

Workshop on the Application of Characterization and Remediation Technologies at Fractured Bedrock Sites

**Providence, RI
November 8, 2000**

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Director
Technology Innovation Office**

**U.S. Environmental
Protection Agency
Technology
Innovation Office**

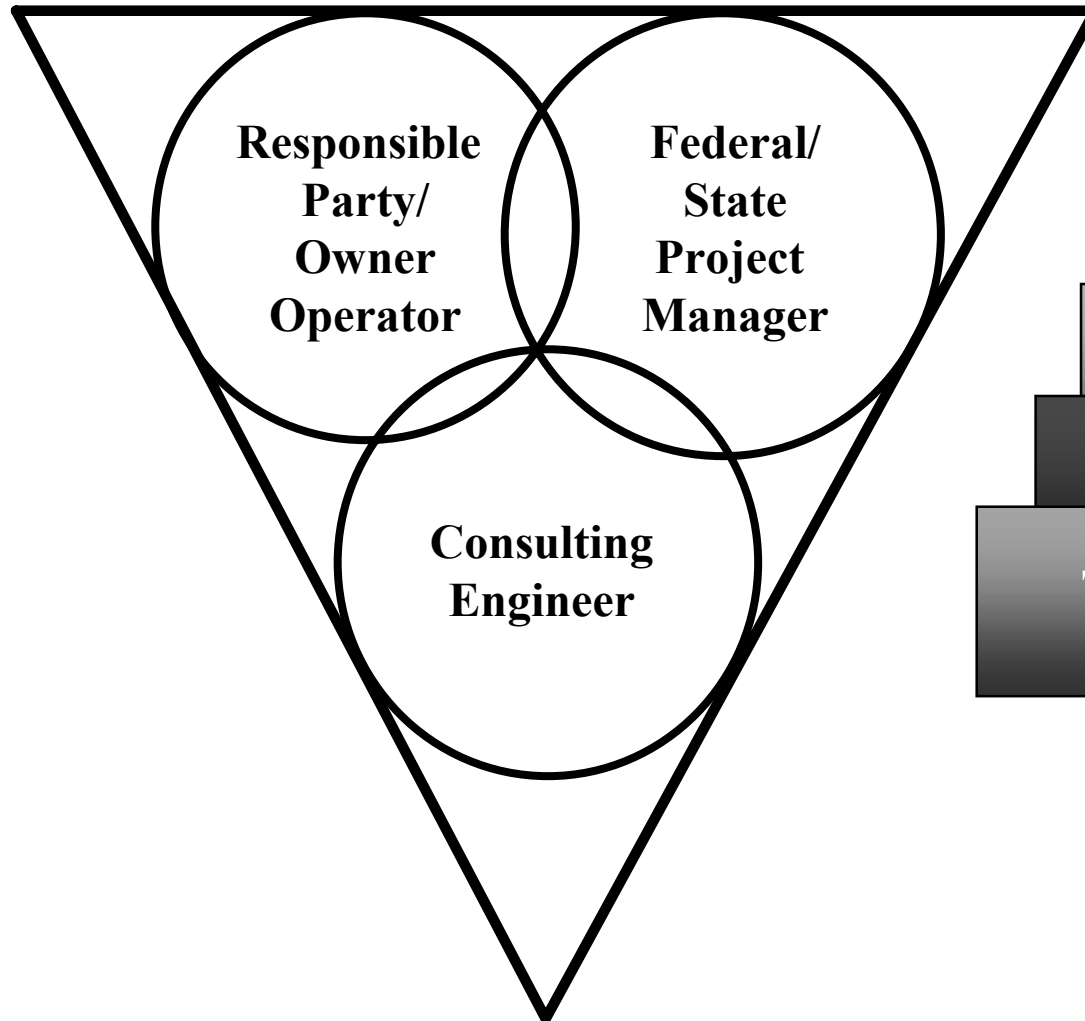
**Ontario Ministry of
the Environment
West Central Region**

**U.S. Department of
Energy
Office of Science &
Technology**

Technology Innovation Office

Clients for Information on Technology Innovations

Technology Vendor



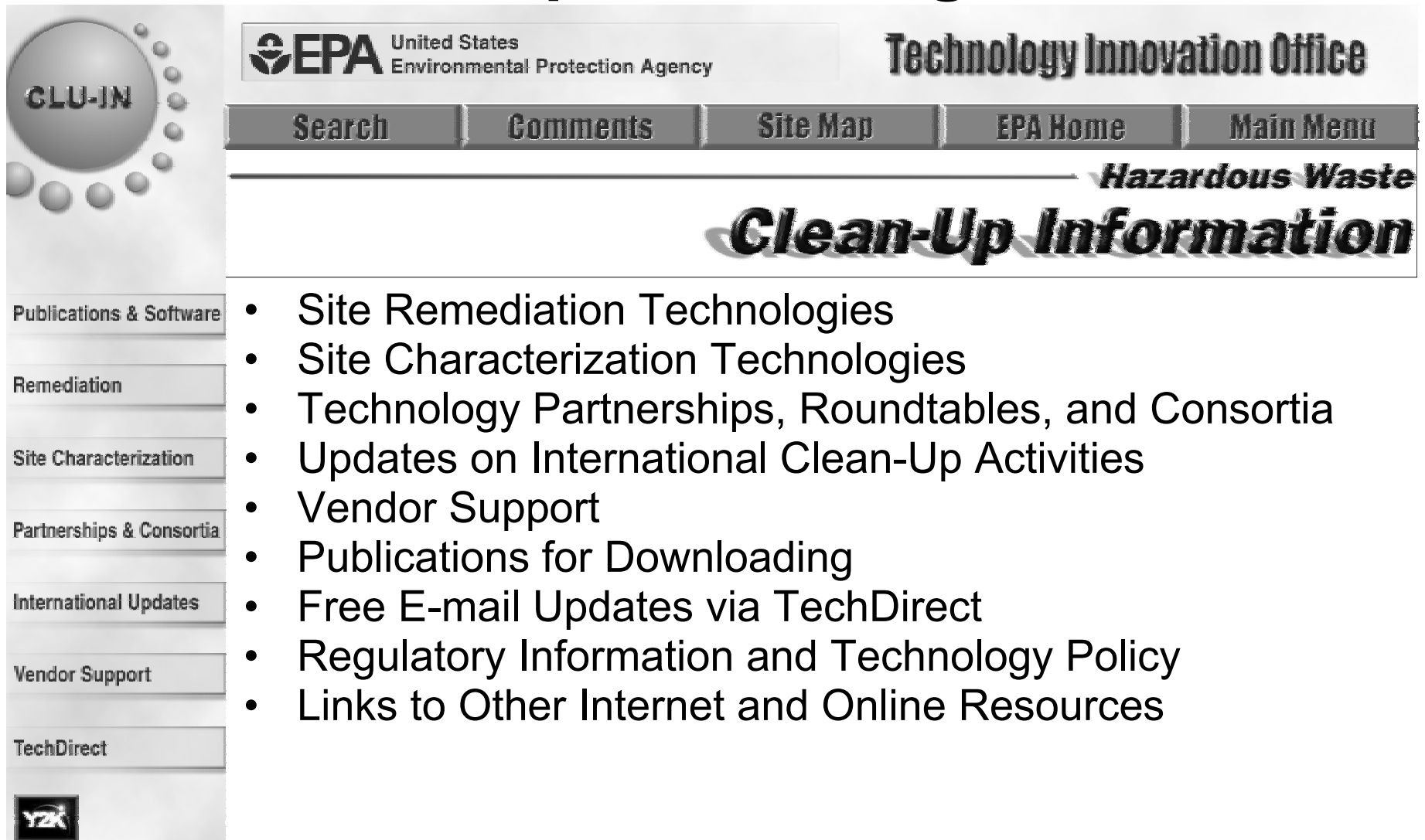
TIO's Mission

- Advocates “smarter” technologies for the characterization and cleanup of contaminated sites
- Works with clients to identify and understand better, faster, and cheaper options
- Seeks to identify and reduce barriers to the use of innovative technologies

CLU-IN World Wide Web Site

Expanding Electronic Availability through the Internet

<http://clu-in.org>



EPA United States Environmental Protection Agency

Technology Innovation Office

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**Hazardous Waste
Clean-Up Information**

- Site Remediation Technologies
- Site Characterization Technologies
- Technology Partnerships, Roundtables, and Consortia
- Updates on International Clean-Up Activities
- Vendor Support
- Publications for Downloading
- Free E-mail Updates via TechDirect
- Regulatory Information and Technology Policy
- Links to Other Internet and Online Resources

Publications & Software

Remediation


Site Characterization

Partnerships & Consortia

International Updates

Vendor Support

TechDirect



TechDirect

Technology Information Service

Highlights

- Broadcasts periodic e-mail messages to the list of over 9,200 subscribers.
- Highlights events of interest to site remediation and site assessment professionals.
- Describes new products and provides instructions on how to obtain them.

National Research Council Ranking Criteria for Difficulty in Remediating Ground Water

Hydrogeology	Mobile Dissolved (Degrades/ Volatilizes)	Mobile Dissolved	Strongly Sorbed, Dissolved	Strongly Sorbed, Dissolved (Degrades/ Volatilizes)	Separate Phase LNAPL	Separate Phase DNAPL
Homogeneous, Single Layer	1	1-2	2	2-3	2-3	3
Homogeneous, Multiple Layers	1	1-2	2	2-3	2-3	3
Heterogenous, Single Layer	2	2	3	3	3	4
Heterogenous, Multiple Layers	2	2	3	3	3	4
Fractured Bedrock	3	3	3	3	4	4

1 = least difficult, 4 = most difficult

Fractured Rock Remediation WebSite

<http://clu-in.org/fracrock>

- Opened July 1999
- Information on sites
- Bibliography
- Electronic presentations from
this workshop

Current Remedial Activities - Netscape

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Bookmarks Location: <http://clu-in.org/products/siteprof/iform.cfm> What's Related

Briefly describe the geology of this site.

Identify the major contaminants found at this site along with lateral and vertical extent of the plume.

Site Characterization Technologies-check those technologies presently used or those which will be used at this site. (check all that apply)

Borehole Geophysics

- Single Point Resistance
- Natural Gamma
- Caliper

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Site List - Netscape

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Bookmarks Location: <http://clu-in.org/products/siteprof/viewsites.cfm> What's Related

Remedial Technologies of Fractured Bedrock Sites

Site Name	Location
<u>Abilene PWS Site</u>	Abilene, KS
<u>Active Industrial Facility</u>	Clifton, NJ
<u>Beale AFB</u>	Maysville, CA
<u>Caldwell Trucking</u>	northern, NJ
<u>EPA site,</u>	Chester County, PA
<u>EPA site, Warminster, PA</u>	Warminster, PA
<u>Former CWML Site (Smithville PCB Site)</u>	Smithville, ON
<u>Former PVC manufacturing Facility</u>	Central , NJ
<u>Former Sterling Supply</u>	North Reading, MA
<u>Ft. Campbell</u>	Ft. Campbell, TN
<u>GE Gas Turbine</u>	Greenville, SC
<u>Industrial Facility</u>	Not Provided, SC
<u>Industrial Facility</u>	Wayne, NJ

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Display Site Detail - Netscape

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Bookmarks Location: <http://clu-in.org/products/siteprof/sitedtl.cfm?mid=38> What's Related

<p>Status:</p> <p>Conducted or Conducting Characterization Studies Pre-ROD</p> <p>Contact Information:</p> <p>Name: Peter Dao</p> <p>Address: 61 forsyth St. SW Atlanta GA 30303</p> <p>Phone: 404-562-8508</p> <p>Fax: 404-562-8518</p> <p>Email: Dao.peter@epa.gov</p>	<p>Geology:</p> <p>Clay residuum interspersed with limestone cherts down to 40. Below is weathered epikarst layer of limestone that undulate 10 to 20 feet, and below this layer is fractured bed rock with solutional cavities with aperture as big as 10 inches in diameter.</p> <p>Contaminants:</p> <p>Jet Fuel and solvent</p> <p>Selected Site Characterization Technologies:</p> <p>Borehole Physics Single Point Resistance Natural Gamma Fluid Logging Conductivity/Resistivity Surface Seismic Surveys Refraction Vertical Chemical Profiling: Cluster Wells Fracture Trace Analysis</p>
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Information on 24 Sites

Most Used Technologies

Characterization

- ✓ Chemical Profiling
- ✓ Coring
- ✓ Fluid Logging
- ✓ Conductivity/Resistivity

Remediation

- ✓ Pump and Treat
- ✓ Vapor Vacuum Extraction
- ✓ In-situ oxidation
- ✓ Fracturing

Planning Committee

- U.S. Dept. of Energy
- U.S. EPA
- Smithville Bedrock Remediation Program
- U.S. Geological Survey
- NY Dept. of Environmental Conservation
- United Technologies Corporation
- Du Pont Chemicals
- National Ground Water Association

Agenda

- Geophysical Characterization
- Physical and Chemical Characterization
- Remediation
- Evening Poster Session

Purpose of the Workshop

- Results of technology applications
- Technical problems
- Other barriers...

...in order to

***Document the current state of the
practice and***

Suggest research lines of inquiry

Getting Feedback

- Oral participation
- Questionnaires - by hand or electronically
- “Open mike” on web - kiosk or own computer
- Comments welcome through Nov. 16

The Report

What

- 15 – 20 Pages
- Published by sponsors in winter 2001

Who

- Technical Writer – Bernadette Conant
- Planning Committee oversight

The Report (cont.)

- ***To What End***
- Captures the fractured bedrock remediation “dilemma”
- Transmit to 25 US-Canadian-British research centers
- Clarify the “State-of-the-practice” for Fractured Rock 2001 in Toronto

<http://www.niagara.com/sp4/fr2001>



Fractured Rock 2001

March 26-28 - Royal York Hotel, Toronto, Canada

Top 10 Websites For Hazardous Waste Management

- 1. <http://clu-in.org> (or <http://www.epa.gov/tio>)**
- 2. <http://www.epareachit.org>**
- 3. <http://www.frtr.gov>**
- 4. <http://www.gwrtac.org>**
- 5. <http://www.rtdf.org>**
- 6. <http://www.epa.gov/ORD/SITE>**
- 7. <http://em-50.em.doe.gov>**
- 8. <http://www.itrcweb.org/>**
- 9. <http://www.serdp.org/research/research.html>**
- 10. <http://www.epa.gov/etv/>**