Green Cleanup Standards Initiative

April 21-22 NEWMOA Meetings

Carlos Pachon
EPA Office of Superfund Remediation and Technology Innovation

pachon.carlos@epa.gov

U.S. Environmental Protection Agency
Today’s Topics

○ Sustainability and green cleanups: The challenge
○ EPA’s vision of a “green cleanup” standard
○ Discussion & feedback on key questions
  ● Green cleanup framework
  ● Structuring standards and certification
  ● Implementation considerations such as cost, recognition, etc.
Sustainable Revitalization

**Deconstruction, Demolition & Removal**
- Reuse/recycle deconstruction and demolition materials
- Reuse materials on site whenever possible
- Consider future site use and reuse existing infrastructure
- Use clean fuels for equipment
- Retain native vegetation and soils, wherever possible

**Cleanup & Waste Management**
- Use clean fuels for equipment
- Use renewable energy sources
- Improve energy efficiency
- Use cleanup approaches that reduce resource use and impact on air, water, land
- Incorporate remediation activities that sequester carbon

**Design & Construction for Reuse**
- Use Energy Star, LEED, and GreenScapes principles
- Incorporate Smart Growth concepts
- Use best management practices for stormwater
- Create ecological enhancements
- Use native landscaping

**Sustainable Use & Long Term Stewardship**
- Reduce use of toxic materials in building and land maintenance
- Minimize waste generation and recycle
- Use energy efficiently
- Monitor engineering and institutional controls
- Manage waste properly to prevent contamination
What is a Green Cleanup?

The practice of considering all environmental effects of a cleanup during each phase of the process, and incorporating strategies to maximize the net environmental benefit of the cleanup.
Opportunities to Increase Sustainability in Site Cleanups

- Apply to all cleanup programs
- Exist throughout site investigation, design, construction, operation, and monitoring
- Involve best management practices for core elements
The Work of Cleaning Up Contaminated Sites

Sample subset of soil treatment technologies (Superfund, 2005-2008)*

- **Incineration (on-site)**: 4% (42)
- **Physical Separation**: 2% (21)
- **Bioremediation (60)**: 6%
- **Thermal Desorption**: 7% (71)
- **Incineration (off-site)**: 11% (105)
- **Solidification/Stabilization (173)**: 18%
- **In Situ Technologies (462)**: 47%
  - **Soil Vapor Extraction**: 26% (248)
  - **Bioremediation (53)**: 5%
  - **Multi-Phase Extraction**: 5% (46)
  - **Solidification/Stabilization (44)**: 5%
  - **Flushing (17)**: 2%
  - **Chemical Treatment**: 2% (20)
  - **In Situ Thermal Treatment (14)**: 1%
- **Other Ex Situ (43)**
  - Chemical Treatment - 9
  - Neutralization - 7
  - Soil Vapor Extraction - 7
  - Soil Washing - 6
  - Mechanical Soil Aeration - 4
  - Open Burn/Open Detonation - 4
  - Solvent Extraction - 4
  - Phytoremediation - 1
  - Vitrification - 1
- **Other In Situ (20)**
  - Neutralization - 8
  - Phytoremediation - 6
  - Mechanical Soil Aeration - 3
  - Vitrification - 2
  - Electrical Separation - 1

*http://cluin.org/asr
...and There's Still Much Work to be Done

Estimated Number of Sites and Cleanup Cost 2004-2033*

Total = $209 Billion

Total Sites = 294,000

RCRA-CA $45B

States & Private $30B

DOE $35B

Civilian Agencies $19B

NPL $32B

UST $16B

DOD $33B

DOD 6,400

DOE 5,000

Civilian Agencies 3,000

States & Private 150,000

UST 125,000

NPL 736

RCRA-CA 3,800

* http://cluin.org/market
EPA Green Cleanup Activities

Existing

- Green remediation primer, website, and profiles of projects
- Ongoing internet seminars and archived discussions (clu-in.org)
- Training for staff and technical support for projects
- Renewable energy fact sheets and website
- Contracting Toolkits

In the Pipeline

- Green remediation evaluation toolkit
- Remedy specific green cleanup “cheat sheets’
- Superfund green remediation strategy
EPA Green Cleanup “Strategy”

- Benchmark and document green cleanup best management practices
- Build networks of practitioners
- Develop performance metrics and tracking mechanisms
- Assemble a toolkit of enablers
  - Collaborate with the private sector to develop a standard
The Challenge: Integrating Green Cleanup Goals Across Programs

Regulatory Frameworks
- Superfund
- RCRA
- Federal Facilities
- Tanks
- Brownfields

Green Cleanup Goals
- Minimize ancillary impacts such as CO2 emissions to the air
- Minimize total energy use and promote use of renewable energy
- Preserve natural resources
- Maximize the recycling of material
- Maximize reuse options for land
Why a Green Cleanup Standard?

- Growing interest in social responsibility
- Companies have internal goals to become greener
- Builds upon state and local government incentives
- Possible tie-in with other standards such as LEED ND*
- Leverages private sector resources
- May provide measurable results
- Fits within existing regulatory frameworks
- Initiates a constructive dialogue

Potential Incentives at a Site Level

- Carbon offsets and credits
- Credit for LEED or other green building programs
- Loans and grants
- Reduced processing time and fees for remedies
- Publicity and recognition
- Contract incentives
- Consultant education and accreditation
Key Challenges in Developing a GCS

- Keeping it simple *(given site specific nature of cleanups)*
- Defining scope
- Balancing various stakeholders’ needs
- Specifying incentives & certification prior to completion of standard
- Establishing baseline values to measure improvements against
- Minimizing energy use while supporting active cleanup
EPA initiates workgroup to develop Workplan for EPA management

EPA Workgroup partners with ASTSWMO to develop framework and incentives

EPA collaborates with Standard Developing Organization

SDO Develops Green Cleanup Standard through Consensus Process

EPA/States Evaluate Standard and Develop Recognition Program(s)

Self Declaration

Submit documentation to cleanup program

EPA/States Partners with Accrediting Organization(s)

Certifying Organization(s)

Recognized Compliance with Green Cleanup Standard
Standards Development

National Technology Transfer and Advancement Act (NTTAA)

- Enacted February 1996
- Requires federal agencies to develop standards through a consensus process
Key Attributes

**Voluntary** - Not mandating new cleanup evaluation

**Transparent** - Consensus based development

**Universal** - Easier for stakeholders to implement

**Flexible** - Program or State-specific recognition options

**Minimal Resources** - Independent 3rd party or self-certification (audits)

**Market Driven** - Promote technology innovation

**Verifiable** - Documentation to support decisions
Green Cleanups Framework: Draft Available for Public Review

- Draft framework outlining desired outcomes for a standard is available for review and input through April 30 (http://www.clu-in.org/greenremediation/subtab_b5.cfm)
- Final framework will be posted in June 2009
- EPA’s will use proposed framework as a starting point for discussion at the ASTM International kick-off the consensus-based process in October

New Guide for Green Cleanup at Contaminated Sites
http://www.astm.org/DATABASE.CART/WORKITEMS/WK23495.htm
Draft Framework for Green Cleanups (I)

- The cleanup protects human health and the environment, meets requirements and is approved by applicable regulatory authority.
- Establish and employ processes for documenting environmental outcomes (not worker safety*) and provide measurable results.
- Can be done during remedy design and selection and/or by optimizing cleanup implementation.
  - consider assessing remedy options using life cycle analysis
  - reduce the environmental footprint of the cleanup.
- Optimize and encourage innovations related but not limited to the core elements.
Draft Framework for Green Cleanups (II)

- Minimize Total Energy Use and Maximize Use of Renewable Energy
- Minimize Air Pollutants and Greenhouse Gas Emissions
- Minimize Water Use and Impacts to Water Resources
- Optimize Future Land Use and Enhance Ecosystems
- Reduce, Reuse and Recycle Material and Waste
- Optimize Sustainable Management Practices During Stewardship
Green Cleanup Standard Initiative: 2009-2011 Timeframe

- Establish criteria for SDOs
- Draft GCS Framework
- Conduct outreach
- Collaborate with SDO
- Draft GCS Framework
- Finalize GCS Approach
- State Incentives Paper
- Certification & Incentives Options Paper
- Finalize program-specific recognition
- Evaluate standards & conduct pilot projects

**Timeline:**
- Jan: Finalize GCS
- Feb: Conduct outreach
- March: Collaborate with SDO
- April: Draft GCS Framework
- May: Interview SDOs
- June: State Incentives Paper
- July: Certification & Incentives Options Paper
- Aug: Finalize program-specific recognition
- Sept: Continue work with SDO
- Oct: Finalize program-specific recognition
- Nov:
- Dec:

GCS: green cleanup standard
SDO: standard development organization
Key Questions for Your Input

a. Are voluntary standards a viable approach?
b. Are we targeting the right core elements?
c. What should the boundaries be?
d. Should the boundaries/standards apply to projects, practices, people?
e. Will the market bear the costs?
f. What incentives are needed?
g. What certification approach might yield the best results?
h. Is there an SDO we should reach out to?
i. How should we measure results?
Take-Home Messages

- Act now, need not wait for policy changes or sophisticated tools to be developed
- Seek greening options at every stage of a site cleanup and redevelopment
- Be creative while also learning from others and share your experiences
- Stay involved – ASTM, ITRC, NEWMOA, ASTSWMO, cluin.org/greenremediation
www.clu-in.org/greenremediation

<table>
<thead>
<tr>
<th>Site Name</th>
<th>State</th>
<th>Energy Efficiency</th>
<th>Renewable Energy</th>
<th>Air Emission</th>
<th>Water</th>
<th>Land &amp; Ecosystem</th>
<th>Materials &amp; Waste</th>
<th>Stewardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Tus Air Force Base</td>
<td>OK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apache Powder</td>
<td>AZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barksdale Air Force Base</td>
<td>LA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP Casper</td>
<td>WY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP Paulsboro</td>
<td>NJ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Gulch</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crozet Orchard</td>
<td>VA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Sla Restoration Area</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former Clearwell Air Force Base</td>
<td>TX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former Fandula Landfill</td>
<td>NY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former Nebraska Ordnance Plant</td>
<td>NE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former St. Croix Alumina Plant</td>
<td>WI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fort Carson</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ASTSWMO: Greener Cleanups Task Force

- Facilitate cleanup decisions that increase the net environmental benefits of remediation, and in doing so, contribute to site sustainability.
- A cross-program task force representing CERCLA, RCRA, Tanks, Brownfields and Federal Facilities.
- Identify best practices and incentives for greener cleanups;
- Support State programs in their efforts to integrate these approaches into State remedy selection processes;
- Strengthen partnerships between the States and U.S. EPA to improve greener cleanup capacities; and
- Operate as a technical resource for other ASTSWMO task forces and sub-committees.

http://www.astswmo.org/resources_sustainability_greenercleanups.html
ITRC: Green & Sustainable Remediations Team:

Objectives (with some editorial liberty)

- How can we adopt GSR techniques to help better protect human health and the environment?
- Spotting greenwashing
- Development of a consensus technical and regulatory guidance document, at the national level, on how to incorporate green and sustainable approaches to environmental remediation.
- Development of surveys, data gathering and internet-based training modules for GSR approaches and their direct application at contaminated sites.
- How do we measure the GSR approaches success? What metrics do we use and how can we measure them?
- How do we promote the use and development of GSR technologies?

http://www.itrcweb.org/teampublic_GSR.asp
POC Tom O’Neil tom.o’neill@dep.state.nj.us