

# Superfund and Technology Liaison (STL) Report



# 2007–2008

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## DISCLAIMER

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# Mission Statement

**T**he mission of the national Superfund and Technology Liaison Program (STL Program) is to facilitate the sound use of science and technology in decision-making for hazardous waste programs to enhance protection of human health and the environment.

### **The Superfund and Technology Liaisons (STLs) accomplish this mission by:**

- Providing general and site-specific technical support to the Superfund, Resource Conservation and Recovery Act (RCRA), and Brownfields Programs.
- Managing general and site-specific technical support through the Environmental Protection Agency's (EPA's) Office of Research and Development (ORD) Technical Support Centers (TSCs) and other Agency sources of expertise.
- Working with regional staff and ORD to facilitate the planning and implementation of ORD's research program to ensure support for the highest priority hazardous waste issues.
- Facilitating technology and information transfer by:
  - Planning and conducting training and conferences
  - Publishing technical information
  - Spearheading technical workshops and forums on emerging topics related to hazardous waste.
- Bringing innovative technologies and enhanced, cost-effective methods to hazardous waste cleanups.
- Serving as liaisons for the Office of Solid Waste and Emergency Response (OSWER)-related homeland security research.

# MESSAGE FROM FRED HAUCHMAN

I am pleased to present the ORD STL Program's latest report, covering activities for 2007–2008. This report tells a compelling and important story of technical support, collaboration, and partnership in science. Across EPA's 10 regional offices, the STLs represent a dedicated group of individuals whose knowledge and experience is as diverse as the geographic regions they serve.

Since 1990, the STL Program has played a critical role in assisting the regional Superfund and RCRA programs with technical support from ORD labs and ensuring the effective transfer of ORD research results to address high-priority, waste-related regional science needs. The STLs are one of the important links between the regions and the expertise of ORD labs. The STLs work to ensure that EPA science is applied in regional waste cleanup projects through the connection of ORD researchers with regional staff, and through the ORD TSCs. Having these ORD staff “on the ground” also provides real-world input to ORD for future research needs. The STLs develop and lead collaborative networks and partnerships not only within the Agency, but also with non-EPA groups, including other Federal agencies, states, academia, and industry. These collaborative research efforts are accomplished through such programs as the Federal Remediation Technologies Roundtable, National Institute of Environmental Health Science's (NIEHS's) Superfund Basic Research Program, the Interstate Technology Regulatory Council, the Society of Environmental Toxicology and Chemistry, the Department of Defense, the Department of Energy (DOE), and universities.

One of the most important tasks of STLs is to assist Remedial Project Managers (RPMs) in the regional Superfund programs with technical support that will help them make scientifically defensible decisions during their site cleanup work. STLs also plan and execute many national and international technical conferences covering waste-related issues. This report highlights some of these important roles.

Science provides the foundation for credible decision-making. The STL Program facilitates the use of ORD's scientific research in the regions. This report represents ORD's commitment to reducing risks to human health and ecosystems through applied science, technical support, knowledge sharing, and collaboration that the STLs consistently provide to EPA regional offices.

# INTRODUCTION

The STL Program is managed by ORD's Office of Science Policy (OSP). It consists of one STL located in each region, and is supported by a small headquarters staff in OSP. OSP's regional program emphasizes network building and partnerships between regional and ORD scientists, the effective transfer of research results on high-priority regional science issues, and outreach to states. See [www.epa.gov/osp/regions.htm](http://www.epa.gov/osp/regions.htm) for additional information about OSP's regional program.

The STL Program began in the early 1990s in response to a growing need expressed by EPA regional offices and OSWER for ORD technical expertise in the regions. A reliable source of technical support was needed to deal with complex scientific and technical problems encountered in remedial and removal activities for Superfund sites. ORD TSCs and the STL Program were created to meet this need for the Agency, which was greatly burdened by the growing number of new Superfund sites.

The STL Program became part of the Superfund Program's Technical Support Project (TSP), an effort sponsored by OSWER to ensure scientifically sound remedial decision-making. In later years, through a split-funding arrangement, the STL Program was able to apply the provision of technical support to hazardous waste sites under the RCRA and the Brownfields programs. The STL Program was re-named the Hazardous Substances Technical Liaison Program to reflect the expanded role relative to hazardous waste sites, and in 2007 it was re-named again as the STL Program to recognize an enhanced role in transferring information to the regions concerning new and emerging environmental technologies.

This report provides snapshots of STL Program activities during the years of 2007–2008, showcasing the variety of forms of assistance and ORD science products transferred by the STLs to regional office waste programs.

# SITE-SPECIFIC TECHNICAL SUPPORT

## Pine Street Canal Support

### The Problem

The presence of non-aqueous phase liquid (NAPL) at a site provides particular clean-up challenges, because NAPL contaminates soil and groundwater and is very difficult to remove. The characterization and control of NAPL is one of the most difficult challenges in Superfund clean-up work. At the Pine Street Canal Superfund Site in Burlington, Vermont, NAPL is found beneath the canal and adjacent wetlands and is causing contamination of sediments and surface water. ORD is assisting in the characterization and evaluation of remedy modifications at the site.

### Background

Pine Street Canal is adjacent and hydraulically connected to Lake Champlain. Around 1908, a facility to manufacture gas from coal (known as a manufactured gas plant, or MGP) began operating on Pine Street, southeast of the canal. The Burlington plant ceased operations in 1966. The MGP directly discharged or disposed of residual oil (coal tar), wastewater, and wood chips saturated with organic compounds into the Pine Street Canal and associated wetlands. Beginning in the 1960s, coal tar/NAPL was detected seeping from the wetland into the Pine Street Canal. In 1998, EPA issued a Record of Decision specifying a remedy for the site. One element of the selected remedy was the construction of a sand cap on the contaminated sediments in portions of the canal and the adjacent wetlands.

The canal was dewatered and a cap constructed during the 2002–2003 winter season (Figure 1) in order to isolate the contaminants from surface water and benthic fauna. The cap has been generally protective of human health and the environment; however, there is a limited area where an ongoing release of coal tar occurs through the cap into canal water. These releases are known to occur as distinct globules that accumulate on the cap and rise to the surface creating “coal tar sheens.” Gas-generated bubbles facilitate transport of coal tar to the surface (Figure 2).



Figure 1: Installation of isolation cap at the Pine Street Canal Site.

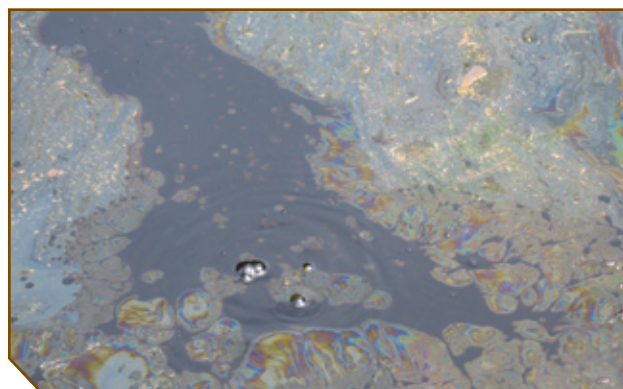


Figure 2: Gases bubble through NAPL-contaminated canal water.

### Requested Support

Coal tar/NAPL movement through the sand cap was not expected. NAPL advection and gas-bubble ebullition were likely mechanisms for contaminant migration and required additional investigations at the site. The precise locations and rate of releases became subjects of additional field work. EPA Region 1, the State of Vermont, and the parties performing the cleanup have been working to determine the nature of the ongoing releases and to evaluate potential NAPL controls. Region 1 RPM Karen Lumino requested assistance from ORD through the Region 1 STL and from EPA’s Groundwater TSC, the Robert S. Kerr Environmental Research Laboratory in Ada, Oklahoma. ORD scientists brought their knowledge of characterization and remediation to support this effort, which resulted in a better understanding of the site stratigraphy, 3-dimensional distribution of NAPL, NAPL release mechanisms, and behavior of NAPL within sediments.

The STL and TSC staff worked with Region 1 to devise a comprehensive investigation work plan, critically review the findings of the field work, revise the site conceptual model, and evaluate methods to address the ongoing NAPL releases. ORD staff also provided the region with oversight during the field investigations for a wide range of activities such as sediment coring, diving work, and use of an innovative tool that uses a laser to measure the distribution of coal tar in the sub-surface. It is expected that additional remedial measures will be implemented in 2009.

## Environmental Photographic and Interpretation Center Coordination

The Environmental Photographic Interpretation Center (EPIC), an ORD TSC, provides a wide range of remote sensing and aerial photographic analyses to EPA staff in support of environmental investigations. This includes aerial photo over flights, collateral data acquisition, aerial film processing, historical aerial photo search and acquisition, and geographic information system (GIS) database development. Also provided are specialized analyses, such as wetlands classification and delineation, photo-geology, fracture trace analysis, and photogrammetric mapping.

Typically, regional waste program staff coordinate with the STL in their region regarding technical support services and products available through EPIC for specific sites. After review and analysis, STLs arrange for technical support from EPIC. Below are examples of EPIC technical support that STLs have coordinated.



*Region 3 STL Bill Hagel reviews an EPIC report with host supervisor Paul Leonard.*



*Example of an EPIC report photo with interpretation (AMCO Chemical Site in Oakland, CA).*

### Jackson Ceramix Site in Falls Creek, Pennsylvania

China was manufactured and painted at the Jackson Ceramix Site in Pennsylvania for over 60 years. Lead-contaminated wastewater was discharged into an unlined drainage ditch and lagoon at the site, which then drained into a wetland. EPIC conducted an over flight of the site using a thermal infrared scanner to help detect the pattern of surface water flow through contaminated wetlands. The over flight report also included a wetlands mapping assessment to define the boundary of the wetlands.

### ReSolve Site in Massachusetts and SRS in Connecticut

The ReSolve Site in Massachusetts is a former waste chemical reclamation facility, which handled a variety of hazardous waste materials over several decades. The Solvents Recovery Service Site in Connecticut was a hazardous waste treatment and storage facility. At these Superfund sites, historical air photos provided by EPIC revealed what and where past waste management activities had occurred. These practices included drum storage and surface impoundments, which were interpreted as possible locations where free-phase solvents (i.e., NAPL) could enter the sub-surface, resulting in significant soil contamination and long-term groundwater contamination. Such data are used to focus more cost-effective characterization and ultimately, remediation activities.

# GENERAL TECHNICAL SUPPORT

## Conferences, Workshops

### **National Forum on Vapor Intrusion Philadelphia, Pennsylvania January 12–13, 2009**

Vapor intrusion (VI) is defined as vapor phase migration of volatile organic and/or inorganic compounds into occupied buildings from underlying contaminated groundwater and/or soil. Until recently, this transport pathway was not routinely considered in RCRA, CERCLA, or underground storage tank (UST) investigations. Therefore, the number of buildings or homes where VI has occurred or is occurring is unknown. However, considering the vast number of current and former industrial, commercial, and waste processing facilities in the United States that are capable of causing volatile organic or inorganic groundwater or soil contamination, contaminant exposure via VI could pose a significant risk to public health. Also, consideration of this transport pathway may necessitate a review of remedial decisions at RCRA and CERCLA sites as well as implementation of risk-reduction technologies at Brownfield sites where future development and subsequent potential exposure may occur.

Recognizing the importance of this issue, STLs Bill Hagel (Region 3) and Michael Gill (Region 9) developed a proposal for extramural funding to hold a forum on VI science, technology, and policy, which was held in Philadelphia on January 12–13, 2009, covering a dual track that highlighted community stakeholder and government issues. The VI Forum agenda included a plenary session with four speakers; technical sessions covering VI sampling and assessment, risk assessment, and engineering and site development; two breakout sessions (one for community stakeholders and one for government program issues); and a series of VI case studies. The forum was the largest gathering of government and community stakeholders brought together to specifically present and discuss VI issues. The forum resulted in a greater understanding of the state-of-the-practice for dealing with VI problems throughout the country. The information provided stakeholders with better tools and a broader understanding of how to address VI issues at the local level. Proceedings of the forum are available at the following link: [http://www.epa.gov/OSP/presentations/viforum09/vi\\_proceedings.pdf](http://www.epa.gov/OSP/presentations/viforum09/vi_proceedings.pdf).

### **The Central and Eastern European Conference on Health and the Environment: The Environment, a Platform for Health Cluj-Napoca, Romania October 19–22, 2008**

This conference represented the third biennial series organized by STL John Barich, Texas A&M University, and NIEHS. The conference series is organized around having environmental health scientists and risk management professionals explore the application of their respective research in solving health and environment problems of common interest in North America and Europe. The emphasis of the series is on integrative research and translating science for environmental decision-makers and the public. The conference emphasized sustainable mining (including mine site remediation, environmental protection for operating mines, and mine closure), risk assessment and management, and environmental health (including children's health, environmental air pollution epidemiology, and environmental genetics). Because mining remains an integral part of our modern-day society's needs, establishing more sustainable practices is critical to ensuring that today's mining sites do not become tomorrow's Superfund cleanup sites. Babes-Bolyai University was the host institute for this conference, which was attended by 230 scientists from 25 countries. Proceedings are scheduled for publication in 2009 and will be available at the following website: <http://www.ceeche.org>.

### **International Environmental Nanotechnology Conference: Applications and Implications Chicago, Illinois October 7–9, 2008**

Nanoparticles are compounds whose size ranges from 1 to 100 nanometers and which have large surface areas relative to their size. The use of nanoparticles has skyrocketed in recent years due to their unique characteristics. Their use has been advantageous in many sectors (e.g., medicine, automotive, sporting equipment, etc.), yet there also may be potentially negative impacts to human health and the environment. Some studies show that these impacts may involve inhalation effects similar to those from asbestos-containing materials. Presently, there is no regulation that specifically addresses nanoparticles. In recent years, ORD has invested in studying nanotechnology and in early 2007 published a Nanotechnology White Paper on its potential uses and impacts.

Also in 2007, the STLs were able to secure extramural funding to hold an international conference that provided a survey of both the environmental applications and implications of nanotechnology. The International Environmental Nanotechnology Conference, co-sponsored by OSP, was considered a huge success, as it drew researchers from around the world to present the latest in research and development in the field of nanotechnology as it relates to environmental issues. The conference was led by Region 5 STL Charles Maurice, Warren Lane (Region 5), and Regions 2 and 9 STLs Jon Josephs and Michael Gill as session co-chairs. This conference drew 185 people from five continents. The speakers were from government, non-governmental organizations, and private entities. Being a truly collaborative effort, many agencies played a part in the success of the conference, including NIEHS, DOE, U.S. Navy, University of Illinois School of Public Health, National Science Foundation, U.S. Army, and the Agency for Toxic Substances and Disease Registry. The sessions included talks on soil, sediment, and groundwater remediation, water pollution control, monitoring and sensing, toxicity, air pollution control, and fate and transport.

Environmental professionals, including a number of RPMs who attended the conference, walked away with a better appreciation for the potential environmental applications of nanotechnology that might assist with Superfund site cleanups, and also learned about those issues that may drive some of the next generation of Superfund sites as a result of spills. The program and other related materials, including speaker manuscripts and bios, are currently available on the following website: <http://emsus.com/nanotechconf/index.htm>. The proceedings will be available in mid-2009.

### **National Homeland Security Research Center Workshop Philadelphia, Pennsylvania July 9–10, 2008**

Bill Hagel, the STL in Region 3, organized, developed, and hosted a workshop for the ORD/ National Homeland Security Research Center (NHSRC) entitled, “The Science and Technology Behind Our Homeland Security Responsibilities.” The workshop was held in the Region 3 Philadelphia office on July 9–10, 2008.

The major goal of this workshop was to present the latest research efforts, expertise, and technology development within NHSRC. Another objective was to strengthen the understanding and communication between NHSRC and Region 3 and other interested stakeholders (such as states, response organizations, and water utilities). Close to 100 people participated in the workshop—either attending in person at the EPA Region 3 office in Philadelphia, via videoconference at the Ft. Meade Science Center, or through a webinar set up through the EPA portal. The workshop focused on four major categories of topics related to homeland security:

- Role of laboratories
- Emergency response
- Water security
- Risk assessment and clean-up goal.

The workshop successfully conveyed new and updated EPA ORD information to regional stakeholders and practitioners who have homeland security responsibilities within their organizations. Disseminating current information is essential for these professionals to understand what tools and products are available, or will be available, through EPA that can help them to perform their duties at the Federal, state, and local levels more effectively.

### **Environmental Sensing Symposium Boise, Idaho October 25–26, 2007**

John Barich, the STL in Region 10, sponsored the Environmental Sensing Symposium in Boise, Idaho, on October 25–26, 2007. Other sponsors included the Boise State Center for Environmental Sensing and the Inland Northwest Research Alliance. The focus of this meeting was on the development of new sensor technology and the use of sensors and sensor systems to acquire information about the movement of nutrients, water, contaminants, and chemical and biological threats in the environment. The availability and use of these sensors makes site characterization and monitoring considerably more efficient and accurate. Such advances in technology and the sharing of information about them allow RPMs and researchers to save time and receive more accurate readings on site conditions. Papers submitted by presenters were published in peer-reviewed proceedings and are available at: <http://ces.boisestate.edu/Attachments/INRA%20ESS%202007%20Proceedings2.pdf>.



**Desert Remedial Action  
Technologies Workshop  
Phoenix, Arizona  
October 2–4, 2007**

Sub-surface conditions in the southwestern deserts of the United States are different from most parts of the country. Annual rainfall is very low and groundwater may be hundreds of feet below the surface, which makes the groundwater resources more important to protect. Common remediation processes may therefore not be as effective in this type of environment. In response to these issues, Region 9 and ORD put together a workshop to help educate others on the cleanup challenges that exist in this part of the country.

Region 9 STL Michael Gill sponsored the Desert Remedial Action Technologies (D-RAT) Workshop, held in Phoenix, Arizona, on October 2–4, 2007. The 2-day workshop was co-sponsored by the Arizona Department of Environmental Quality and corporate sponsors CH2MHill and Arcadis. Approximately 115 people attended the workshop. This was the first EPA-sponsored workshop to focus on remedial technologies being successfully applied in desert environments. The program emphasized field applications and case studies for technologies being applied to volatile organic compounds in the sub-surface, specifically trichloroethylene, as well as perchlorate and chromium in desert environments. The focus was on *in-situ* technologies. Poster presentations and a field trip to the PGA North Superfund Site located in Goodyear, Arizona, were also part of this workshop. The workshop resulted in a better understanding of potential remedies for sites in arid climates.

The D-RAT Workshop was a green workshop, with no printed materials provided. Abstracts were available on the website prior to the workshop, and presentation materials and papers are now available on line as well. The presentations and papers can be found at the following link: [http://www.epa.gov/osp/presentations/drat/D-RAT\\_Workshop\\_Proceedings\\_\(Oct\\_2-4,\\_07\).pdf](http://www.epa.gov/osp/presentations/drat/D-RAT_Workshop_Proceedings_(Oct_2-4,_07).pdf).

**Ohio River Valley Brownfields Conference  
Louisville, Kentucky  
October 1–3, 2007**

The Ohio River Valley Brownfields Conference was a joint effort between the Region 4 and 5 Brownfields programs to provide state, local, and community groups along the Ohio River Valley with information on remediation and re-use of industrial areas. Felicia Barnett, the Region 4 STL, and Ann Vega, Revitalization Research Program Manager at the National Risk Management Research Laboratory, ORD, gave a presentation on SMARTe, the ORD Brownfields Support Tool. This tool can be particularly useful to communities when planning Brownfields re-development projects. The conference was well attended with 300+ participants, and feedback was positive. A summary report is available for interested parties by contacting Matt Robbins, Program Advisor, RCRA Division, Region 4, at [robbins.matt@epa.gov](mailto:robbins.matt@epa.gov).

**Clandestine Methamphetamine Training for  
Brownfields/Community Groups  
Atlanta, Georgia  
April 24, 2007**

In late 2005, the Brownfields Program announced that Congress had made properties contaminated by controlled substances such as methamphetamine eligible for Brownfields funding. Brownfields assessment grants can be used to post warnings, assess the extent of contamination, and assure proper cleanup. In FY07, Region 4 STL Felicia Barnett assisted ORD in document reviews on methamphetamine information, and she provided training and information for communities on clandestine methamphetamine labs at a number of Brownfields grant meetings in FY08.

In cooperation with the Georgia Tech Research Institute and Region 4, a training video for environmental cleanup of methamphetamine sites was developed, taped, and placed on EPA's internal Region 4 website (only available within EPA): <http://r4intranet.epa.gov/waste/videos/methlabs.htm>. The video is linked on EPA's Pharmaceuticals and Personal Care Products page.

The following links contain information on clandestine methamphetamine labs. This list was given to the local representatives and communities during STL presentations on Brownfields technical support.

- <http://www.gameth.com>
- <http://www.health.state.mn.us/divs/eh/meth/lab/labcleanup.html#guidance>
- <http://www.cdphe.state.co.us/hm/methlab.htm>



*This is a methamphetamine lab on a dressing table in a bedroom. The photo is from the South Dakota Department of Environment and Natural Resources.*

- <http://www.doh.wa.gov/phepr/handbook/meth.htm>
- <http://www.doh.wa.gov/ehts/CDL/MethFS.htm>
- <http://www.doh.wa.gov/ehts/CDL/default.htm>
- <http://www.doh.wa.gov/ehts/CDL/methhazards.htm>
- <http://state.tn.us/environment/dor/meth/>
- <http://www.idph.state.il.us/envhealth/factsheets/meth-labs.htm>
- <http://www.idph.state.il.us/envhealth/factsheets/meth-cleanup.htm>
- <http://www.epi.state.nc.us/epi/oii/pdf/methguidelines042005.pdf>

By sending training information out to a broad EPA audience, the STL was able to assist in effectively and efficiently addressing sites contaminated with methamphetamine and its production. This type of technical support on emerging contamination issues is another critical role that STLs play when assisting their regional offices with remediation projects.

### **NATO Advanced Research Workshop on Decision Support for Natural Disasters and Intentional Threats to Water Security Dubrovnik, Croatia April 22–25, 2007**

STL John Barich coordinated a North Atlantic Treaty Organization Advanced Research Workshop that was attended by scientists from 17 countries. The goal of the workshop was to explore the relationship of decision support and environmental informatics as complementary tools to improve water security. Objectives included the evaluation of lessons learned from recent natural disasters (hurricanes, tsunamis, etc.) and the delineation of how the use of state-of-the-science tools improves water security in relation to natural disasters and intentional threats. Technical and policy papers were presented on: (1) catastrophic events such as the 2004 South Asian tsunami, hurricane Katrina, and chronic

threats of floods; (2) anthropogenic threats to water security—either intentional, such as a terrorist threat, or unintended, such as an unwanted consequence of economic or cultural activity; and (3) decision support tools. Workshop proceedings are available in a 280-page publication, *Decision Support for Natural Disasters and Intentional Threats to Water Security*, Illangasekare, T., Mahutova, K., and Barich, J. (Eds.), Springer Academic Publishers (ISBN: 978-90-481-2712-2).

### **Metals Fate and Transport Modeling Workshop Denver, Colorado February 13–14, 2007**

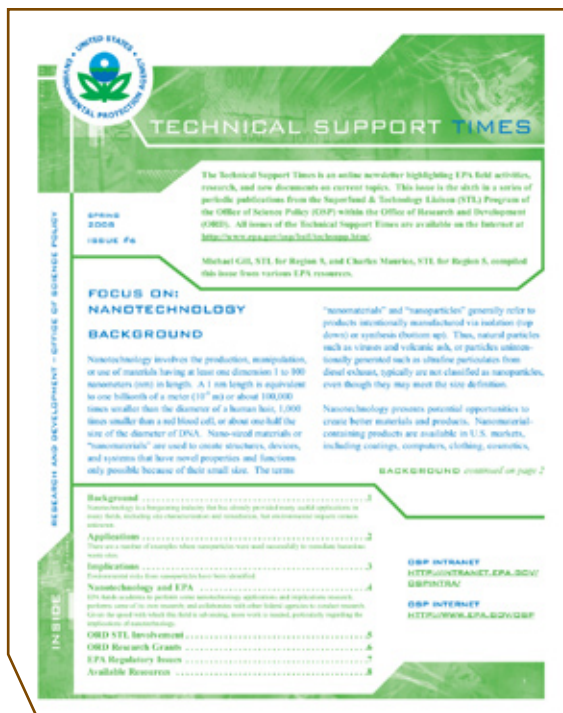
In February 2007, former Region 8 STL Brian Caruso coordinated and hosted a 2-day workshop entitled, “Metals Fate and Transport Modeling.” The workshop brought together experts from across the country and abroad to discuss state-of-the-practice methods for modeling metals fate and transport, data gaps in knowledge, and future directions in metals modeling. Because there are over 100,000 abandoned or inactive mining sites across the United States encompassing over 500,000 acres of land, metals leaching from these mines can create potentially detrimental human health and ecological situations. It is therefore critical to understand and predict how metals behave in different environmental situations, so that we can better determine where the problem areas will be and the impacts the metals will have. This workshop focused on modeling metals in streams, rivers, and watersheds, with particular interest paid to high-altitude watersheds impacted by mining wastes. High-altitude watersheds contaminated by abandoned mine wastes are of significant concern in the Rocky Mountain states of Region 8, where historic metals mining contributed substantially to the early economy.

Workshop participants included experts from government, academia, and consulting. The workshop was motivated by EPA’s recognition of the need for a review and synthesis of available metals modeling tools that can be used to support efforts on Superfund site investigation and remediation, abandoned mine reclamation, total maximum daily load analyses, and other projects involving metals-impacted areas and watershed and stream restoration. Outcomes from the workshop included a paper by EPA and U.S. Geological Survey (USGS) on hydrological processes and a follow-on project to revise and enhance a model for predicting water quality at mining sites after remedial action occurs. This model is being revised by EPA and USGS based upon discussions and comments from workshop participants, and will be available with user-friendly instructions upon completion.

# STL Technical Support Times Newsletter

## Update from 2004–2006 Report

The STL Program publishes the *Technical Support Times* newsletter to highlight timely technical issues of interest to EPA regions and OSWER. The periodic newsletter is written by STLs based upon their expertise or on the technical support they have provided or coordinated, and incorporates information about ORD research in the topical area. Since 2006, the *Technical Support Times* has addressed optimization of Superfund pump and treat sites in Region 3, nanotechnology for site remediation, and evaluation of waste material for beneficial use. This outreach tool is a valuable resource for regions and OSWER on technical support and research being conducted by ORD on issues related to hazardous substance remediation. Issues of *Technical Support Times* can be found on the EPA website at <http://www.epa.gov/osp/hstl/techsupp.htm>.



## Other Outreach and Collaboration Activities

### SMARTe/Brownfields Support

Several STLs have been the regional contacts for ORD's Regional and Local Land Revitalization Planning Team (previously the ORD Brownfields Workgroup) and the U.S.–German Bilateral Working Group. These groups have worked together to develop, promote, and provide support for SMARTe, the Sustainable Management Approaches and Revitalization Tool—electronic. SMARTe is a national support tool designed to assist land revitalization stakeholders in their decision-making process.

The STL Program provided regional input to research activities related to Brownfields and in the development of SMARTe. Region 5 STL Charles Maurice provided his expertise to assist with the development of risk assessment components of SMARTe by providing multiple peer review iterations, commenting on content, breadth of coverage, presentation, and user friendliness.

Region 4 STL Felicia Barnett has been a liaison for SMARTe beta test sites, and the STL Program has also supported stakeholder training by giving a number of SMARTe/Brownfields support presentations at meetings that included community, state, and local officials. These presentations and exhibits included the National Association of Development Organizations conferences in multiple regions, the Wildlife Habitat Council's Restoring Greenspace Conference in Atlanta, Georgia, EPA's

Region 4, 2007 Brownfields Grantee Workshop, the Region 4/State/Tribal Brownfields Meeting, and the Region 4 and 5 Ohio River Valley Brownfields Conference in Louisville, Kentucky.

SMARTe was used extensively by the Stella, Missouri, community to assist them in planning and implementing redevelopment of Brownfields areas in their town. Their successful use of this tool is just one example of the valuable resources that SMARTe provides to local community planners. More information can be found at: <http://www.epa.gov/ord/NRMRL/news/news072008.html>.

### Technology Performance Evaluation: Stabilization/Solidification

The Superfund Program has over 1,000 construction completions and a substantial amount of post-construction monitoring and results from 5-year reviews. The performances of individual remedy components, such as soil treatment, are not well-documented outside the administrative record for individual sites because collective reviews have not been performed on many older, commonly used technologies. It was therefore determined that a comprehensive evaluation of soil treatment would be of great use to the regions and ORD. Since the STLs and the Engineering Technical Support Center (ETSC) provide technical assistance to the regions on soil remediation treatment processes and technologies, both groups have an overall

perspective on technology evaluation. They agreed to collaborate on developing an evaluation of the frequently implemented soil treatment remediation of stabilization/solidification.

In 2007, the STL Program and ETSC jointly funded a technology review paper on stabilization/solidification. The purpose of this review was to compare analyses completed prior to remediation, with site and soil characterization and post-remediation data. This information, along with actual cost data, allows regional managers to determine which technologies are most appropriate for use at their sites. As an additional resource, this performance document provides contact information for personnel who have applied given technologies at their sites, thereby providing another valuable tool for knowledge transfer. In FY08, material was extracted from the above resources and developed into a publication and web-based technology review for quick and easy viewing. The finalized document will be available in 2009 at the following link: <http://www.epa.gov/nrmrl/lrpd/r/etsc/index.html>.

## Energy Calculator

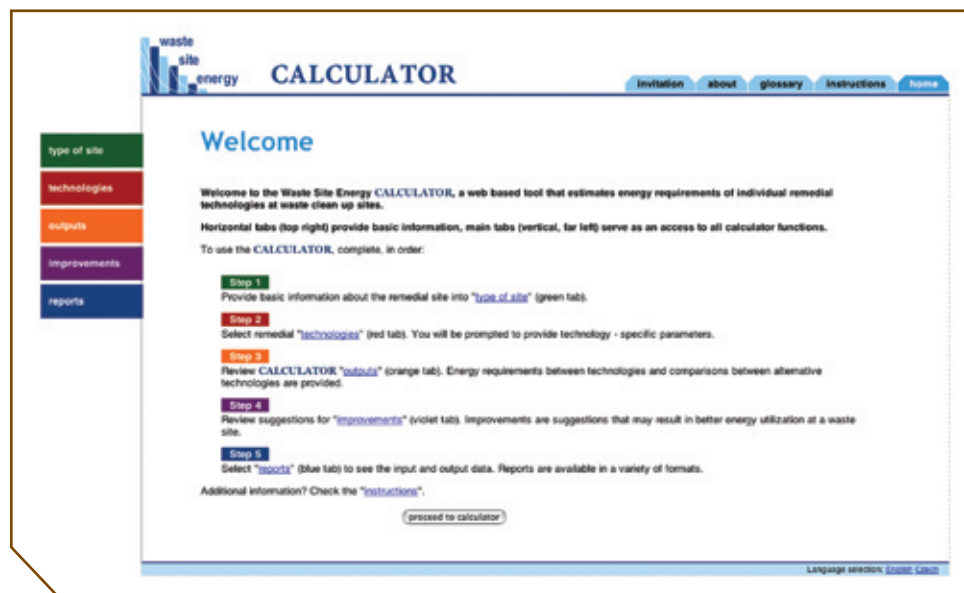
Green remediation—the cleanup of Superfund sites in a more sustainable manner—is currently a hot topic. However, the process of more sustainable site cleanups was practiced long before it was considered “green remediation.” Energy has long been a consideration in the cost-benefit analysis of site cleanup, and now, with constantly fluctuating energy costs and the popularity of carbon counting, the use of energy calculators has become prevalent.

In 2003–2004, EPA and the Northwest Pollution Prevention Resource Center developed a web-based calculator to evaluate energy requirements for a limited number of soil remedies that are commonly used at Superfund and RCRA sites. The eight models present energy requirements in both traditional terms and as environmental/sustainability equivalents (e.g., global warming potential, acres of trees/carbon sequestration potential, autos off road, and home energy). The calculator provides a link between Superfund/Brownfields and sustainability/energy issues.

One of ORD’s partners who assisted with the development of the original calculator is Masaryk University in the Czech Republic, which has 40,000 students and is the second largest university in the Czech Republic (<http://www.muni.cz/general/about>).

In the summer of 2008, STLs Mike Gill and John Barich assisted the Office of Superfund Remediation and Technology Innovation in a review and expansion of the original calculator. The STL Program, through its extramural projects funding, provided partial financial support. Final products from this work and recommendations for future actions will be available by mid-2009.

Although not yet released for public use due to incomplete quality assurance (QA) efforts, the current version of the calculator can be found at <http://iris.fi.muni.cz/calculator>. The plan is to complete the QA effort and expand the calculator to include some groundwater remediation technologies before its public release. The technologies will



Example screenshot from unreleased energy calculator.

be chosen by an advisory group, which includes members of the TSP forums and others. Students from Masaryk University will also be involved in contributing informatics. The work is being funded by OSWER and ORD. When completed, the calculator will be a simple online tool that Superfund decision-makers can use to determine whether energy use is a critical factor in selecting a remedy at their sites.

### **The Region 2 Harbor Project**

Region 2 STL Jon Josephs participated in a unique project initiated by Region 2 entitled, "Industrial Ecology, Pollution Prevention and the New York/New Jersey Harbor" (or "Harbor Project"). Region 2 proposed the Harbor Project to the New York Academy of Sciences (NYAS), which agreed to manage it. NYAS was viewed as being scientifically objective and therefore, was able to bring diverse stakeholders together. In addition to EPA, many other stakeholders signed on as co-sponsors of the Harbor Project.

STL Josephs was asked to assist with the development of a draft Harbor Project report on "Pollution Prevention and Management Strategies for Dioxins in the New York/New Jersey Harbor." He met with NYAS staff and consortium members and assisted Professor Donna Fennell of Rutgers University, who was compiling data for a mass balance report on dioxins entering and leaving the harbor. The STL also served as a liaison to obtain input from Region 2 Superfund representatives and facilitated input from ORD staff members active in EPA's dioxin re-assessment efforts. STL Josephs' expertise was a valuable addition to the report on dioxins, as were his coordination efforts to engage EPA's involvement in the process.

In addition to the dioxin report, the Harbor Project prepared similar reports for other harbor pollutants. The Harbor Project successfully concluded its work on April 3, 2008, with a workshop at NYAS. Among the speakers at the workshop were New York City Mayor Michael Bloomberg, the EPA Regional Administrator, Alan J. Steinberg, and EPA Deputy Regional Administrator, Kathy Callahan.

Extensive information about the Harbor Project is available from the following website: <http://www.nyas.org/programs/harbor.asp>. Harbor Project reports can be downloaded or ordered from the following link, free of charge: [http://www.nyas.org/programs/harbor\\_materials.asp](http://www.nyas.org/programs/harbor_materials.asp). The most recent of the reports, the Safe Harbor Report, released in January 2008, describes the methodology applied by the Harbor Project and provides a summary of the major findings, recommendations, and accomplishments.

### **Costa Rica Underground Storage Tank Program Support**

In the spring of 2007, Region 4 sent a small group of UST representatives to Costa Rica to aid its government in understanding issues associated with USTs. Region 4 STL Felicia Barnett provided UST representatives with advice, assistance, and guidance documents regarding the chemistry and toxicity of gasoline and gasoline additives. This information was used in presentations at the National University of Costa Rica and in writing the final report to the International Atomic Energy Commission (IAEC) regarding groundwater pollution that threatens the population in San Jose, Costa Rica. It was shared with the scientists and engineers in Costa Rica and members of the IAEC in Vienna, Austria. Following this effort to investigate and share information about USTs, the Government of Costa Rica closed 22 gasoline stations that posed a threat to human health and the environment. This type of international information exchange is a critical process for expediting cleanup projects around the globe.

### **STL Involvement with Cross-Regional Groups**

The STLs' involvement with cross-regional technical groups is an essential part of their role to assist regional staff in obtaining the best scientific and technical information and to support decisions relative to waste site cleanup. STLs participate in a wide variety of technical and risk assessment forums. These include OSRTI-sponsored groundwater, engineering, Federal facilities, national sediment, ecological risk assessment, and risk assessment teleconferences for Superfund forums as well as the Office of the Science Advisor-sponsored risk assessment forum. Further, STLs work on group projects, particularly technical issue papers, with members of these forums.

STLs are often on the local regional science council of their respective regions and participate in special technical workgroups looking for solutions to difficult issues of concern to the region. STLs also serve on committees to review and approve proposals for funding from the Regional Applied Research Effort (RARE) Program and Regional Methods Program (<http://www.epa.gov/osp/regions/rm.htm>).

Currently, STLs are involved with technical workgroups and networks of regional and headquarters staff on such issues as nanotechnology, contaminated sediments, landfill covers, energy usage relative to remediation, phytoremediation, VI, and biofuels.

# SITE CHARACTERIZATION AND MONITORING TECHNICAL SUPPORT CENTER MANAGEMENT

## Short History and Accomplishments of the TSC

On October 1, 2007, the Site Characterization and Monitoring Technical Support Center (SCMTSC) changed operations from the National Exposure Research Laboratory (NERL), Environmental Sciences Division (ESD) in Las Vegas to the STL Program of ORD's OSP. The SCMTSC is supported by a contract with Lockheed Martin, an Interagency Agreement (IAG) with DOE's Idaho National Laboratory (INL), and NERL-ESD technical staff.

Felicia Barnett, STL in Region 4, is the new SCMTSC Director and Task Order Manager (TOM) for the Lockheed-Martin support contract, and Region 3 STL Bill Hagel is the Alternate TOM. Region 10 STL John Barich and Region 8 STL Kathleen Graham have served as the Project Officers for the INL IAG.

The SCMTSC provides support on sampling and monitoring-related issues. Specifically, the technical focus of the SCMTSC includes soil-gas measurements, special analytical services, GIS and data interpretation, site characterization technologies (e.g., field portable X-ray fluorescence), fingerprinting of wastes, geophysics, quality assurance, geostatistics, and statistical design/analysis. The SCMTSC is also responsible for the development, management, and support of ProUCL, a statistical software program available to Federal, state, and public project managers at <http://www.epa.gov/nerlesd1/tsc/software.htm>. ProUCL addresses statistical issues arising in exposure and risk assessment studies, background evaluations, and background versus site comparison applications. It includes statistical methods to estimate exposure point concentration terms, not-to-exceed, and background threshold values for data sets with non-detect and without non-detect observations.

The SCMTSC Director receives requests for technical support from individual STLs on behalf of their regional waste program staff. Each STL works with their regional staff to determine to what extent ORD can best handle their technical support needs, including individual support, laboratory staff, contracts, or other agency agreements. The requests can be long- or short-term, depending on need.

In FY08, the SCMTSC received over 100 short-term requests, including requests for phone consultations with experts on statistics or sampling/analysis issues and over 60 requests for usage support for ProUCL. The SCMTSC also performed 49 long-term tasks for 26 sites in seven regions and EPA headquarters. These tasks included statistical reviews/plans, asbestos sampler training, and development of complex site sampling and monitoring plans. Three examples are given below.

### **Fluidized-Bed Soil Segregator/Sampler for Asbestos in Mines**

Asbestos is a naturally occurring, fibrous, silicate mineral mined for its useful properties, including thermal insulation, chemical and thermal stability, and high-tensile strength. Asbestos is commonly used as an acoustics insulator, and in thermal insulation, fire proofing, and other building materials. Many products in use today contain asbestos. Asbestos is made up of microscopic bundles of fibers that may become airborne when asbestos-containing materials are damaged or disturbed. When these fibers get into the air, they may be inhaled into the lungs, where they can cause significant health problems.

EPA currently assesses risk for asbestos remaining in soil at remediated sites by performing activity-based sampling. This method employs workers wearing protective gear and air sampling equipment while performing various tasks. The potential for asbestos liberation (and subsequent risk) is then evaluated by the amount of asbestos captured by the air sampling filters. While this method provides a realistic basis for evaluating potential risk, it is time-consuming and expensive. The goal of this project was to develop a device that could simulate different types of activity and provide a means to evaluate risk without the expense of activity-based sampling.

Researchers at the INL have developed a field-deployable fluidized-bed segregator/sampler for separation and collection of releasable fine particulate and asbestos fibers from soil samples.

The segregator is also capable of simulating different activity levels for comparison with activity-based sampling data. Developmental work on the sampler continued throughout 2007 and was completed in September 2008. Multi-regional and national training on use of the sampler occurred during the spring and summer of 2008.

Region 10 STL John Barich managed the development of this asbestos sampler from a number of EPA entities. The funded work included related training, development of a standard operating procedure, plus confirmation sample preparation for the asbestos sampler. The funding was obtained through the SCMTSC, as well as from the RARE Program (<http://www.epa.gov/osp/regions/rare.htm>), OSWER, and a Region 10 IAG.

### **Hanlin-Allied-Olin Site Region 3 Statistical Sampling Plan Reviews**

Region 3 needed a review of the Bayesian statistical analysis plan submitted to the RPM for soil sampling at the Hanlin-Allied-Olin Superfund Site to determine if the use of Bayesian statistics was a reasonable approach. In December 2007, the SCMTSC utilized Lockheed-Martin support to evaluate the sampling plan, which concluded that the proposed Bayesian approach was an acceptable approach, but there were concerns with the accuracy and adequacy of the prior information that could affect the use of statistical analysis. Those concerns would need to be addressed to meet the region's standards before the final analysis.

There were uncertainties associated with the estimates of the sample sizes. It was further recommended that simulation experiments be performed to demonstrate the appropriateness of the proposed Bayesian approach based upon regression models on estimated statistics. It was also recommended that alternative approaches such as kriging be evaluated.

After the evaluations, the remediation contractor developed a Bayesian statistical approach. In mid-2008, the SCMTSC provided the RPM with an evaluation of the report and comments to be addressed. The SCMTSC has been available throughout the reviews and responses to discuss issues and clarify comments.

### **Barite Hill Mine Site Region 4 Remote Mine Monitoring System**

The Barite Hill Mine Site is currently undergoing a removal action that includes the installation of an evaporative cap over an approximate 250,000 cubic yard waste-rock dump that extends into an adjacent 10-acre acid mine drainage-filled pit lake. The pit lake is being treated using lime neutralization and carbon loading. Region 4 staff members are currently monitoring the pit lake reservoir at the site. Due to the dynamic nature of the Barite Hill Mine remediation effort (where there are dramatic changes in water pH and oxidation reduction potential), the change in reservoir water chemistry and precipitation of crystallites have caused many of the present sensor probes to give erroneous readings. These probes have been cleaned and replaced on



*Barite Mine Site. Acid drainage pit prior to remediation efforts. The pit is now used as a treatment area for acid drainage of the site.*



*Barite Mine Site. Acid removal and waste-rock cap construction.*

several occasions but continue to malfunction when used over an extended period of time. The region also needed to develop a monitoring system for the adjacent mine waste-rock fill, which will be capped.

Region 4 requested that the SCMTSC provide a remote monitoring system for the acid mine drainage and for the waste-rock cap monitoring. The design needed to incorporate the level of monitoring that would be required to evaluate the effectiveness of the cap's role in preventing the re-acidification of the pit lake over time.

The SCMTSC, through its agreement with DOE's INL, provided a design approach predicated on developing an integrated, autonomous, low-cost

system that includes geophysical, hydrological, and a self-calibrating general chemical sensor network backed by a secure integrated web-based data storage and retrieval software system. The system enables remote control and access to accessible and remote-inaccessible monitoring systems. A similar system was designed and implemented at the Gilt Edge Mine Site in South Dakota.

The new monitoring design has been reviewed and accepted by the region, and the SCMTSC will be aiding in its implementation in 2009. The SCMTSC also will be assisting with sensor modifications, which are necessary for ensuring system reliability under the harsh conditions, but that are not currently available from private sources.



*Barite Mine Site. Preparing the drainage area.*



*Barite Mine Site. Post-remediation with new cap, retaining wall, and lime-neutralized treatment pit. The remote monitoring system that SCMTSC/INL designed ensures that this treatment pit and cap are working properly and, if necessary, will detect issues so changes can be made, especially in this early stage while the vegetation on the cap takes hold.*

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