and how to use supplemental assessment tools, and to know how to demonstrate bioattenuation at petroleum hydrocarbon sites.

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Studies of Subsurface Petroleum Hydrocarbon Vapor Bioattenuation

Presenter: Robin Davis, UT DEQ

Studies show that petroleum hydrocarbon vapors in the subsurface are readily degraded aerobically by natural biological processes when sufficient thickness of clean, uncontaminated soil is present. Clean soil contains the necessary oxygen to support naturally-occurring aerobic microbes that biodegrade petroleum hydrocarbons. Subsequently, the characteristics of petroleum vapor biodegradation and attenuation are well-understood and predictable.

This presentation shows the importance of collecting basic site-specific data and formulating a conceptual site model for evaluating the petroleum vapor intrusion pathway, and how to apply screening methods and criteria to avoid unnecessary vapor intrusion investigations.

The BioVapor Model is a useful screening tool for determining if vapor intrusion to overlying buildings is likely to occur and if vapor intrusion investigations may be necessary. Screening criteria for excluding sites from vapor intrusion investigations are based on a careful analysis of well-characterized sites in the Petroleum Vapor Database.

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Status Update on PVI

Presenter: Matt Young, USEPA OUST

This presentation provides a status update for the work that EPA's Office of Underground Storage Tanks (OUST) is doing in regards to the development of guidance on Petroleum Vapor Intrusion. The motivation for this guidance is that EPA's Office of Solid Waste and Emergency Response's Draft 2002 Vapor Intrusion Guidance does not address petroleum hydrocarbons from RCRA Subtitle I underground storage tank sites. This presentation lays out the elements that OUST is currently considering to include within the guidance along with a time line and some of the processes that OUST will use to further develop the guidance.

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PVI vs. CVI

Presenter: Michael Lowry, RTI International

This presentation describes fundamental differences between the behavior of petroleum versus chlorinated chemicals in the unsaturated zone and the associated influence on risks due to vapor intrusion. The presentation summarizes an upcoming information paper from EPA's Office of Underground Storage Tanks entitled "How is Petroleum Vapor Intrusion Different from Chlorinated Solvent Vapor Intrusion". Petroleum chemicals in the unsaturated zone biodegrade readily in most situations. In fact, natural biodegradation can prevent petroleum vapor intrusion in many cases. The presentation discusses the underlying science and empirical evidence for petroleum biodegradation, conditions with greater potential for petroleum vapor intrusion, as well as implications for site investigation and screening.

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Luncheon Session

Introduced by: Jeff Kuhn, MT

Biofuel Release at Vandenberg Air Force Base, CA

Speaker: Doug MacKay, UC Davis

Unintentional spills of ethanol-gasoline blends introduce new contaminants to the subsurface but may also affect those left from prior spills of other fuel blends, including fuels containing MTBE. In this talk we will review what is known about the behavior of

ethanol-gasoline blends in the subsurface, and review key results of a field experiment conducted to evaluate the impact of ethanol on the biodegradation in groundwater of BTEX species and pre-existing MTBE contamination. We will discuss some implications of extrapolating from the small-scale experimental results to more practical scales. We will then outline what the primary potential risks from gasohol spills now appear to be, while also highlighting some gaps in our current understanding.

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LUST Project Management Topical Areas 1-2

Moderated by: Jeff Kuhn, MT

1) Site Characterization and Fuel Composition Session

There has been much recent discussion involving the release of gasoline containing ethanol compounds, especially the biological breakdown of ethanol after train car derailments. Is this a real problem that LUST project managers should anticipate seeing as a future groundwater contaminant? What compounds should project managers evaluate?

Fuel Composition and its Impacts on Site Characterization

Presenter: Jim Weaver, EPA ORD

The composition of leaked fuels is one of the drivers of subsurface contamination from LUST sites. Fuel composition varies because of geographic, technical and regulatory factors. The major regulatory factor for LUST sites is the distinction between reformulated and conventional gasoline, created by the Clean Air Act Amendments of 1990. For both types of gasoline oxygenate and benzene concentrations were specified. Change happens and ethanol replaced ethers first because of state, then because of federal laws. Benzene itself will be further limited in 2011 by the Mobile Source Air Toxics Rule. Lurking in the background were lead scavengers, which were a necessary part of leaded gasoline, and have proven persistent in ground water. This problem points to an aspect of composition that has not been intensively investigated, namely additives. As a starting point, an example of behavior of two additives and their potential for generating water and soil gas impacts will be presented.

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2) LNAPL Assessment and Remediation Practices Session

This session will include a discussion involving the “State of the Science” for removal of free product to the “maximum extent practicable”. Recent results from the ITRC and ASTM LNAPL Workgroups will be presented and discussed.

"LNAPL Transmissivity as a Metric: The Future in Tracking LNAPL Recovery Progress"

Presenter: Paul Cho, CA

The rate at which a volume of LNAPL will flow through a unit width of porous material for a unit gradient is termed LNAPL transmissivity. A discussion of the physical and chemical conditions that affect LNAPL well thickness and why it can be misleading for determining its occurrence and movement.

- Review and elaborate on perched and confined LNAPL conditions
- LNAPL thickness in wells – while it is need to know info but why it is useless as an LNAPL metric
- What is LNAPL transmissivity?
- How can you measure LNAPL transmissivity?
- Why is LNAPL transmissivity a good metric for tracking LNAPL recovery progress?

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The ITRC LNAPL Paradigm Shift and Remediation/Closure of LUST Sites with LNAPL

Presenter: John Menatti, UT

The assessment and remediation of sites contaminated with light non-aqueous phase liquids (LNAPLs), such as gasoline, diesel fuel, and motor oil, is difficult and expensive. U.S. EPA regulation CFR 40, Section 280.64 states that LUST owner/operators *remove free product (LNAPL) to the maximum extent practicable as determined by the implementing agency (State/local regulator)*.

In 2009, the Interstate Technology & Regulatory Council (ITRC) LNAPL Team published two documents to assist State/local regulators and consultants with the assessment and remediation of LNAPL.

1. Technology Overview, *Evaluating Natural Source Zone Depletion at Sites with LNAPL*, April 2009.
2. Technical/Regulatory Guidance, *Evaluating LNAPL Remedial Technologies for Achieving Project Goals*, December 2009.

As these documents were being developed, the ITRC LNAPL Team surveyed the States to determine how they defined removal of free product to the maximum extent practicable. The responses varied from “removal of all petroleum to pre-spill conditions” to “removal to a sheen” to “removal to a 1/8-inch thickness in monitor wells” to “removal to a site-specific/risk-based level.” New York responded that they require removal of all petroleum to pre-spill conditions and that they have not adopted a risk-based corrective action (RBCA) approach. However, they went on to say that this requirement was actually a “goal” that few sites actually meet, and that many sites are closed despite the fact that the goal has not been achieved. Utah’s policy is removal to 1/8-inch and is a RBCA State, however, Utah has never closed a site with LNAPL. California State Water Resources Control Board Resolution 92-49 has been interpreted to mean that LUST sites can be closed if the required level of water quality will be attained within a reasonable period of time. California has closed several sites with LNAPL.

This presentation will provide an overview of the ITRC LNAPL documents, present remediation methods for LNAPL, and discuss how sites with free product (LNAPL) may be meeting the spirit of 40CFR280.64 and are being closed, or not being closed, by the implementing agencies.

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LUST Project Management Topical Area 3 Session

Moderated by: Jeff Kuhn, MT

3) Remedial Site Optimization (RSO) Session

The optimization of engineered remediation systems will be discussed in this session: How often do systems need to be optimized? How much does optimization cost? How do you evaluate a remediation system for maximum optimization? Is your system just making noise? In addition, evaluating subsurface characterization to effectively optimize remediation efforts will be discussed along with application case studies and other best management practices.

Remediation System Optimization – Minimizing O&M Duration through Proper Design and Implementation

Presenter: Charles Blanchard, GES

Effective system optimization can reduce a remediation system's life-cycle by several years, resulting in expedited clean-up and significant cost savings. System optimization decisions must be made during remediation system design, as well as during operation and maintenance (O&M) activities. Evaluation of the performance of hundreds of remediation systems has allowed the development of more effective system design and O&M procedures and practices. These lessons learned help define the optimal remediation equipment and instrumentation, improve remediation system up-time, guide information collection in the field, and allow proactive optimization of remediation systems.

Soil vapor extraction (SVE) is a commonly utilized remedial technology in our industry (e.g air sparging/SVE, groundwater pumping with SVE, and total-phase vacuum extraction) and is one of the best available technologies for volatile organic compound (VOC) mass recovery. Unfortunately pilot testing data is frequently not analyzed properly resulting in poor recovery well placement and lengthy remediation. Advanced SVE pilot testing data analysis techniques will be discussed with an emphasis on quantifying remedial rates. Examples will also be given on how to manually and automatically optimize SVE systems to maximize mass recovery while minimizing the project life cycle.

Additional topics will include, combining remedial technologies to reduce the remedial life-cycle, effective data evaluation to allow for system adjustments, data management to ensure optimization, and utilizing visual/modeling tools to help make optimization improvements.

Examples will be provided to illustrate how effective optimization efforts can reduce the duration of remediation system O&M, as well as the overall cost of remediation efforts. Remediation system tracking tools and evaluation methods/procedures that are available to assist with system optimization efforts will be presented.

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Open Forum/Town Hall Meeting

Moderated by: Fred McGarry, NH

This session will provide attendees an opportunity to discuss any issues affecting their State/Territorial LUST program, find out what other States are doing on a particular issue and discuss other topics by submitting questions. Note cards will be distributed to all attendees in their meeting packets and will also be available at the ASTSWMO Registration table. All note cards must be submitted back to the registration table by the conclusion of the luncheon session on June 8, 2010.

Wednesday, June 9, 2010

LUST Project Management Topical Area 3 (continued)

Moderated by: Stephen Reuter, NM

3) Remedial Site Optimization (RSO) Session (Continued from Day One)

Remediation Optimization by Finding Missed Residual Mass with SOURCE LOCATOR

Presenter: Edward Tung, MK Environmental Inc.

Despite the small size of many retail gasoline stations, many remediation systems have missed source mass outside, above, below and in between the recovery wells. Continued operation without modifications that extend the capture zone produce prolonged periods of ineffective operation without ever reaching the remedial goals. One of two costly events occur, the system operates ineffectively for several years while removing very little mass even with high uptimes or an incomplete understanding of the true problem leads to pursuing alternative remedies.

SOURCE LOCATOR applies principles of NAPL dissolution to convert the readily available groundwater and water elevation data into three dimensional residual source representations. SOURCE LOCATOR, in conjunction with several other modeling and data analysis techniques provide State Regulators and consultants an independent third party evaluation of the site and remediation system. These methods originally developed, rigorously tested and verified with field investigations with millions of dollars and several years on Superfund and other large petroleum sites have been adapted to apply to small retail gasoline stations at cost less than a typical soil investigation. Application of

SOURCE LOCATOR at over every site studied with an extended cleanup (>3.5 years) clearly identified a missed a portion of the source as the root cause. System optimization shifts from squeezing extra pounds of recovery to identifying if or why a remediation has a critical flaw of missing a portion of the source that results in years of ineffective cleanup and failure to reach remedial goals. The presentation primarily provides case studies of several underground storage tank sites that employed the SOURCE LOCATOR.

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A Regulator's View of Remediation Optimization

Presenter: Dorothy Malaier, AL

Underground Storage Tank releases have posed significant challenges to UST regulators over the years due to the large number of projects that most regulators must oversee. The challenges presented in regulating a large number of facilities at any given time have resulted in a number of streamlining measures in the assessment of sites. Now that more sites are under remediation, ensuring that a remedial approach is undertaken to provide for a cleanup in a cost efficient and timely manner can be one of the greatest challenges a regulator may face. Questioning remediation results and determining if remediation is being performed to reach cleanup endpoints is becoming a greater part of a regulator's workday. Do you require the tank owner to modify the existing remediation system, or switch to a new technology? A discussion of several UST sites and the approaches taken to enhance the remedial efforts will be discussed during this session.

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Green Remediation at Tank Sites

Presenter: Stephen Reuter, NM

Green Remediation is an initiative from U.S. EPA OUST that comes to underground storage tanks by way of other RCRA programs, notably Superfund. Applying Green Remediation to sites at the scale of a typical gasoline retail station poses unique challenges and affords a project manager many opportunities for creative site management. This session will focus on the application of Green Remediation strategies at the retail gasoline station scale. The session will demonstrate that Green Remediation strategies equate to site optimization through the application of a series of best management practices that not only optimize remediation efforts, but maximize use of ever-dwindling fiscal resources.

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LUST Project Management Topical Area 4

Moderated by: Stephen Reuter, NM

4) Petroleum Brownfields Case Incidents Session

In this session, Petroleum Brownfields success stories will be examined from a policy perspective, as well as a discussion will take place of successful Brownfields Corridor Revitalization Projects.

Overcoming Obstacles for Redevelopment of Petroleum Brownfields and Other Vacant Properties

Presenter: Sandra Nichols, Environmental Law Institute

Nationwide, federal and State brownfields programs are striving to assess, clean up, and redevelop brownfields and vacant properties. Even with a recent increase in available funding, implementation challenges continue to inhibit the success of these programs. In particular, petroleum brownfields have lagged behind their hazardous waste counterparts in terms of the attention received and the degree of revitalization that has taken place, as illustrated by corrective action backlogs. Some recent state policy developments and public-private partnership initiatives represent the way forward to a world where redeveloped formerly-abandoned and contaminated properties are the anchor for newly revitalized communities.

Through a cooperative agreement with EPA, the Environmental Law Institute (ELI) is educating critical state decision- and policy-makers on how they can adopt these successful strategies. *Overcoming Barriers to Redevelopment of Petroleum Brownfields and Other Vacant Properties* is a project to promote the cleanup and sustainable redevelopment of vacant properties by evaluating existing state-level strategies, identifying policy and implementation gaps and barriers, and conducting education and outreach on successful strategies and lessons learned. By identifying the legal underpinnings to successful initiatives such as the Selma to Montgomery National Historic Trail corridor redevelopment initiative and Genesee County, Michigan's land bank ELI is developing a set of recommended approaches for brownfields redevelopment.

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Petroleum Brownfields Sites: What's Working?

Presenter: Gary Lynn, NH

The redevelopment of petroleum brownfields sites presents a variety of challenges and potential rewards to State petroleum remediation programs. This presentation will highlight approaches that have successfully been used to identify and redevelop brownfields sites. A number of successful projects will be discussed including the use of stimulus funding to resolve a "stuck" bank foreclosure of a local country store and gas station.

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Open Forum/Town Hall Meeting

Moderated by: Stephen Reuter, NM

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