The State of **Greener Cleanups** in Massachusetts

Air & Waste Management Association – New England Section
FALL 2016 CONFERENCE

Thursday, October 27, 2016
Sheraton Framingham Hotel & Conference Center, Framingham

**Thomas M. Potter, Clean Energy Development Coordinator**
Cleanups have an Environmental Footprint

Remediation – 1996 to 2016
A) Incinerator & Restored Wetland
B) Groundwater Treatment Plant
C) Bauer, Inc.
D) Excavation
E) Backfilled Incinerated Ash
F) Cochato River
Challenge: To Lower the Environmental Footprint of Cleanup Projects

Greener Cleanups*

The practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions.

*as defined by US EPA, aka Green Remediation (no definition in Massachusetts)
Core Elements for Greener Cleanups

"Minimize, Reuse, and Recycle…"

Materials & Waste

"Reduction, Efficiency, and Renewables…"

Energy

"Conserve, Protect, and Restore…"

Land & Ecosystems

"Protect Air Quality, Reduce Greenhouse Gases…"

Water

"Improve Quality, Decrease Quantity of Use…"
Framework for **Greener Cleanups**

- **Greener Cleanup is a Process, not a Technology**
  - Greener cleanup principles should be integrated into cleanup projects
  - Applied on a phase-by-phase basis
  - Is not just about remedy selection and “green technologies”

- **Two tracks in Greener Cleanups**
  - **Qualitative** - Focus on how to incorporate BMPs (Best Management Practices) into projects
  - **Quantitative** Evaluation to help identify BMPs
Best Management Practices (BMPs)

Activities that, if applicable to the situation, typically will reduce the environmental footprint of a cleanup activity.

Examples:

– Use on-site generated renewable energy
– Recycle non-usable/spent materials & Equip.
– Implement idle reduction plans
– Minimize clearing of trees
– Establish green requirements (for example, SMPs and BMPs) as evaluation criteria in the selection of contractors and include language in RFPs,
Massachusetts Clean Energy

- 2007 established Executive Office of Energy & Environmental Affairs
- 2008 Green Communities Act (GCA)
  - Supports Development of Clean Energy Resources
  - Expands Efforts to Promote Energy Efficiency
  - Increased the Renewable Energy Portfolio Standard (RPS) to 1% per year.
  - Goal of 15% “New Sources” by 2020 (currently 9%)
- 2008 Global Warming Solutions Act
  - Comprehensive Program -> Climate Change
  - Goal 25 % Below 1990 GHG levels by 2020
ENERGY: RPS Programs Nationally

29 states + Washington DC + 2 territories have a renewable portfolio standard
(9 states and 2 territories have renewable portfolio goals)
EMISSIONS: GHG Emission Reduction Opportunities

Reduction Sources

Non-Energy

• vehicle AC
• stationary refrigerant
• Reducing SF6 in elec equip
• Reducing plastics GHG

Transportation

• Green DOT
• Fed/CA standards
• Fed Std for medium and heavy vehicles
• Fed RFS and regional LCFS
• Clean car consumer incentives
• PAYD pilot insurance
• Sustainable development
• Smart growth

Buildings

• efficiency/RGGI
• bldg codes
• bldg rating and labeling
• “deep” retrofits
• C&I oil
• solar thermal
• cooling/trees
• appliance stds

Electricity

• RPS
• EPA/Power plant rules
• Clean energy imports
• Clean Energy Performance Std

Executive Office of Energy and Environmental Affairs
• Launched 2011
• **Promotes Clean and Efficient Sources of Energy at MassDEP Regulated Sites (where we have authority or control)**
• Maximizes MassDEP’s Unique Expertise to Overcome Permitting & Siting Obstacles
• **Create economic growth and employment opportunities**
COMMISSIONER’S CERP GOAL

“Promote the use of Green Remediation/Greener Cleanups at state and federally regulated contaminated sites”

Brockton Brightfields, 425 kW solar PV

October 27, 2016
Core Elements of **Greener Cleanups**

- **Materials & Waste**: “Minimize, Reuse, and Recycle…”
- **Energy**: “Reduction, Efficiency, and Renewables…”
- **Air**: “Protect Air Quality, Reduce Greenhouse Gases…”
- **Water**: “Improve Quality, Decrease Quantity of Use…”
- **Land & Ecosystems**: “Conserve, Protect, and Restore…”

**RPS Compliance**

**GHG Reduction / Climate Change Mitigation**

*October 27, 2016*
WASTE: “Landfills Last” - Materials Management Framework

- **2008 Goal** - Significantly reduce the waste deposited in landfills

- **Waste Bans**
  - Asphalt Pavement, Brick & Concrete
  - Clean Gypsum Wallboard
  - Commercial Food Waste (Effective October 1, 2014)
  - Ferrous & Non-Ferrous Metals
  - Leaves & Yard Waste
  - Recyclable Paper, Cardboard & Paperboard
  - Treated & Untreated Wood & Wood Waste (Banned from Landfills Only)

October 27, 2016
WATER: Management of Water Resources

- **2008 Goal** - Work to bolster water quality and quantity by promoting best practices for better conservation, management and protection

- **Major Activities:**
  - Water Management Act
  - \textit{SWMI} – \textit{Sustainable Water Management Initiative}
LAND: Protecting Land And Ecosystems

- Minimize areas that need use limitations
- Minimize soil and habitat disturbance or destruction
- Use native species to support habitat
Core Elements of Greener Cleanups

“Minimize, Reuse, and Recycle…”

“Conserve, Protect, and Restore…”

“Reduce, Efficiency, and Renewables…”

“Protect Air Quality, Reduce Greenhouse Gases…”

“Improve Quality, Decrease Quantity of Use…”

Materials & Waste

Energy

Land & Ecosystems

Air

Water
MassDEP Efforts (2012 – 2016)

• GREENER CLEANUPS WORKGROUP (2012 – Present)
• REGULATORY AMENDMENTS (June 2014)
  – Consider eliminating/reducing impacts (Core Elements)
• GREENER CLEANUPS “GUIDANCE” (October 2014)
• LSP TRAINING
  – December 2014
• Greener Cleanups Leadership Recognition Incentive Program
310 CMR 40.0191
Response Action Performance Standard (RAPs)

• (3) The application of RAPS shall be protective of health, safety, public welfare and the environment and shall include, without limitation, in the context of meeting the requirements of this Contingency Plan, consideration of the following:

  – (e) eliminating or reducing, to the extent practicable and consistent with response action requirements and objectives, total energy use, air pollutant emissions, greenhouse gases, water use, materials consumption, and ecosystem and water resources impacts resulting from the performance of response actions through energy efficiency, renewable energy use, materials management, waste reduction, land management, and ecosystem protection.
Greener Cleanups Guidance (WSC #14 – 150)

- **DRAFT**
  - May 2014

- **COMMENTS**
  - July 2014

- **FINAL EFFECTIVE**
  - October 2014
Compliance Through Available Industry Standards & Guidance

- **USEPA, CLU-IN**, Green Remediation Focus (http://cluin.org/greenremediation/)
MassDEP Recommendation


- List of up to 160 BMPs’
Best Management Practices (BMPs)

Activities that, if applicable to the situation, typically will reduce the environmental footprint of a cleanup activity.

- “Best Engineering Practices”
- BMPs are organized on a technology or activity basis, but are applied based on the phase of the project
- BMPs assigned to EPA’s five core elements
- Also established 10 Categories
Green BMP Categories

1. Buildings
2. Materials
3. Power & Fuel
4. Project Planning & Team Management
5. Residual Solid & Liquid Waste
6. Sampling & Analysis
7. Site Preparation/Land Restoration
8. Surface/Storm Water Management
9. Vehicle & Equipment Management
10. Wastewater Management
# ASTM Standard Guide for Greener Cleanups

## BMP Table

<table>
<thead>
<tr>
<th>Category</th>
<th>Best Management Practice</th>
<th>Core Element Addressed (at Site Level)</th>
<th>Remediation Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Energy</td>
<td>Air</td>
</tr>
<tr>
<td>Buildings</td>
<td>Minimize the size of the housing for above-ground treatment systems and equipment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Buildings</td>
<td>Use energy recovery ventilation in buildings to allow incoming fresh air while capturing energy from outgoing, conditioned air</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Buildings</td>
<td>Reuse existing structures for treatment system, storage, sample management, etc.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Buildings</td>
<td>Build energy efficient heating and cooling into new buildings by using natural conditions such as prevailing wind directions for cooling/heating, passive solar building design, and/or existing</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Buildings</td>
<td>Design energy efficient HVAC systems (e.g., programmable heating and cooling systems)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Buildings</td>
<td>Property isolate buildings</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Buildings</td>
<td>Build energy efficiency lighting into new buildings by using natural conditions such as passive lighting and by using designed systems such as energy star lighting</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use dedicated materials when performing multiple rounds of sampling of all materials</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Purchase materials in bulk quantities and packed in reusable/recyclable containers and drums to reduce packaging waste</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use products, packing materials, and equipment that can be reused or recycled</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Prepare, store, and distribute documents electronically using an environmental management system</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Recycle all non-usable/plant equipment/materials following completion of project</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use materials that are made from recycled materials (e.g., steel, concrete, plastics and asphalt; )</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use a demonstration project with an on-site or local control, construction or renovation project to facilitate reuse of clean salvaged materials.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use on-site/local materials, when possible.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Steam-clean or use phosphate-free detergents or biodegradable cleaning products instead of organic solvents or acids to decontaminate sampling equipment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use wood based materials and products that are certified in accordance with the Forest Stewardship Council (FSC) Principles and Criteria for wood building components</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Use regenerable GAC for use in carbon beds</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials</td>
<td>Consider pretreating vapors to reduce relative humidity prior to treatment with vapor-phase GAC to improve adsorption efficiency when additional analysis supports approach</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
BMP Examples

AIR

• Use local laboratory to minimize impacts from transportation
• Implement an idle reduction plan
• Replace conventional vehicles with electric, hybrid, ethanol, or compressed natural gas vehicles

Waste Management

• Link a deconstruction project with a replacement construction project (for example, the same site of the deconstruction project or a local current construction or renovation project) to facilitate reuse of clean salvaged materials
• Salvage uncontaminated objects/infrastructure with potential recycle, resale, donation, or reuse
• Use products, packing material, and equipment that can be reused or recycled
FREE Access to View ASTM's Standard Guide for Greener Cleanups

- In partnership with USEPA, ASTM is offering a complimentary, 2-month viewing period (September 28 – November 30) for this standard. For complementary viewing of the Standard, go to www.astm.org/E2893-16.
Cleanups Required!

- Actions and remedies must eliminate, mitigate or prevent certain conditions, including an **Imminent Hazard**, a **Condition of Substantial Release Migration**, a **Substantial Hazard** and a **Critical Exposure Pathway**.

- Greener cleanup considerations **MAY NOT** be used to override these or any other MCP requirements.
Time-Critical Situations

• Time-critical situations (e.g., “2-hour” and “72-hour” reportable conditions under the MCP) are likely are not suitable for initial consideration of greener cleanup practices.

• However, once immediate risks and their causes have been addressed, greener cleanup practices should be considered.
Example A: Excavation and Surface Restoration

- **Asphalt Pavement:** from roads, parking lots, and similar sources
- **Brick and Concrete:** from construction activities and demolition of buildings, roads, bridges, and similar sources
<table>
<thead>
<tr>
<th>Category</th>
<th>BMP</th>
<th>Energy</th>
<th>Air</th>
<th>Water</th>
<th>Materials and Waste</th>
<th>Land and Ecosystems</th>
<th>Excavation and Surface Restoration</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td><strong>YES</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td><strong>X</strong></td>
</tr>
<tr>
<td>Materials</td>
<td>Use recycled content (for example, steel made from recycled metals, concrete and/or asphalt from recycled crushed concrete and/or asphalt, respectively, and plastic made from recycled plastic; tarps made with recycled or biobased contents instead of virgin petroleum-based contents)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td><strong>YES</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td><strong>X</strong></td>
</tr>
<tr>
<td>Materials</td>
<td>Link a deconstruction project with a replacement construction project (for example, the same site of the deconstruction project or a local current construction or renovation project) to facilitate reuse of clean salvaged materials</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
INCENTIVES

• Cleanup Cost Reductions/Savings
  – Implement BMPs that reduce or have no effect on the project cost, unless reason not to do so
  – If during implementation, new information or changed circumstances causes implementation of BMP to be cost-prohibitive, may elect not to implement

• Contracting requirements
  – MassDEP SARRS

• Leadership Recognition
2016 Massachusetts DEP
Greener Cleanups Leadership Recognition
*Incentive* Program

“MassDEP will recognize the person(s), entity, or project that demonstrates professional performance in applying Greener Cleanup principles and practices to reduce the overall net environmental footprint of response actions implemented under the Massachusetts Contingency Plan. Greener Cleanups aim to eliminate or reduce total energy use, air pollutant emissions, greenhouse gases, water use, materials consumption, and ecosystem and water resources impacts related to the assessment and cleanup of a disposal site.”
Eligibility & Consideration

- Any response action submittal completed in accordance with applicable requirements of the MCP in consideration of the “Greener Cleanup” core elements prescribed at 310 CMR 40.0191 and, as applicable, at 310 CMR 40.0858.
- Primary focus will be on:
  - MCP regulatory compliance and “Greener Cleanups Guidance”
  - Identification, prioritization, selection, implementation and documentation of feasible ASTM’s Best Management Practices (BMPs), and/or other technical equivalent.
- Internal BWSC Review Team - screened and scored universe.
Leadership Recognition - PROJECT

- **RA**: Modified Phase III Remedial Action Plan
- **RELEASE**: No source established. Soil, groundwater, and indoor air at the Site have been impacted by chlorinated volatile organic compounds (VOCs), primarily tetrachloroethylene (PCE).
- **REMEDY**: Surfactant enhanced ISCO treatment for unsaturated and saturated soil, and ISCO for groundwater
- **GC**: Qualitative BMP application (identification, selection, prioritization)
  - 88 BMPs Identified, 30 retained for remedial design
    - (5 CE: EN/A/MW/EC/W, 4 with High Priority)
  - BMP tables completed

October 27, 2016
<table>
<thead>
<tr>
<th>Category</th>
<th>Best Management Practice</th>
<th>Core Element Addressed</th>
<th>Priority</th>
<th>Retained?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Use dedicated materials when sampling</td>
<td>X</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>Materials</td>
<td>Purchase materials in bulk quantities and reusable containers to reduce packaging waste</td>
<td>X</td>
<td>Medium</td>
<td>Yes</td>
</tr>
<tr>
<td>Materials</td>
<td>Use products that can be reused or recycled</td>
<td>X</td>
<td>Low</td>
<td>Yes</td>
</tr>
<tr>
<td>Materials</td>
<td>Prepare, store and distribute documents electronically</td>
<td>X</td>
<td>Low</td>
<td>Yes</td>
</tr>
<tr>
<td>Materials</td>
<td>Recycle as much non-usable/spent equipment/materials as possible</td>
<td>X</td>
<td>Low</td>
<td>Yes</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Conduct hydraulic tracer tests to optimize hydraulic delivery of reagents</td>
<td>X</td>
<td>Low</td>
<td>Yes</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Operate remediation system during off-peak hours of electrical demand</td>
<td>X</td>
<td>Not applicable</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Install amp meters to evaluate consumption rates on a real time basis to evaluate options for off-peak energy usage</td>
<td>X</td>
<td>Not applicable</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Use on-site renewable energy</td>
<td>X X</td>
<td>Not applicable</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Insulate all applicable pipes and equipment to improve energy efficiency</td>
<td>X</td>
<td>Low</td>
<td>Yes</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Use solar power pack system for low-power system demands</td>
<td>X</td>
<td>Not applicable</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Purchase renewable energy via local utility to power cleanup activities</td>
<td>X X</td>
<td>Not applicable</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Employ auxiliary power units to power cab heating and air conditioning when machines not operating</td>
<td>X X</td>
<td>Low</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Use gravity flow to introduce amendments or chemical oxidants to the subsurface</td>
<td>X X</td>
<td>Low</td>
<td>No</td>
</tr>
<tr>
<td>Power and Fuel</td>
<td>Operate pumping equipment in pulsed mode when nearing asymptotic conditions</td>
<td>X</td>
<td>Not applicable</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 1 - Greener Cleanups BMPs (applicable to ISCO)

Page 2
• **Sample BMPs:**

  – **Select oxidants/reagents** with lower environmental burden

  – **Insulate** all applicable pipes and equipment to improve energy efficiency

  – **Establish green requirements** as evaluation criteria in the selection of contractors and include language in RFPs

  – **Use alternate drilling methods** including DPT (Direct Push Technology) or sonic drilling to minimize drill cuttings that require disposal
448 High Street Site, Medford
RTN 3-0028477

(View file at: http://public.dep.state.ma.us/SearchableSites2/Search.aspx)
Thank You!

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Thomas.Potter@state.ma.us

Clean Energy Results Program Website:
http://www.mass.gov/eea/agencies/massdep/climate-energy/energy/