United States Environmental Protection Agency
Solid Waste and Emergency Response (5102G)
EPA 542-N-97-005
October 1997
Issue No. 27

EPA TECH TRENDS

CONTENTS

The Applied Technologies Newsletter for Superfund Removals & Remedial Actions & RCRA Corrective Action

ABOUT THIS ISSUE NEWS

This issue highlights the results of demonstrations of a number of innovative technologies and processes for site characterization at Superfund and other sites.

Overview of the Consortium for Site Characterization Technology

As a pilot under EPA's Environmental Technology Verification (ETV) Program, the Consortium for Site Characterization Technology (CSCT) was established to increase the application of innovative site characterization and monitoring technologies. The CSCT is one of 12 ETV pilots to verify the performance of innovative technical solutions to problems that threaten human health or the environment. The CSCT identifies, demonstrates, evaluates, verifies, and transfers information about innovative and alternative monitoring, measurement, and site characterization technologies through a defined process. As an ETV pilot, the CSCT uses a third-party verification organization to develop demonstration plans, conduct evaluations, and prepare technology evaluation reports. This pilot uses the U.S. Department of Energy (DOE) National Laboratories at Oak Ridge and Sandia.

The CSCT technology verification process begins with the identification of user needs expressed by the CSCT Board of Technology Users, EPA regions, states, and other verification organizations. Based on identified user needs, the CSCT determines the availability and appropriate level of development of needed technologies (all must be fully mature and commercially available), and invites qualifying vendors to attend technology-specific conferences. The CSCT reviews vendor proposals and selects qualified participants to work with the CSCT in developing test plans. Field testing is conducted at two sites, where "visitors' days" are held for the public to view on-site demonstrations of the selected technologies. Following field tests, the CSCT prepares a verification report and final report, including a formal EPA verification statement for use by the vendors and potential customers.

Technologies verified to date include the Site Characterization and Analysis Penetrometer System (SCAPS), the Rapid Optical Screening Tool (ROST™), and energy dispersive x-ray fluorescence (EDXRF). Two final reports, *The Site*

Consortium for Site Caracterization Technology

Process

- **Identify needs of user community**
- **Determine technology availability**
- **Determine appropriate level of development**
- **Invite qualifying vendors to vendor presentations**
- **Vendors submit simple proposals**
- **CSCT reviews proposals and selects vendors**
- **Interested vendors work with Verification Organization to develop test plans**
- **Conduct field tests - two sites**
- **Prepare/review verification report**
- **Issue final report/EPA Verification statement**
- **Conduct dissemination and outreach**

Characterization and Analysis Penetrometer System (SCAPS) Laser-Induced Fluorescence (LIF) Sensor and Support System (EPA/600/R-97/019) and *The Rapid Optical Screening Tool (ROST™) Laser-Induced Fluorescence (LIF) System for Screening of Petroleum Hydrocarbons in Subsurface Soils* (EPA/600/R-97/020), are available. The final report on EDXRF will be finalized later this year.

CSCT verification statements, reports, and other publications on site characterization technologies are available on the ETV and CLU-IN home pages. For more information, contact Dan Powell (EPA Technology Innovation Office) at 703-603-7196.

Energy Dispersive X-Ray Fluorescence for Expedited Site Characterization

by Roger Henderson, U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) has achieved considerable time and costs savings in site characterization by using a field-portable energy dispersive x-ray fluorescence (EDXRF) system in conjunction with a global positioning system (GPS). The combined system enabled the USACE to fully characterize both the vertical and horizontal extent of heavy metal contamination on eight firing ranges at the Presidio of San Francisco within five weeks, under a single field mobilization. In contrast, the USACE estimates that a typical site characterization approach using a fixed-based laboratory and traditional investigation methods would have required 2-3 field mobilizations spread out over 1.5 years. The USACE realized a cost savings of $50,000-75,000 by using the EDXRF/GPS approach.

Basic x-ray fluorescence analysis entails the bombardment of soil samples by an x-ray source, which results in an increased excitement of atoms in the sample. Each metal contained in the sample re-radiates x-rays of a unique wavelength, and these wavelength emissions are picked up by an x-ray detector. At Presidio, the USACE used the Spectrace 9000 to analyze multiple metals (lead, zinc, antimony, copper, and barium) in each sample. Developers of the Spectrace 9000 participated in a recent CSCT verification project on which final results will be issued later this year.

Field staff collected samples from a 40-ft. x 40-ft. sampling grid at selected locations based on information from historic maps, traditional range usages, and experience from other firing range sites, and located specific sample points through use of a portable GPS. The system produced quantitative analytical results within 20 minutes of sample receipt and immediately posted the results on computerized maps, which dictated the vertical and horizontal location of the following sample. This process complied with decision criteria requiring that each sample in which more than 400 mg/kg of lead were detected be followed by additional samples (each 1 foot deeper and 10-15 feet farther out than the previous) until levels fell to less than 400 mg/kg.

The USACE concluded this effort in record time, and collected and analyzed over 400 soil samples, which is far more sampling than would have been completed under traditional methods.

This iterative approach to site characterization, coupled with on-site real time analysis, provides distinct advantages over traditional methods, including its extreme flexibility for both sample collection and analysis. At the eight Presidio firing ranges, the USACE completed site characterization at a cost of approximately $77,000, while a traditional approach may have cost over $162,000. For more information on the use of EDXRF/GPS technology used at the Presidio, contact Roger Henderson (USACE, Sacramento District) at 916-557-5378.

The USACE is committed to informing, encouraging, and supporting the consideration and use of effective innovative technologies for environmental investigation and remediation. Since 1989, the USACE Innovative Technology Advocate Program has empowered USACE districts and divisions, laboratories, and the Hazardous, Toxic and Radioactive Waste Center of Expertise with direct responsibility for innovative technology development and application. During fiscal year 1997, the USACE conducted more than 250 innovative technology projects under this program. For more information on innovative technologies within the USACE, contact Innovative Technology Advocates Dr. Donna Kuroda at 202-761-4335, Johnette Schockley at 402-697-2558, or Jeff Breckenridge at 402-697-2577.

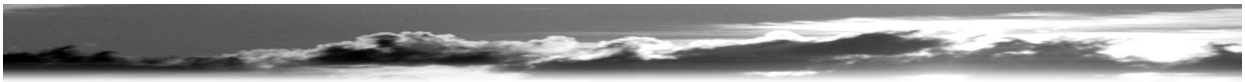
ETV/CSCT Program Solicitation

This fall, the ETV/CSCT will issue a technology needs statement on site characterization and monitoring for consideration in the 1998/1999 ETV/CSCT program. The ETV/CSCT program seeks to accelerate the development of environmental technology through objective verification and reporting of commercial-ready technologies. Twelve ETV pilots, including the CSCT's efforts, have been established or are being initiated; the ETV/CSCT currently is planning verification projects on sampling design software, field extraction, and sampling technologies during early 1998. Visit the CLU-IN home page to view this CSCT solicitation for vendor proposals, or contact Steve Billets (EPA's National Exposure Research Laboratory) at 702-798-2232. For more information on the ETV Program, visit the ETV home page at http://www.epa.gov/etv.

Expedited Site Characterization (ESC) at Soil Sites

by Albert Bevolo, Ph.D., Ames Laboratory

Conventional site characterization practice is typified by multiple field investigations managed and performed by various groups that focus on contaminant



distribution using off-site analytical services. The cost of this approach is high, because it can takes year to accomplish compared to expedited site characterization (ESC).

ESC is a proven methodology that utilizes in-field decision-making, a dynamic work plan, and real-time data acquisition and interpretation. ESC incorporates several key principles:

- an experienced, multidisciplinary core team of hands-on professionals that plans the project and manages the field investigations,
- a dynamic work plan that uses on-site data processing and interpretations by these senior technical experts to ensure effective decision-making,
- a Phase I that focuses on the hydrogeologic portion of the conceptual site model (CSM) and utilizes multiple methods, such as geophysical techniques, borehole logging, and direct push technologies (DPT), and
- a Phase II, which begins only after the hydrogeologic portion of the CSM is complete, that focuses on the chemical contaminant portion of the CSM.

Since 1993, the Ames Laboratory ESC team, supported by the DOE Office of Environmental Management (EM), has implemented soil and ground-water projects involving contaminants such as polycyclic aromatic hydrocarbons (PAHs), volatile organics, petroleum products, dense non-aqueous phase liquids (DNAPLs), pesticides, radioactive isotopes, and RCRA metals. The team's biggest success to date occurred at the Savannah River Site (SRS) D Area oil seepage basin assessment. This project involved 13 contaminants, an extensive hydrogeology investigation, three on-site laboratories, and a 14-day ground- water investigation, and resulted in regulatory acceptance of ESC. Based on these SRS results, DOE plans to use ESC for all future SRS site assessments, currently budgeted at $650,000,000.

The ASTM standard guide (PS 86-96) contains a comprehensive explanation of ESC. At several demonstration sites, ESC has resulted in cost savings of 30-50% and savings in time of 30-80%. Regulators are accepting ESC because of DOE's proactive, open strategy to involve them and ESC's demonstrated ability to move the cleanup ahead of schedule, while providing for improved data quality to support better remedial decisions.

Soil contamination was recently investigated at the DOE Central Nevada Test Area. Most of the surface structures had been decommissioned, but surface and subsurface drilling mud pits and shaker pads were left for assessment. A geophysical investigation used electromagnetic surface geophysical measurements, combined with percussive electrical conductivity probing, to optimize the sampling strategy. Depth-specific mud layers in covered pits and shaker debris runoff could be located. Total petroleum hydrocarbon (TPH) diesel and hexavalent chromium (Cr) were the contaminants of potential concern. Nearly 1,000 soil samples were taken with percussive DPT to depths of 20 feet in the sandy high-desert soils over a period of 22 days.

One mobile lab tracked TPH diesel using U.S. EPA Method 8015A. Early gas chromatography (GC) results indicated the presence of a motor oil component of TPH. Having senior decision-makers in the field made it easy to incorporate the additional measurements. Eight sites would have been misidentified as below regulatory concern without consideration of the TPH motor oil.

The second mobile lab tracked total Cr by flame atomic absorption and x-ray fluorescence and hexavalent Cr by wet chemistry. The latter techniques allowed a quick determination that eight sites with high total Cr were actually below the hexavalent Cr preliminary action level.

For additional information, contact Dr. Albert Bevolo (Ames Laboratory, Ames, IA) at 515-294-5414, 515-294-6963 (fax), or e-mail bevolo@ameslab.gov.

Calendar

Environmental Clean Up Technologies Conference: South Central Marketplace; **November 13-14, 1997; The Hotel Monteleone, New Orleans, LA; 800-783-3870, e-mail joann.m.saville@cpmx.saic.com, or the World Wide Web site http://www.clu-in.com.**

Superfund XVIII; **December 2-4, 1997; Sheraton Washington Hotel, Washington, DC; 301-593-5500 or the World Wide Web site http://www.ejkrause.com/enviroshows.**

Third Annual SERDP Symposium; **December 3-5, 1997; Washington Hilton Hotel, Washington, DC; 703-736-4548 or the World Wide Web site http://www.hgl.com/serdp.**

Bioavailability: Quantifying the Real Toxicity of Common Soil Contaminants; **December 11-12, 1997; Radisson Resort, Scottsdale, AZ; 508-481-6400, e-mail inq@ibcusa.com, or the World Wide Web site http://www.ibcusa.com/conf/bioavailability.**

Upcoming ETV/CSCT Visitors' Days

The ETV/CSCT will sponsor three visitors' days in various cities over the coming months. As an ETV pilot program, the CSCT focuses on increasing the use of innovative characterization technologies at contaminated sites. The upcoming visitors' days will focus on sampling design software, field extraction, and sampling technologies. Developers of commercially-ready, fully mature technologies in any of these areas are invited to contact Steve Billets (EPA's National Exposure Research Laboratory) at 702-798-2232 to inquire about submitting proposals and participating in the initial developers' conferences.

Resources

Road Map to Understanding Innovative Technology Options for Brownfields Investigation and Cleanup (PB97144810) and the companion *Tool Kit of Information Resources for Brownfields Investigation and Cleanup* (PB97144828) identify the range of technology options and EPA resources available to brownfields stakeholders. Full text of these documents is provided on the CLU-IN home page. Copies also may be obtained from the National Technical Information Service at 703-487-4650 for a cost of $25 and $35, respectively.

Vendor Field Analytical and Characterization Technologies System (Vendor FACTS), Version 3.0, is scheduled for release in November 1997. *Vendor FACTS* is a searchable, electronic "yellow-pages" of field analytical technologies. The *Vendor FACTS* database may be downloaded through the CLU-IN home page; for further information, contact the *Vendor FACTS* help line at 800-245-4505.

EPA's National Risk Management Research Laboratory (NRMRL) is developing site-specific engineering guides to assess and clean up brownfields sites. The guides will address three brownfields site types, as well as cost estimating techniques. For more information, contact Joan Colson (NRMRL) at 513 569-7501.

Tech Trends is on the NET!
View or download it from CLU-IN at:

WWW site:	http://clu-in.com
ftp site:	ftp://clu-in.com
telnet to BBS:	telnet://clu-in.epa.gov (or 134.67.99.13)

Tech Trends welcomes readers' comments and contributions. Address correspondence to:
Tech Trends,
8601 Georgia Avenue, Suite 500
Silver Spring, Maryland 20910

TechDirect

We now offer a new service-TechDirect-to keep you abreast of new EPA publications and events of interest to site remediation and site characterization professionals. Once a month, a TechDirect message will be sent via email describing new products and instructions on how to obtain them.

To subscribe:
- Send an e-mail message to "listserver@unixmail.rtpnc.epa.gov"
- Please do not include a subject line in your message; you may add a period "." if your mailserver requires an entry.
- The body of your message should say: *subscribe techdirect* firstname lastname
- TIP: Please have your Postmaster exclude "techdirect@unixmail.rtpnc.epa.gov" from your AutoResponder if you are using one.

United States Environmental Protection Agency | Solid Waste and Emergency Response (5102G) | EPA 542-N-97-005 October 1997 Issue No. 27

EPA

TECH TRENDS