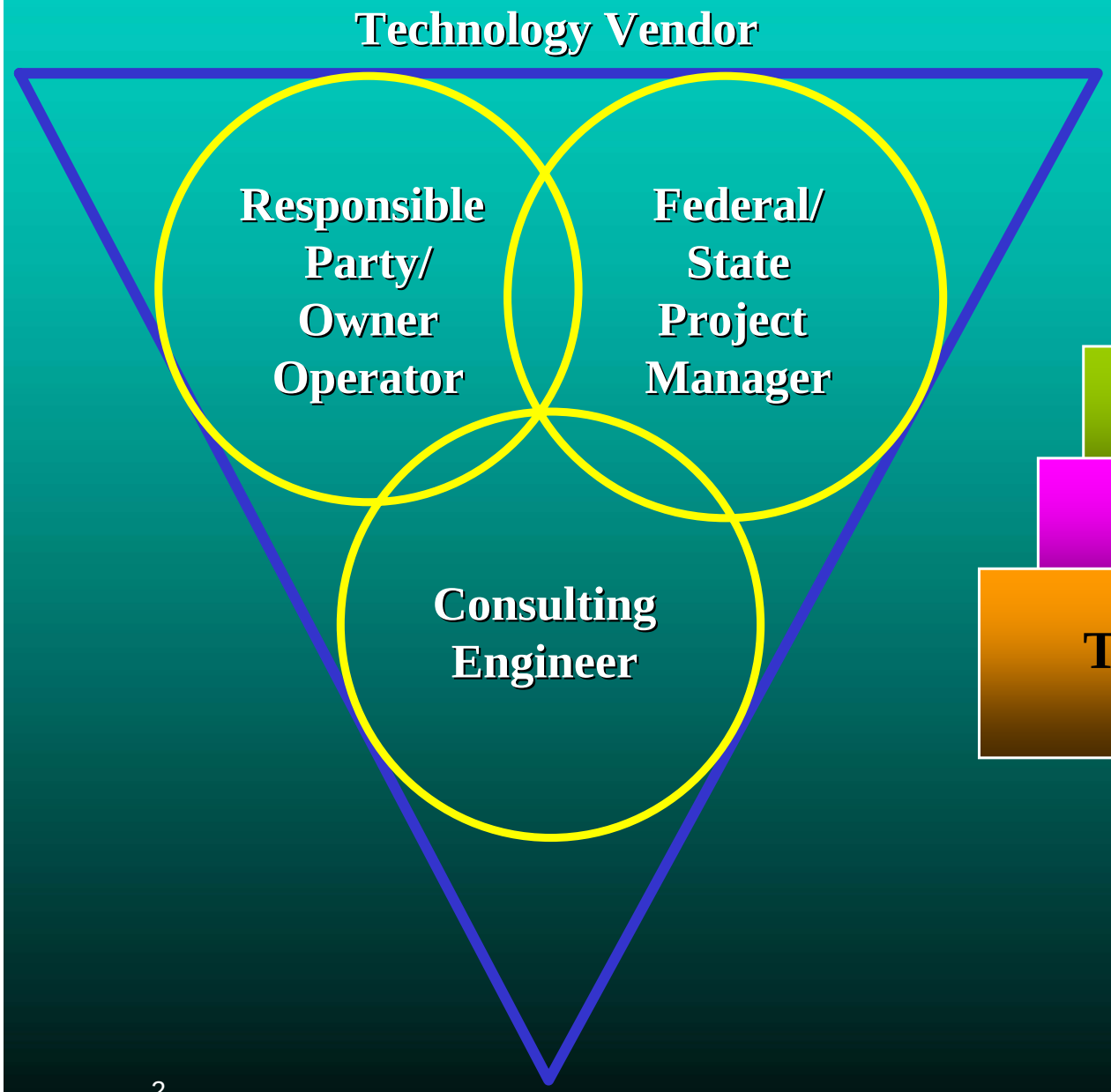
Update on Electronic Resources for Site Remediation and Characterization Information

NATO/CCMS Pilot Study
Prevention and Remediation In Selected Industrial Sectors: Mega-Sites
June 12-16, 2005
Ottawa, Ontario, Canada

Walter Kovalick Jr., Ph.D.
Director
Technology Innovation and Field Services Division
US Environmental Protection Agency
kovalick.walter@epa.gov

Technology Innovation Office

Clients for Information on Technology Innovations



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

Hazardous Waste Clean-Up Information

What's Hot? What's New?

Remediation

Characterization and Monitoring

Initiatives and Partnerships

Publications and Studio

Databases

TechDirect and Newsletters

Vendor and Developer Support

About CLU-IN

Providing information about innovative treatment and site characterization technologies while acting as a forum for all waste remediation stakeholders

CLU-IN Website

- Serving the hazardous waste remediation community since 1987
- Links to over 450 cleanup-related documents
- Sources of most documents are EPA as well as:
  - Department of Defense
  - U.S. Geological Survey
  - Dept. of Energy
  - Interstate Technology and Regulatory Council (ITRC)
  - Remediation Technologies Development Forum (RTDF)
  - NATO
- About 65,000 users/month
- Over 100,000 document downloaded in 2004

Contaminant & Technology Focus

- Created Contaminant Focus and Technology Focus areas to provide clearer and more useful cleanup information
- Contaminant Focus currently has information about arsenic, chromium VI, 1,4-dioxane, mercury, methyl tertiary butyl ether (MTBE), perchlorate, polychlorinated biphenyls (PCBs), trichloroethylene (TCE)
- Technology Focus has 19 technologies
- New contaminants/technologies added periodically

http://www.cluin.org/contaminantfocus/
http://www.cluin.org/techfocus

Contaminant & Technology Focus Information Categories

Contaminant Focus

- Overview
- Policy & Guidance
- Chemistry & Behavior
- Environmental Occurrence
- Toxicology
- Detection & Site Characterization
- Treatment Technologies
- Conferences & Training
- Additional Resources (work groups, Internet seminars, bibliographies, websites)

Technology Focus

- Overview
- Guidance
- Application (case studies, vendors, multi-site reports, Annual Status Report on Superfund site remedies)
- Conferences and Training
- Additional Resources

TechDirect

Highlights

- Broadcasts periodic e-mail messages to list of almost 22,000 subscribers
- Highlights events of interest to site remediation and site assessment professionals
- Describes new products and provides instructions on how to obtain them

Subscribe at www.cluin.org/techdrdt

Vendors, Technologies, and Site Use

EPA REACH IT System

- Free information service, searchable on-line
- Information on 309 treatment and 168 characterization technology vendors
- Site information on 1,811 EPA Superfund remediation projects
- Flexible search options include by technology, contaminant, media, and sites
- Easier-to-use website made available October 2004

www.epareachit.org

REACHIT (Cont'd)

- In last year, >130 new technologies added/updated, most of which address difficult remediation problems, including:
  - chlorinated solvents
  - perchlorate
  - fuel oxygenates such as methyl tertiary butyl ether (MTBE)
  - nonaqueous phase liquids (NAPL)
  - fractured rock
  - low-permeability clays
- New vendors offer technologies including:
  - in situ chemical oxidation & thermal treatment
  - in situ flushing
  - phytoremediation (use of plants and trees for environmental restoration)
  - Characterization and sampling technologies for NAPL, perchlorate, and dioxane

Soil Treatment Projects from Vendors on EPA REACH IT for Pesticides/PCBs (Pilot- and Full-Scale Projects)

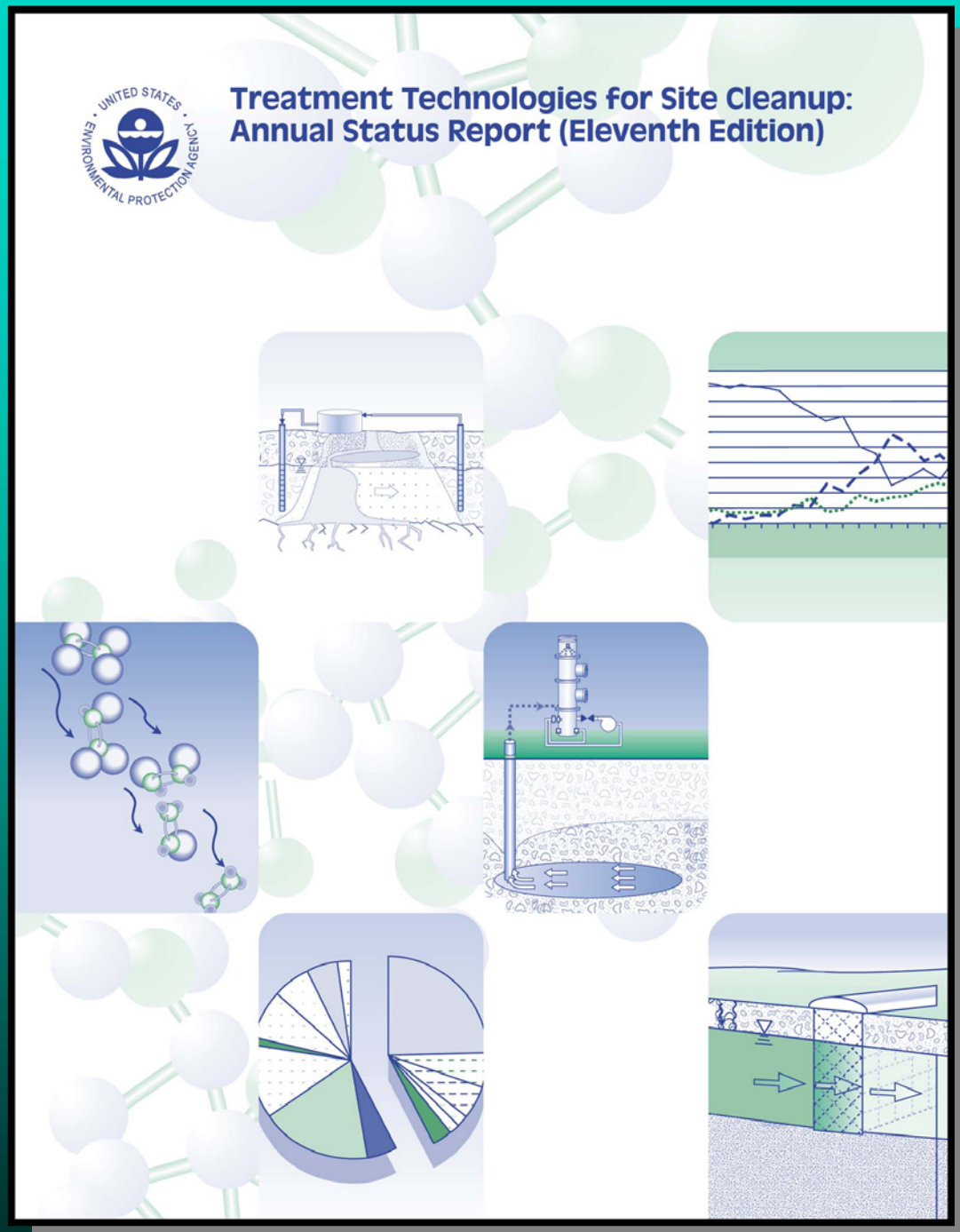
Technology	Halogenated Pesticides and Herbicides	PCBs, Dioxins, and Furans
Bioremediation	4	1
Phytoremediation	4	0
Thermal Desorption (in situ)	2	2
Thermal Desorption (ex situ)	2	7
Vitrification	1	0
Chemical Treatment	1	2
Solvent Extraction	0	1
Flushing (in situ)	0	1
Soil Washing	0	2
TOTAL	14 (8)	16 (8)

More information about these projects available at http://epareachit.org
( ) Total number of full-scale projects.
Vendor-supplied incineration data not available on EPA REACH IT.

Soil Treatment Projects from Vendors on EPA REACH IT for Metals

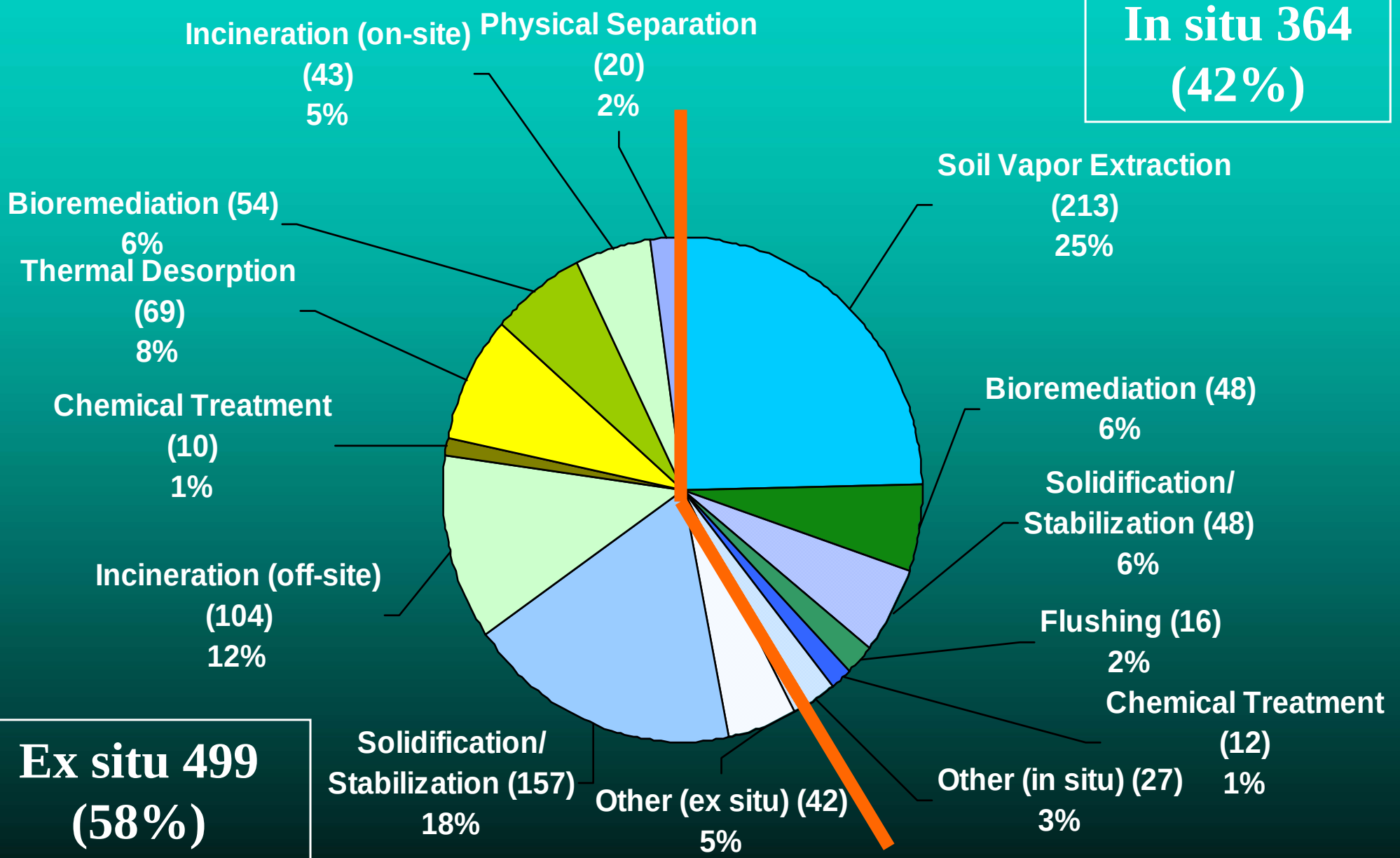
Technology	Number of Vendors	Number of Vendor-Provided Example Sites
Solidification/Stabilization	12	6
Chemical Treatment	15	16
In Situ Flushing	1	0
Soil Washing	5	7
Vitrification	4	5
Phytoremediation	7	4
Electrokinetics	2	5

http://www.epareachit.org



http://cfpub.epa.gov/asr

Superfund Source Control Treatment Projects (FY 82-02)



Full-Scale Application


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF THE AIR FORCE
MCMXLVII
UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA
NASA
Federal
Remediation
Technologies
Roundtable
DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY
1775
UNITED STATES OF AMERICA
DEPARTMENT OF THE NAVY
UNITED STATES OF AMERICA
U.S. DEPARTMENT OF THE INTERIOR
March 3, 1849

FRTR Technology Reports

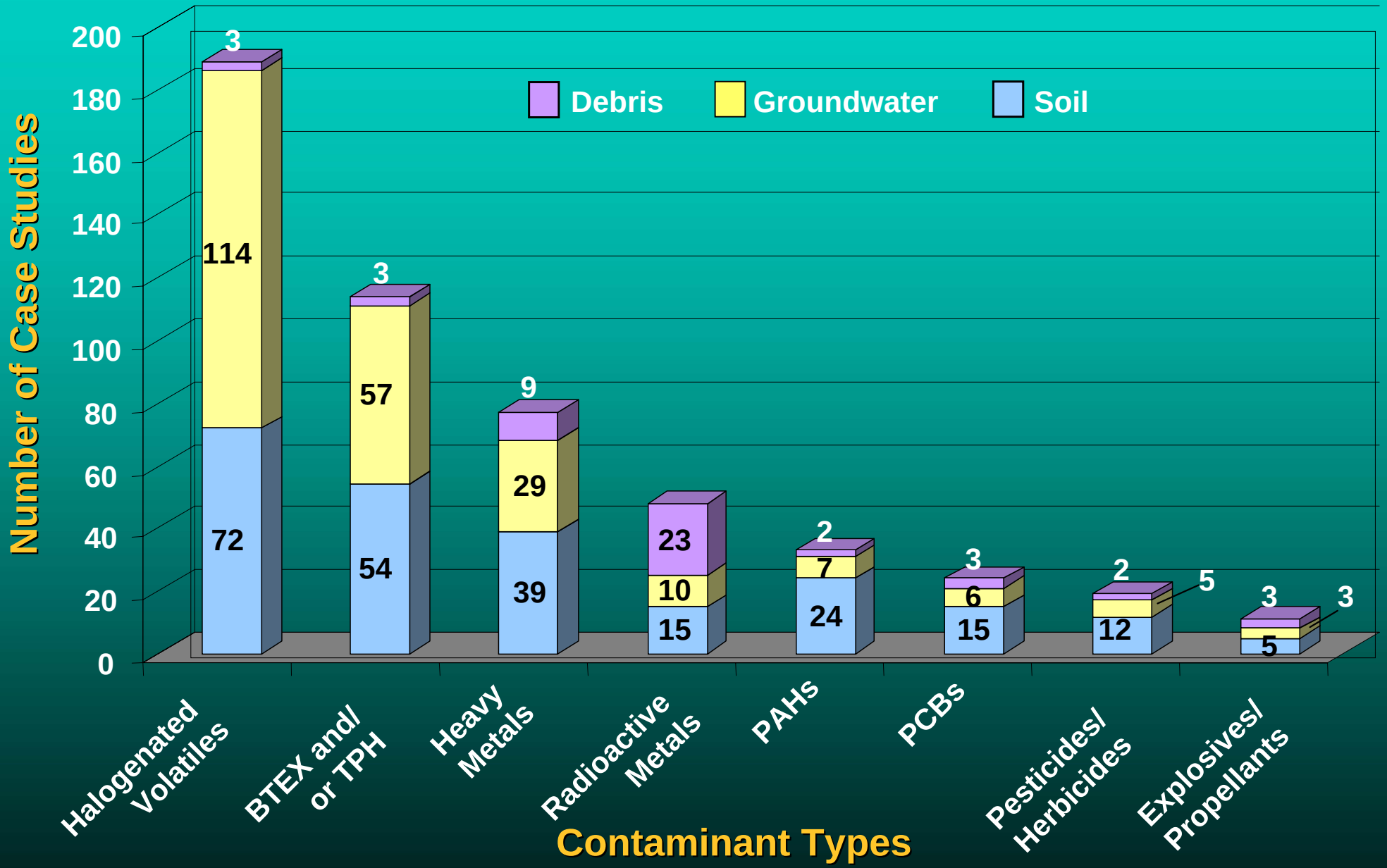
Information on cost, performance, & lessons learned on applying technologies at full-scale cleanup & large-scale demonstrations

- 361 remediation cost and performance case studies
- 145 site characterization and monitoring reports
- 73 long-term monitoring/optimization case studies
- 54 remediation technology assessment reports

Search or view on FRTR website

http://www.frtr.gov

FRTR Cost and Performance Case Studies*
Contaminants and Media Treated



* Some case studies address more than one type of media and/or contaminant

Fractured Bedrock Site Profiles Database

- Summaries of innovative characterization and treatment technologies
  - Continuously updated since 2001
  - 67 profiles
- Contains bibliography
- Includes links to other relevant web sites
- Public able to add sites

clu-in.org/fracrock

Technology Use for Fractured Bedrock Sites

Fracrock Database* n=67

Technology	*Number of Profiles*
Pump & Treat	21
Bioremediation	20
Oxidation	21
Soil Vapor Extraction	14
Fracturing	9
Multi-Phase Extraction	8
Thermal	4
Flushing	1

* http://clu-in.org/fracrock

Welcome to the Remediation Technologies Development Forum (RTDF) Web Site

The purpose of the RTDF is to identify what government and industry can do together to develop and improve the environmental technologies needed to address their mutual cleanup problems in the safest, most cost-effective manner. The RTDF fosters public and private sector partnerships to undertake the research, development, demonstration, and evaluation efforts needed to achieve common cleanup goals.

- General Information
- Bioremediation Consortium
- Lasagna™ Partnership
- IINERT Soil-Metals Action Team
- Phytoremediation of Organics Action Team
- Permeable Reactive Barriers Action Team
- *In Situ* Flushing Action Team
- Sediments Remediation Action Team

Other RTDF Action Teams

Bioremediation Consortium

Focus:

- Chlorinated solvents
  - Degradation
    - In soil and ground water

Phytoremediation Team

Focus:

- Solvents, TPH, PAH
  - Degradation/immobilization
    - In soil and ground water

NAPL Cleanup Alliance

Focus:

- Petroleum hydrocarbons
  - Degradation/characterization
    - In soil and ground water

Permeable Reactive Barriers Team

Focus:

- Chlorinated solvents, metals
  - Degradation/immobilization
    - In ground water

IINERT Soil-Metals Team

Focus:

- Lead
  - Immobilization/inactivation
    - In soil

Former Teams: Lasagna™ Partnership & *In Situ* Flushing Team

Phytotechnology Resources

- 2005 Third International Phytotechnology Conference April 20-22, 2005 Atlanta, GA (cluin.org/phytoconf)
- Evaluation of Phytoremediation for Management of Chlorinated Solvents in Soil an Groundwater, EPA 542-R-05-001, 2005, (www.rtdf.org/public/phyto/chlor_solv_management.pdf)
- Phytoremediation Technology Focus (cluin.org/techfocus/default.focus/sec/Phytoremediation/cat/Overview/)
- Use of Field-Scale Phytotechnology for Chlorinated Solvents, Metals, Explosives/Propellants, and Pesticides, EPA 542-R-05-002, (cluin.org/download/remed/542-r-05-002.pdf)

Groundwater Cleanup Technology Resources

Ranking Criteria for Difficulty in Remediating Ground Water

least difficult = 1 / most difficult = 4

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	1-2
Homogeneous, Multiple Layers	1	1-2	2	2-3	2-3	2 ?
Heterogenous, Single Layer	2	2	3	3	3	3 ?
Heterogenous, Multiple Layers	2	2	3	3	3	4
Fractured Bedrock	3	3	3	3	4	4

Update to National Research Council, Alternatives for Ground Water Cleanup, 1997, http://books.nap.edu/catalog/2311.html

DNAPL Characterization Technology Resources

- An Introduction to Characterizing Sites Contaminated with DNAPLs (www.itrcweb.org)
- Site Characterization Technologies for DNAPL Investigation (clu-in.org/techpubs.htm)
- Strategies for Monitoring the Performance of DNAPL Source Zone Remedies (www.itrcweb.org)

DNAPL Treatment Technology Resources

- DNAPL Remediation: Selected Projects Approaching Regulatory Closure (clu-in.org/techpubs.htm)
- In Situ Thermal Treatment of Chlorinated Solvents: Fundamentals and Field Applications (clu-in.org/techpubs.htm)
- In Situ Thermal Treatment Site Profiles – 90 projects (clu-in.org/products/thermal)
- Chemical Oxidation Site Profiles – 389 projects (clu-in.org/products/chemox)
- In Situ Surfactant/Cosolvent Flushing Profiles Database (approx. 46 projects – upcoming)

Site Characterization Resources

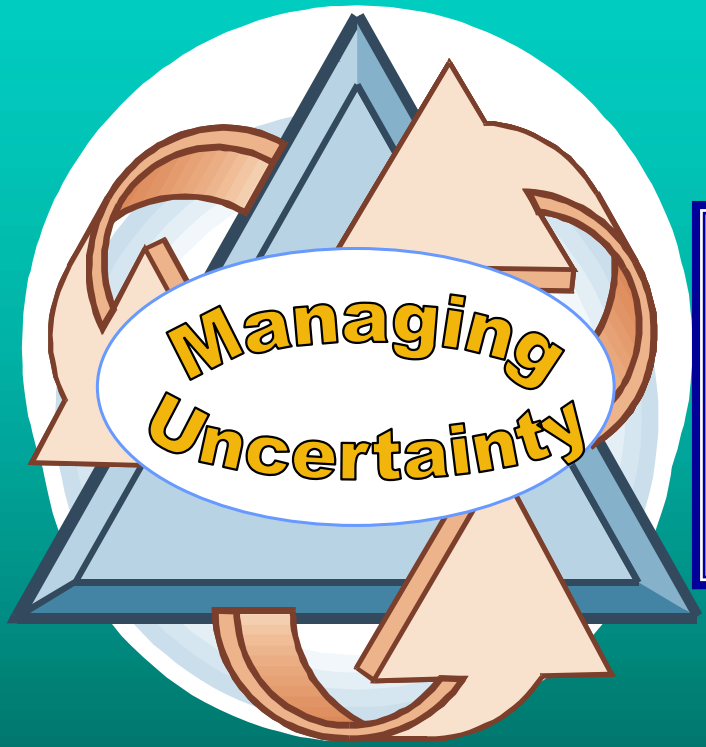
Field Analytical Technology Encyclopedia (FATE)

- On-line encyclopedia compiling information on field analytical technologies for hazardous site cleanup
- Currently covers 17 technology classes
  - Chemical analytics (e.g., Fiber optic chemical sensors, gas chromatography, graphite furnace AA spectroscopy, immunoassay, infrared spectroscopy, laser-induced fluorescence, test kits, x-ray fluorescence)
  - Direct-push technologies (analytical systems, direct-push platforms, geotechnical sensors, groundwater samplers, soil & soil-gas samplers)
  - Geophysics (ground penetrating radar, magnetics)
  - Comprehensive explosives module

http://fate.clu-in.org/

The Triad Approach

Systematic Project Planning



Dynamic Work Strategy

Real Time Measurement Technologies

Synthesizes practitioner experience, successes, and lessons-learned into an institutional framework

Triad Resource Center. Triad: A smarter solution to site cleanup. - Netscape

Glossary Go Search Site Go

Triad Overview | Triad Management | Regulatory Information | Technical Components | User Experiences | Reference/Resources

Privacy/Security

Triad Resource Center

TRIAD: A SMARTER SOLUTION TO SITE CLEANUP

The Triad is an innovative approach to decision-making for hazardous waste site characterization and remediation. The Triad approach proactively exploits new characterization and treatment tools, using work strategies developed by innovative and successful site professionals. The Triad Resource Center provides the information hazardous waste site managers and cleanup practitioners need to implement the Triad effectively.

"The NJDEP supports and encourages the use of the Triad for sites undergoing investigation and remediation within the Site Remediation and Waste Management Program where feasible."

Evan Van Hook
New Jersey Department of Environmental Protection
Assistant Commissioner for Site Remediation and Waste Management

Multiagency support for Triad

Triad Overview
Introduction to Triad key concepts, guiding principles, and benefits

Triad Management
Triad vs. traditional, cost estimation, procurement, QA/QC, logistics and implementation, and other management concerns

Regulatory Information
Legal defensibility, relationship to DQO process, QA/QC, and other regulatory issues

Technical Components
Triad and cleanup programs, systematic planning, dynamic work plans, real-time measurements, and other technical information

User Experiences
Triad projects map, case studies, and lessons learned

References/Resources
Triad documents, web links, training classes, and resource providers

News
- ITRC Releases Triad Guidance Document for State Environmental Protection Agencies

Subscribe
Enter your e-mail address below to receive updates and announcements.
Go
more info >

Glossary — Search and browse definitions

Acronyms ABC — Search and browse acronyms

Frequently Asked Questions

E-mail this page

Printable version

Home | Overview | Triad Management | Regulatory Info | Technical Components | User Experiences | Reference/Resources

www.triadcentral.org

Document: Done (0.735 secs)

Site Cleanup Classroom Training

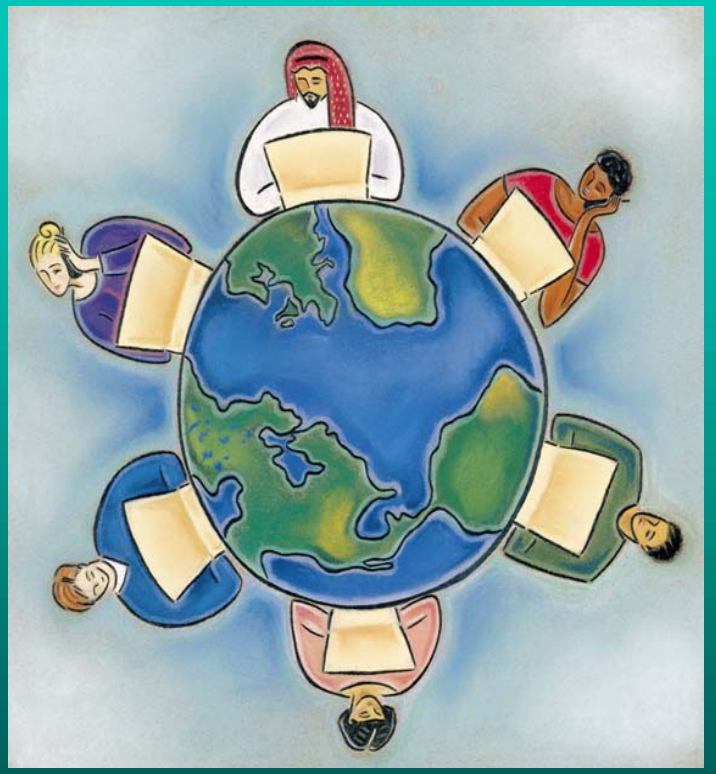
- Course catalogue and schedule online at www.trainex.org
- Catalog lists current schedules for 357 courses offered by EPA Superfund program or by partners
- Register for training online, or participate in 12 **online courses** available from EPA and ATSDR
- Some course materials available on request (contact kovalick.walter@epa.gov)

Internet-Based Seminars

- Live, 2-hour seminar on technical topics related to contaminated site management
- Generally 2-3 speakers/instructors
  - National technical and regulatory experts
- 1.5 hours of technical/regulatory presentation and 0.5 hours for Q & A
- Presentation and supporting information mounted on website
- Audio transmitted over the phone or transmitted over the internet
- Live sessions archived

Internet-Based Seminars (Cont'd)

- Cost effective information exchange and training
  - No cost to participants
  - No travel expense
- Since 1998, presented over 200 seminars
- One seminar reaches 150-200 participants
- 35,000+ participants from 54 U.S. states and territories and 51 countries on six continents
- Announced in TechDirect



http://cluin.org/studio/seminar.cfm

Top 10 Websites For Hazardous Waste Management

1. http://cluin.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://www.afcee.brooks.af.mil/products/techtrans/treatmenttechnologies.asp
8. http://www.itrcweb.org/
9. http://www.serdp.org/research/research.html
10. http://www.epa.gov/etv/