Update on the Superfund Program: U.S. Tour de Table

NATO SPS Pilot Study

Prevention and Remediation in Selected Industrial Sectors

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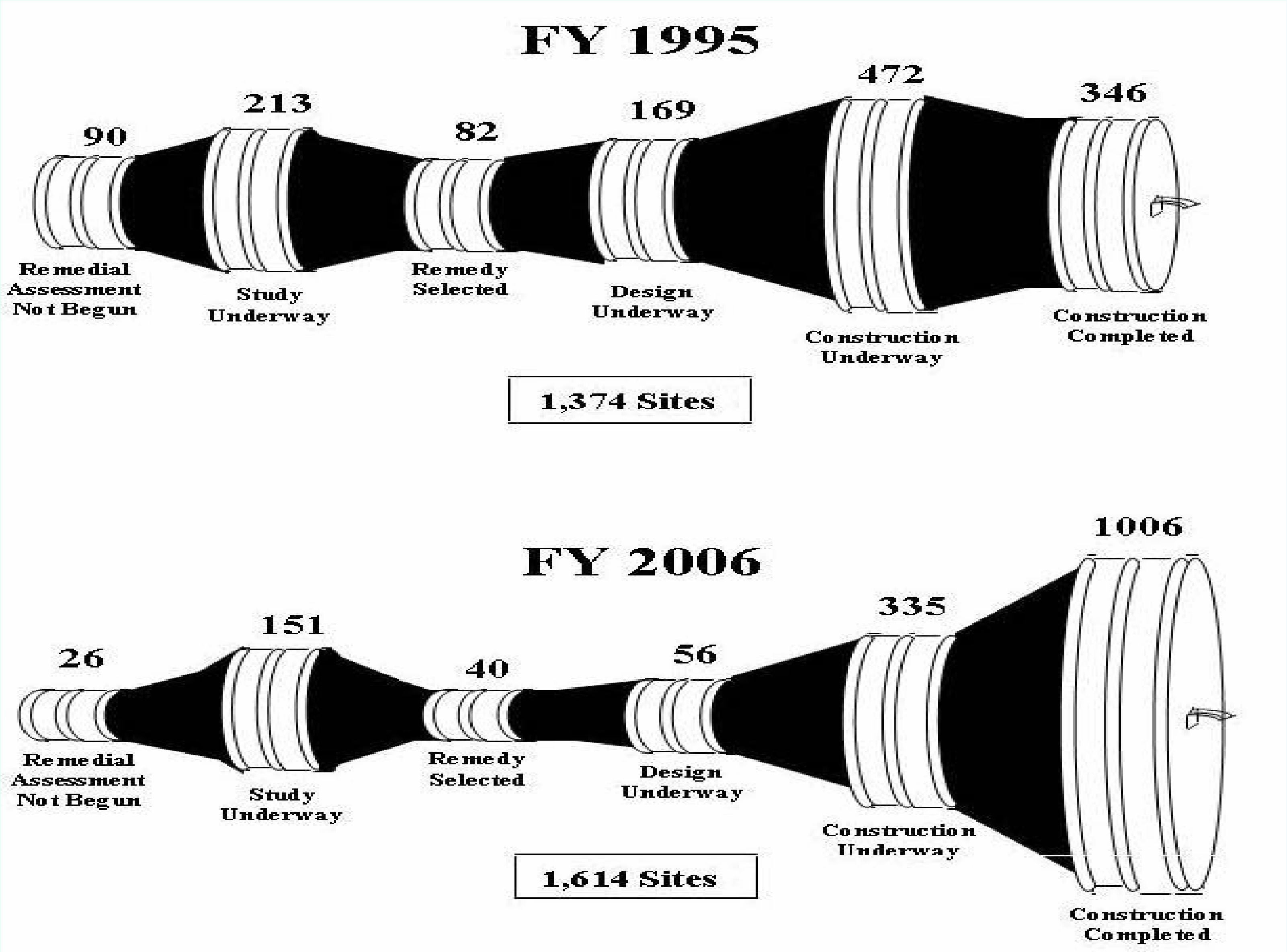
Walter W. Kovalick, Jr. Ph.D.

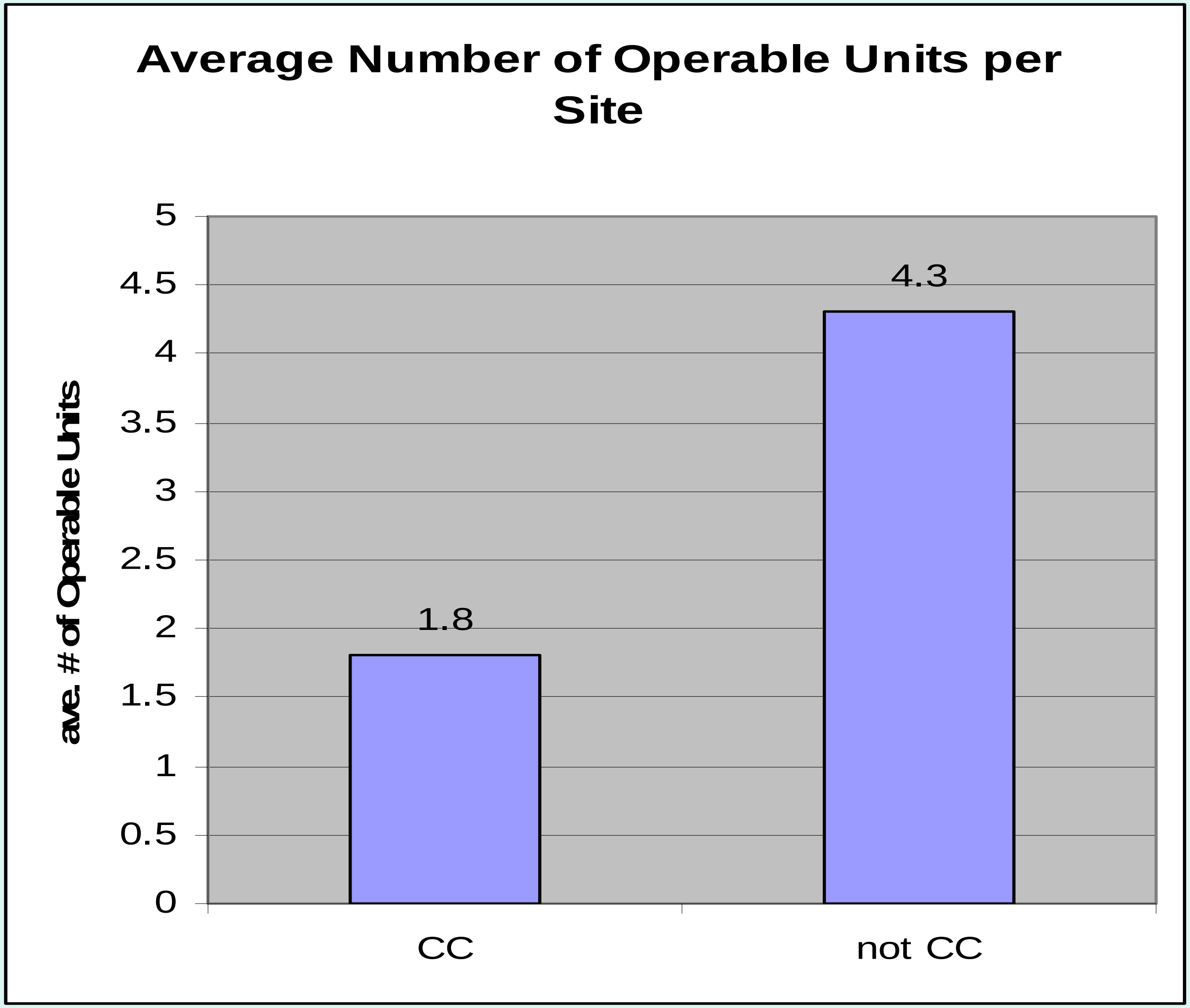
Kovalick.walter@epa.gov

Progress Cleaning up Superfund Sites



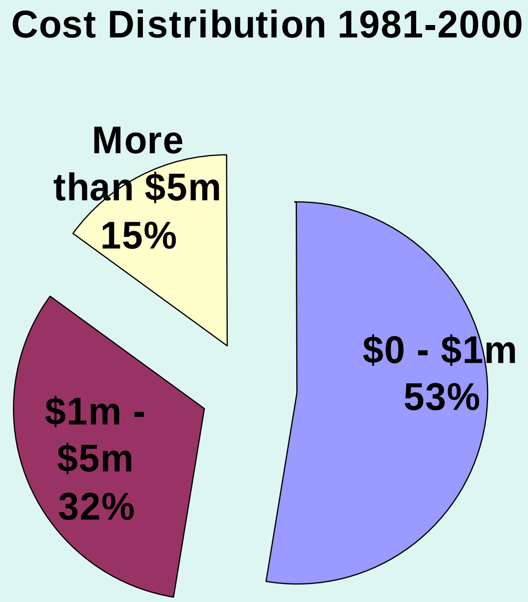
Remaining Sites Are More Complex

Sites That Have Not Completed Remedy Construction Have More Operable Units

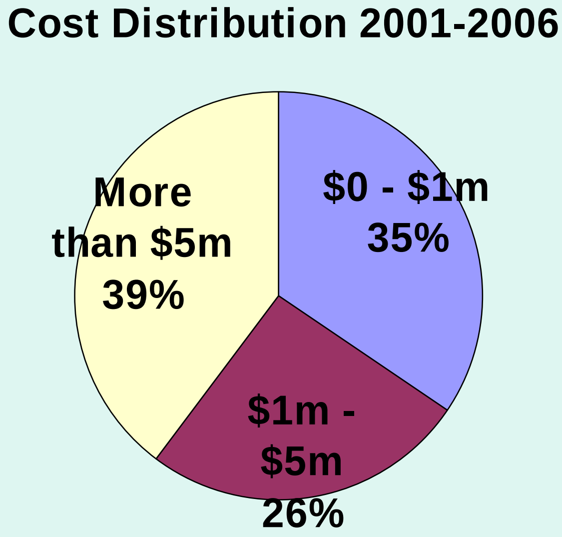


Remaining Sites Are More Complex

Sites completed after 2001 required greater EPA resources per site.

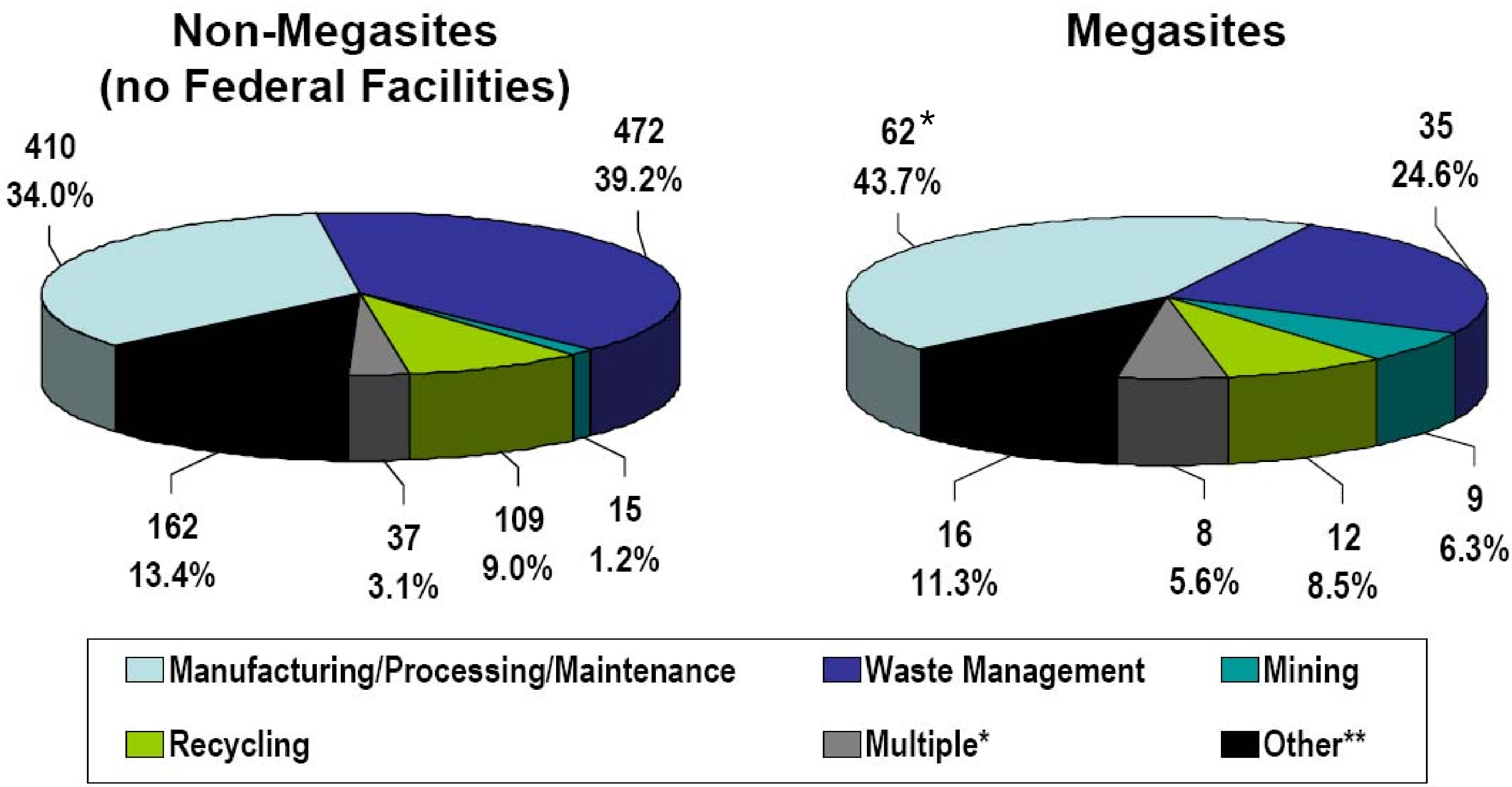


* EPA Costs Only



14 Sites Used 45% of Construction Resources in FY 2006

What is the Nature of these"Megasites"?



* Note that several manufacturing sites have impacted fluvial systems resulting in major river sediment cleanup projects (Hudson, Fox, etc).

Cleaning Up Sediment Sites under Superfund

- Selected a remedy at over 150 sediment sites – as of September 2005
  - 11 considered mega sites (cost for sediment remedy exceeded $50 million)
- Approximately 50 other sites with ongoing sediment investigations
  - Expect some to become mega sites
- Tracking cleanup progress on roughly 60 “Tier I” sites
  - Remedy has been selected, and
  - Includes dredging or excavation of at least 10,000 yd3, or capping or monitored natural recovery of at least 5 acres

http://www.epa.gov/superfund/resources/sediment/

Nature of the “Tier I” Superfund Sediment Sites*

- Over 1/2 are rivers/streams and about 1/3 are wetlands
- PCBs drive risk at 1/2 the areas, while metals at 1/3, and PAHs at 1/5 of the areas
- Dredging or excavation is sole remedy at 30 sites, while 1/3 included capping and/or MNR in addition to dredging or excavation. Capping or MNR alone were selected at < 10% of the sites, but MNR is frequent component
- The volume of sediment removed < 50,000 yd3 at 1/2 of the areas, while > 1 million yd3 at 10%
- The number of areas dredged vs. excavated were about the same; at almost 1/2 of these areas, a thin layer of sand was used to backfill
- Caps range in size from less than 1 acre to 430 acres, but most are between 10 and 70 acres.

*Data is further broken down for 98 areas within the 60 Tier I sites

EPA Continues to Enforce "Polluter Pays" Principle

- General revenues and cost recoveries are currently the Trust Fund's largest revenue sources, in addition to fines and penalties and interest. The Trust Fund (Superfund) stands at about $3 B.
- Just from 2006 enforcement efforts, parties held responsible for pollution will invest $391 million for cleanups of contamination from up to 15 million cy of soil and 1.3 billion cy of groundwater at waste sites.
- In addition to penalties paid in 2006, regulated entities will also be required to invest $4.9 billion to reduce pollution and achieve compliance with environmental laws.

Superfund Site Reuse: Beyond Cleanup

Redevelopment at Superfund sites has resulted in nearly 80,000 on-site jobs, $2.7 billion in annual income and more than 244,000 acres of land in reuse or made ready for reuse

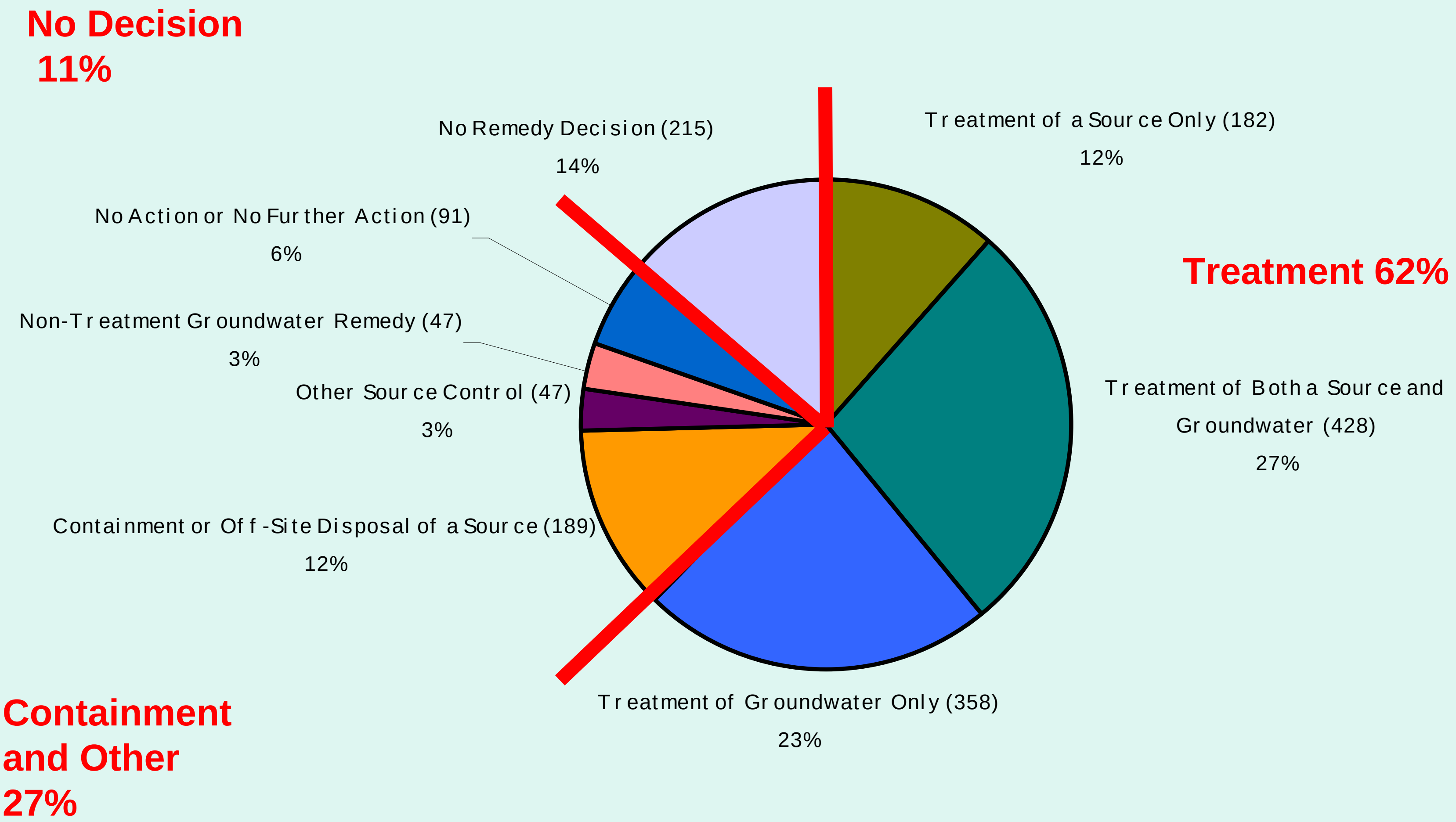
Approximately 550 Superfund sites are ready for reuse, or have already been returned to productive uses

- 56 sites in ecological use
- 50 sites in residential use
- 68 sites in recreational use
- 21 sites in agricultural use
- 40 sites in public service use
- 117 sites in commercial use
- 108 sites in industrial use.

Wide Beach Development in Brant, New York

Remedy Types at NPL Sites

1982-2005, 1557 Sites

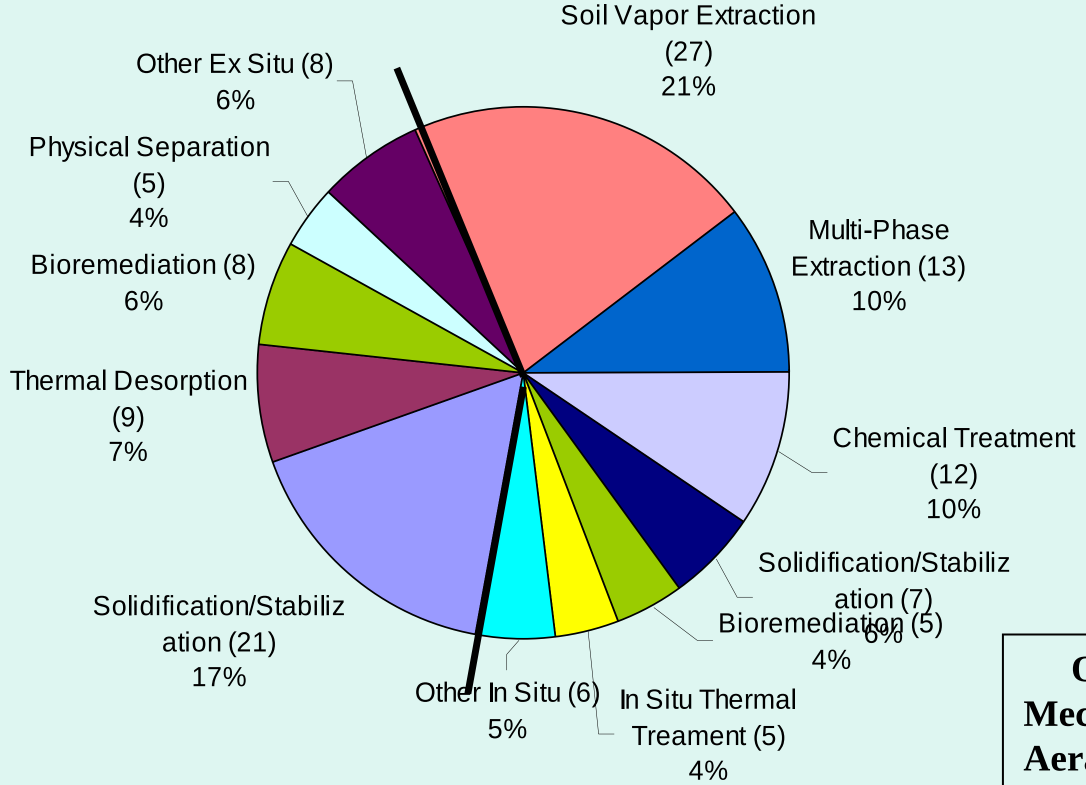


Recent Source Control Treatment Projects

2002-2005 RODS - Total of 126 (Prelim. Data)

Ex Situ Technologies (51) 40%

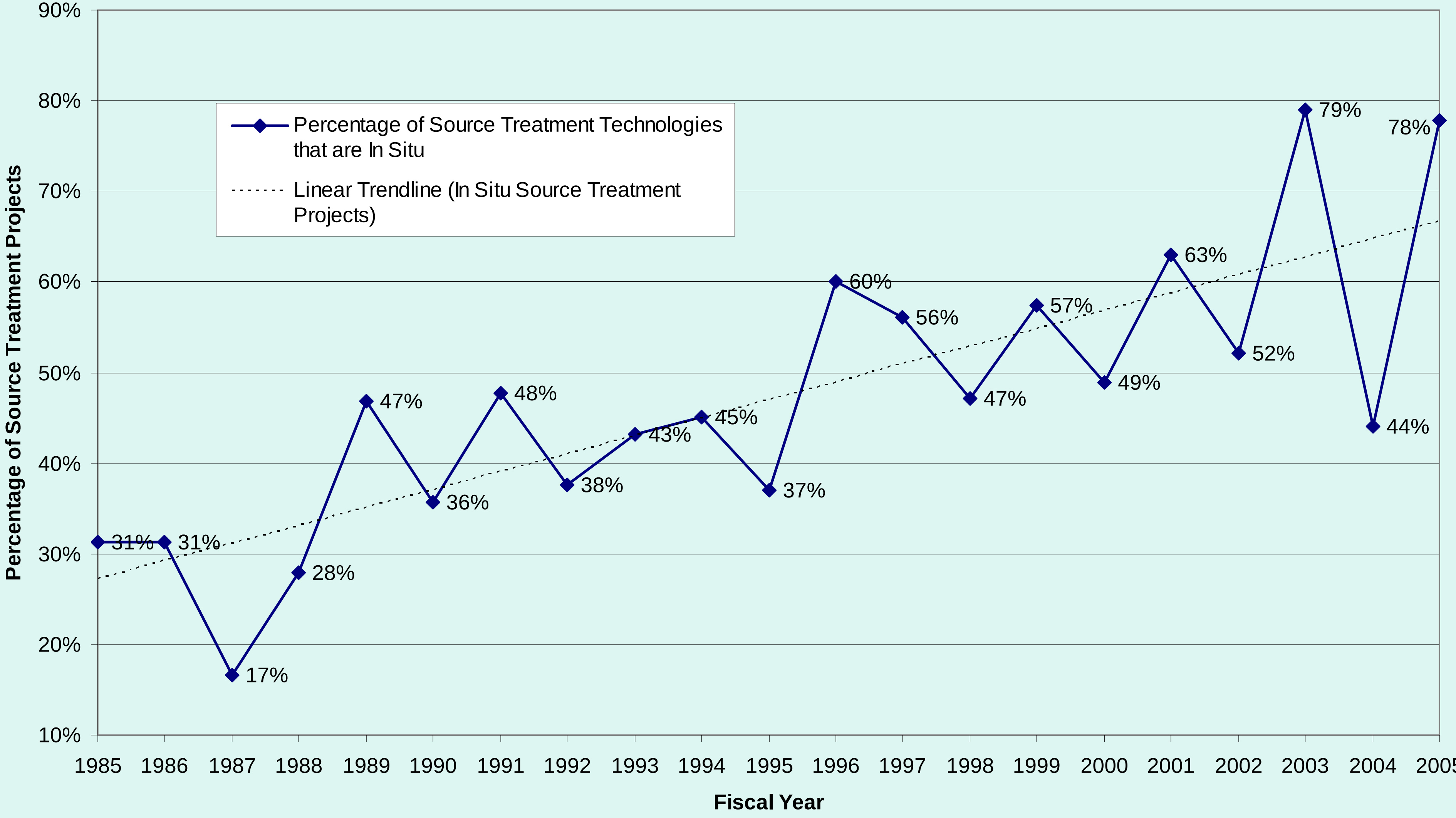
In Situ Technologies (75) 60%



Other Ex Situ (8)
Incineration (off-site) - 3
Open Burn/Open Detonation - 3
Chemical Treatment - 1
Neutralization - 1

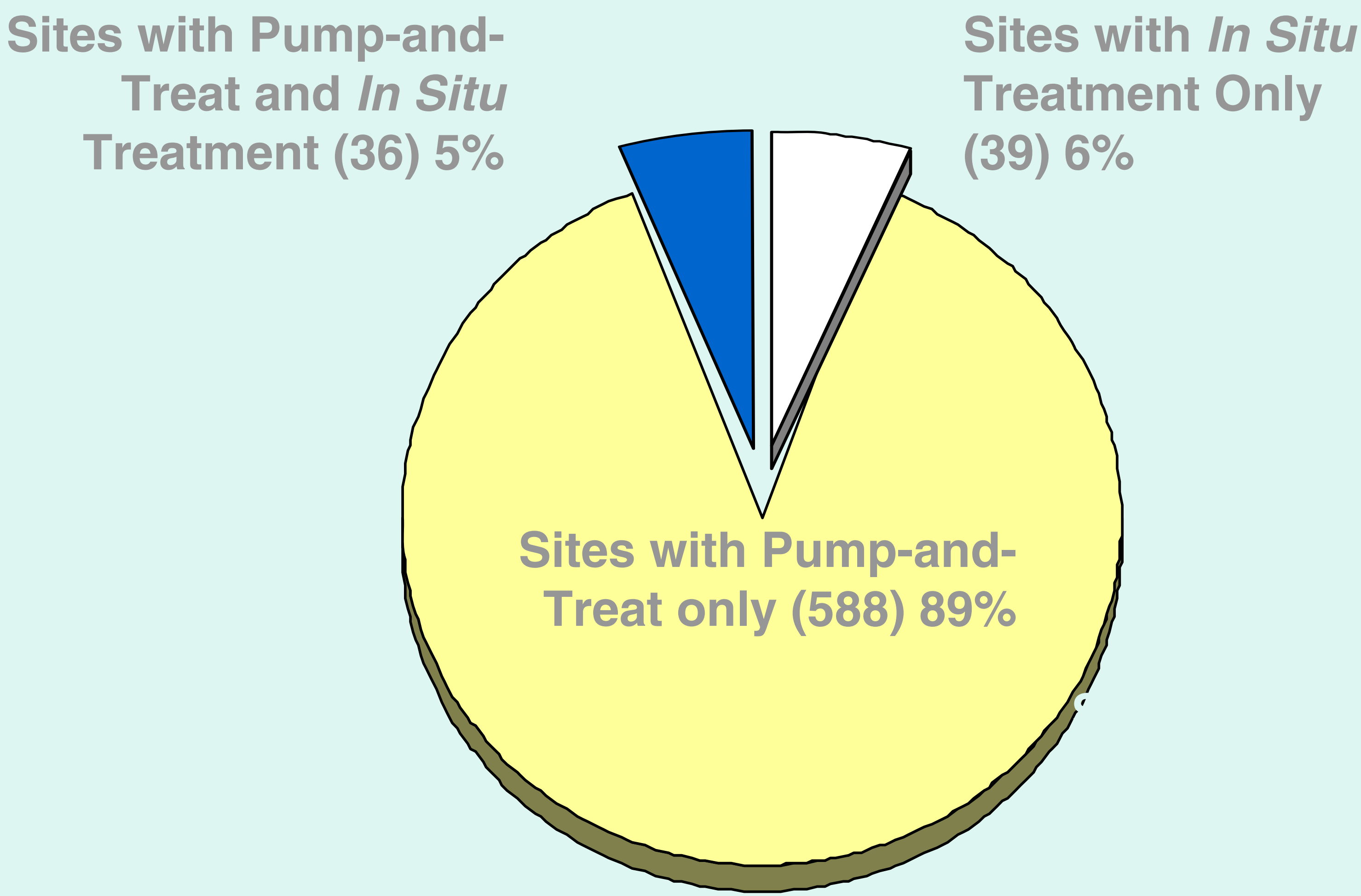
Other In Situ (6)
Mechanical Soil Aeration - 2
Phytoremediation - 2
Flushing - 1
Neutralization - 1

In Situ Technologies for Source Control



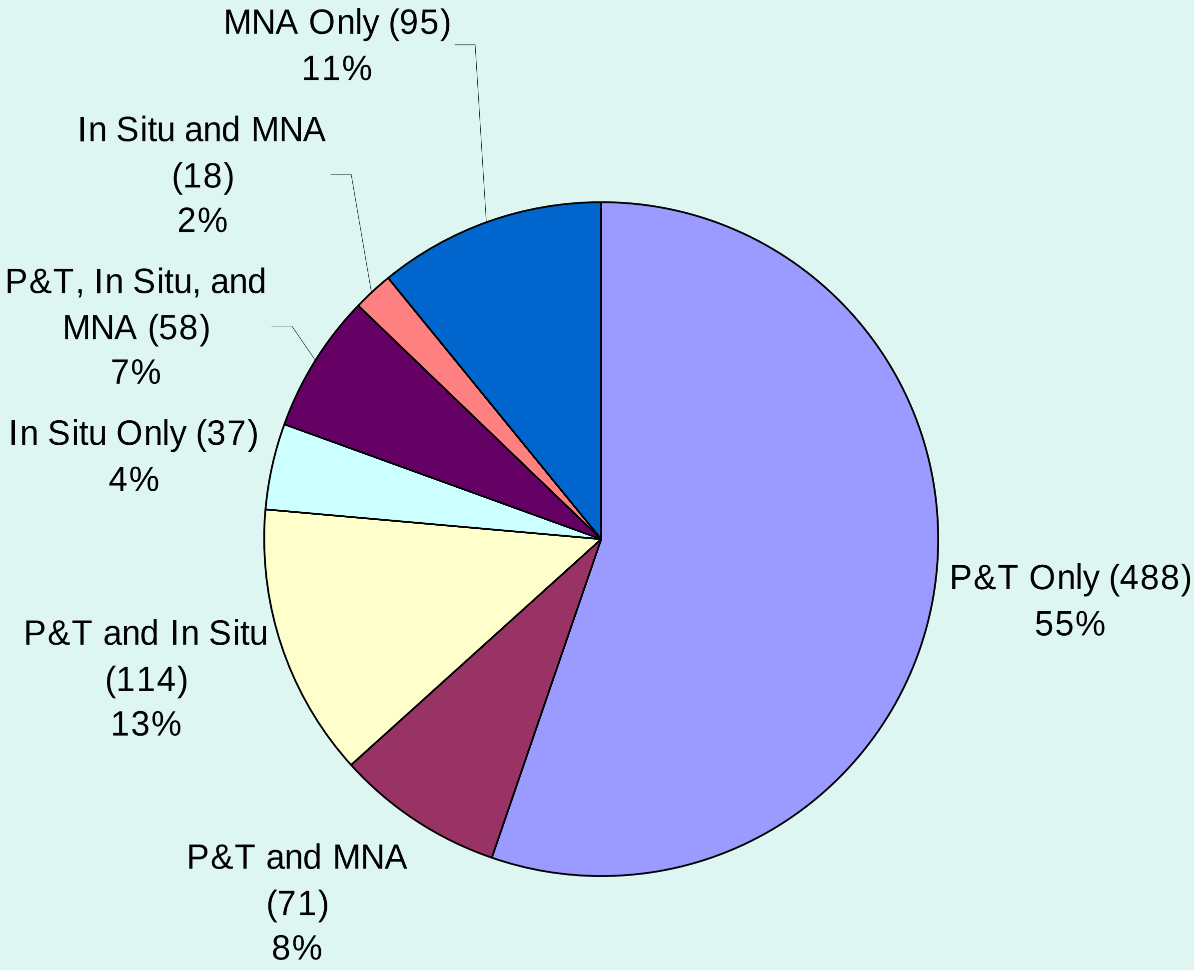
Progress in GW Treatment Technologies
Then: Groundwater Remedies Through '97

(ASR 9th Edition) Total Sites = 663

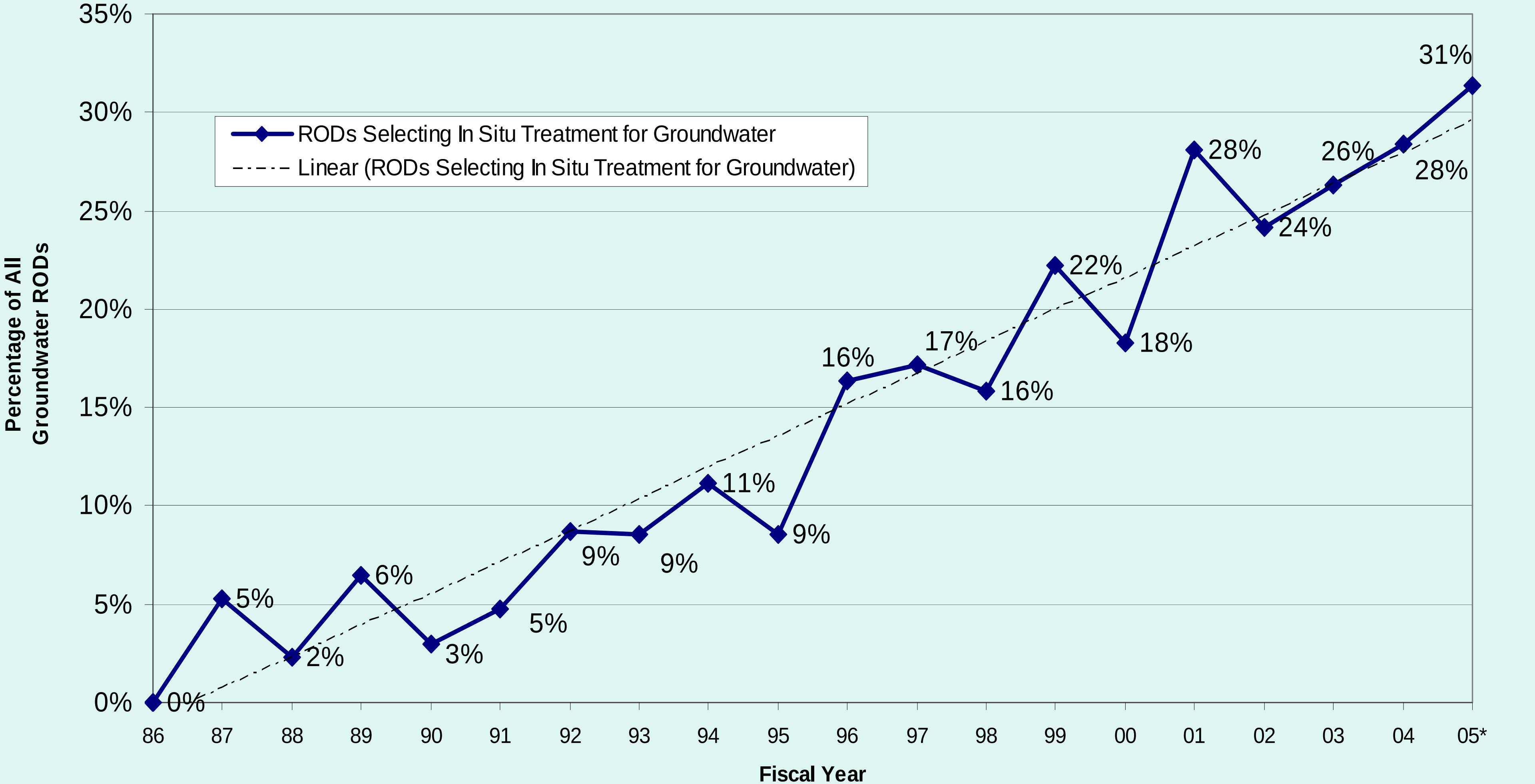


Now: Sites with P&T, In Situ Treatment, or MNA as Part of a Groundwater Remedy

(ASR 12th Edition) Total Sites = 881

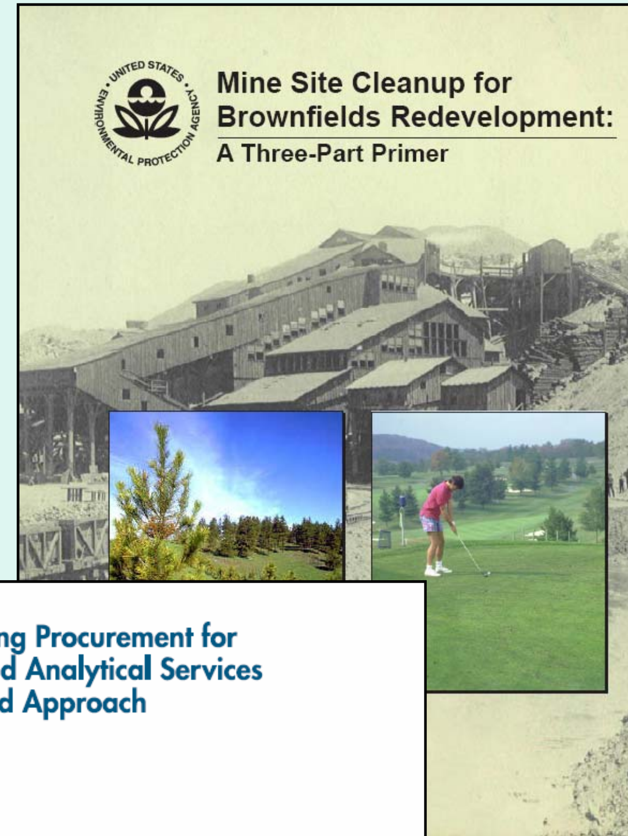


In situ Groundwater Remedies in Superfund



*RODs and Amendments are included in this figure. As of October 2006, 74% of FY 2005 RODs and Amendments were available.

Advancing Knowledge of the State of the Practice



Mine Site Cleanup for Brownfields Redevelopment: A Three-Part Primer

Road Map to Understanding Innovative Technology Options for Brownfields Investigation and Cleanup, Fourth Edition

TECHNOLOGY NEWS AND TRENDS

A newsletter about soil, sediment, and ground-water characterization and remediation technologies

Issue 30 May 2007

This issue of Technology News and Trends *highlights methods for harnessing energy from renewable resources to reduce remediation costs and minimize the environmental footprint left by remediation technologies. These methods currently are used to generate virtually no-cost electrical power for low-energy remediation systems, to "polish" remediation following aggressive baseline technologies, or to serve as baseline technologies addressing moderate contaminant concentrations. Incorporation of renewable energy resources early in remediation planning can significantly reduce long-term cleanup costs and allows site managers to evaluate environmental tradeoffs of potential remedies.*

Solar Power Recirculates Contaminated Ground Water in Low-Energy Bioreactor

A pilot-scale recirculation bioreactor has operated at "Landfill 3" on Altus Air Force Base (AFB), OK, since late 2003 to address a hotspot of volatile organic compounds (VOCs) in ground water residing in fractured clay and weathered shale. A solar-powered pump operating in the system's extraction/collection trench recirculates ground water through the 10,000-ft^3 bioreactor and into the aquifer to generate high-carbon leachate and enhance VOC biodegradation. Since startup, the system has transferred approximately 1,300 m^3/yr of organic carbon-enriched leachate from the bioreactor into the aquifer. Ground water recirculation through the bioreactor has achieved a 98% reduction in trichloroethene (TCE) concentrations within the bioreactor and a 90-97% reduction in plume toxicity in hotspot wells between the bioreactor cell and the extraction trench.

Prior to project startup, TCE concentrations in the hotspot were 19 mg/L, and the plume extended nearly 1,100 yds downgradient of the landfill. The bioreactor was constructed immediately upgradient of hotspot wells in a 30- by 30-ft excavation extending 11

cotton-gin trash, an inexpensive and locally available byproduct of the cotton industry. At the top of the cell a ground-water distribution (irrigation) system operates between two layers of geotextile fabric. The entire cell is capped with two feet of soil and a native grass cover.

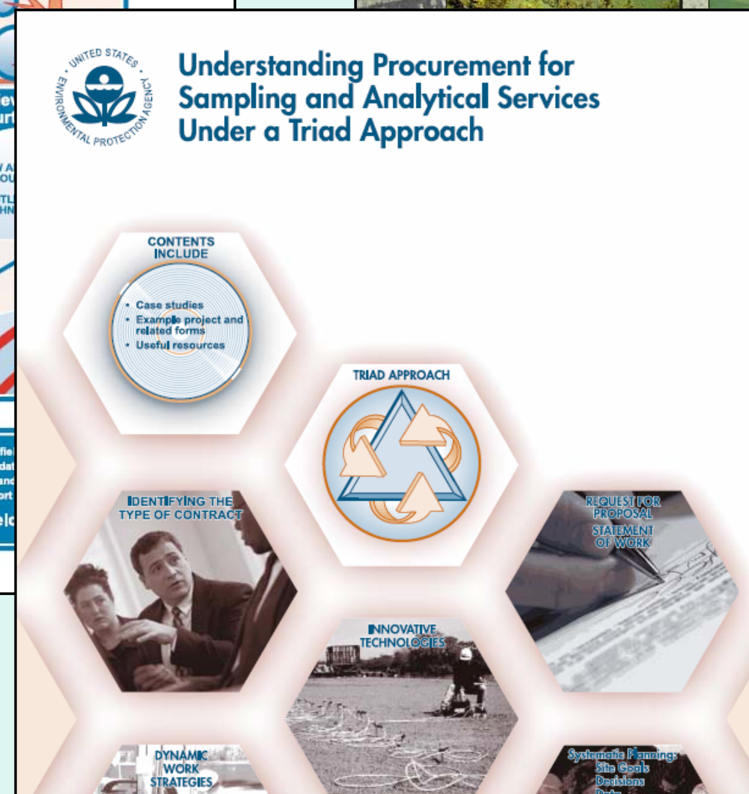
The bioreactor relies on recirculation of ground water from downgradient of the hotspot, which is located in the shallow aquifer 10-18 feet bgs. Ground water collected in a 2-ft-wide by 30-ft-long trench extending 18 feet bgs is recirculated through the bioreactor by a single solar-powered pump. Contaminant degradation is monitored through a network of 18 wells.

The site's remote location and average solar radiation of 4-5 kWh/m^2/day prompted investigation of solar power early in the project planning process to reduce construction and energy costs associated with long-term pumping. The selected photovoltaic (PV) array comprises four single-crystal silicon panels, each capable of delivering 50 watts to the pump through a simple control box. The panels are mounted in series on a single frame oriented

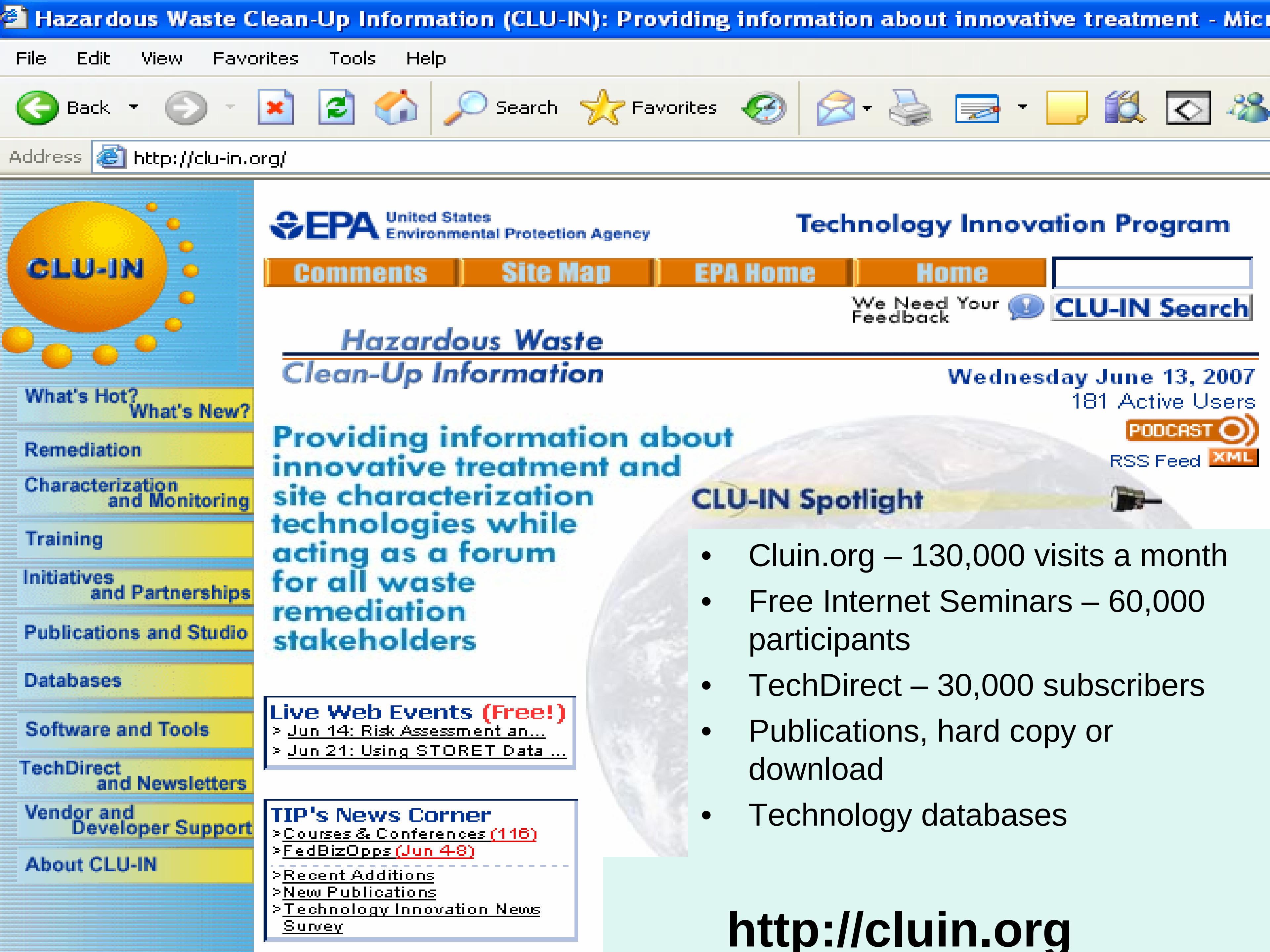
Contents

CLU-IN Resources

Environmentally sustainable cleanup technologies commonly include phytoremediation, bioremediation, and monitored natural attenuation but increasingly involve modifications to conventional technologies relying on passive rather than active mechanisms. Information about other no- or low-energy remediation technologies is available in the U.S. EPA's "Technology Focus" on CLU-IN (http://cluin.org/techfocus/).



Understanding Procurement for Sampling and Analytical Services Under a Triad Approach



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