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science in ACTION

BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

LAND RESEARCH PROGRAM

SITE CHARACTERIZATION: EPA LAYS THE GROUNDWORK

Issue

Gathering the right kind of information about a contaminated site is the essential first step in successful characterization and remediation. Site characterization includes identifying the source, type, concentration, and extent of the contamination. It calls for:

- Examining the history of the site
- Collecting and analyzing environmental samples from air, water, soil, and sediment, as well as samples in drums, tanks and other containers
- Interpreting and mapping data collected

Solving difficult site characterization problems requires innovative methods and techniques. This is particularly true at sites with multiple contaminants in a variety of environmental media. The Land Research Program in EPA's Office of Research and Development (ORD) provides the science and technology to restore contaminated properties which protects human health and the environment. The program conducts research in the following areas:

- Sampling and analytical methods
- Statistical software
- Monitoring and remediation technologies for mining sites
- Modeling, such as the oil spill dispersal model

Using the Land Research Program's research findings, site remediation managers are able to evaluate appropriate solutions for their sites.

Science Activity

The use of proper and effective sampling methods is essential for site characterization. It is from these collected samples and their subsequent analyses that decisions concerning whether to remediate a site will be made. Hence, it is crucial that the samples be collected in a manner that maintains the integrity of the contaminants present (i.e., that the contaminant concentrations do not change as a result of the sampling method, sample handling, or sample preservation techniques), and that the samples represent the conditions and contaminant distribution at the site.

Methods and techniques to accurately monitor vapor intrusion by reducing the error associated with soil gas sampling are being developed. The research is being done so that consistent measurement of soil gas concentrations can be made throughout the country and that the data obtained can be used to make correct decisions about vapor intrusion at Brownfield and Superfund sites.

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Also, methods to analyze sediments are being developed. For example, the Undisturbed Surface Sediment (USS) sampler enables users to collect thin layers of sediment of one centimeter for use in analyzing newly deposited sediment layers at a site.

Two key statistical software packages for site characterization have been developed: ProUCL 4.0 and SCOUT.

ProUCL 4.0 was written to support risk assessment and cleanup decisions at contaminated sites by providing site managers with the upper confidence limit to determine the attainment of cleanup standards. The SCOUT statistical software package goes many steps further than ProUCL 4.0 and includes robust statistical procedures and a geostatistical model for advanced statistical techniques that validate data used during site characterization as well as the ProUCL 4.0 software package.

Application and Impact

Analytical methods developed by the Land Research Program support improved cost-effectiveness, accuracy, and speed of analysis. For example, immunochemical and other bioanalytical methods allow rapid onsite characterization and monitoring of remediation, so real-time decisions can be made.

Site characterization and remediation often requires new scientific approaches and technology to address complex cleanup challenges. The science and technology developed by the Land Research Program are used by EPA, states, local communities, and property owners to assess, minimize, and manage the risks of hazardous waste contamination.

Research has improved the ability of Superfund program managers to:

- Identify contamination issues during site characterization
- Assess the best approaches to remediation
- Monitor the effectiveness of remediation over time

The research supports EPA's Office of Solid Waste and Emergency Response, which provides policy, guidance, and direction for EPA's solid waste and emergency response programs. The research also is used by those who are responsible for implementing regulations to dispose of hazardous waste and remediate contaminated sites.

REFERENCES

Site Characterization
http://www.epa.gov/ord/lrp/quickfinder/site-characterization.htm

ProUCL 4.0
http://www.epa.gov/nerlesd1/tsc/software.htm

SCOUT
http://www.epa.gov/esd//databases/scout/abstract.htm

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August 2008