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2018 Chlorinated Conference | April 8-12 | Palm Springs, CA

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Working on the Railroad: Implementation of Sustainable Remediation at a Programmatic Level

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SURF President, 2018

4/12/2018

NSRC Program Objectives

- ✓ Implement the Sustainable Remediation (SR) Program across NSRC's entire portfolio of remediation sites;
- ✓ Use a tiered approach that matches the complexity of the SR assessment with the size and complexity of the project;
- ✓ Provide the SR Guidance to all NSRC's consultants and require that they implement it at all sites at the appropriate tier; and
- ✓ Roll up the quantified metrics at year-end to demonstrate progress and allow for a quantitative summary of the SR program's impact.

Sustainable Remediation Program Development

– SR Priority Metrics for NSRC
  - Air Emissions (GHG, NO_x, SO_x, PM_{10})
  - Water Consumption
  - Electricity Usage
  - Landfill Disposal (Hazardous & Non-Hazardous)
  - Topsoil Consumption
  - Cost
  - Lost Hours – Injury
  - Percent Electricity from Renewable Sources

– These metrics go beyond the standard CERCLA evaluation criteria, and state requirements

Remedy Evaluation Criteria Under CERCLA

- ✓ *Overall protection of human health and the environment;*
- ✓ *Compliance with [applicable or relevant and appropriate requirements (ARARs)];*
- ✓ *Long-term effectiveness and permanence;*
- ✓ *Reduction of toxicity, mobility, or volume;*
- ✓ *Short-term effectiveness;*
- ✓ *Implementability;*
- ✓ *Cost;*
- ✓ *State acceptance; and*
- ✓ *Community acceptance*

Guidance Document

Project Types		Tools
Extremely Large, Costly, Complex	Tier 3 Quantitative	Lifecycle Analysis (LCA)
Complex Diesel Fuel or Chlorinated Volatile Organic Compound (CVOC) Release	Tier 2 Simple Quantitative	Spreadsheet Calculator (e.g., SiteWise™)
Simple UST Release Site	Tier 1 Qualitative	Narrative or Checklist (e.g., GSRx™)

Tier 1: Qualitative Assessment with BMPs

- Not intended to be used for evaluation of sustainability of remedial alternatives

- BMP Selection Process:
  1. BMP Opportunity Assessment
  2. BMP Selection
  3. BMP Implementation
  4. BMP documentation

- Think about: *How has implementation of the selected BMPS positively impacted the sustainability of this project?*

BMP Tool – AECOM GSRx™

Best Management Practices: Site Remediation and Sustainability

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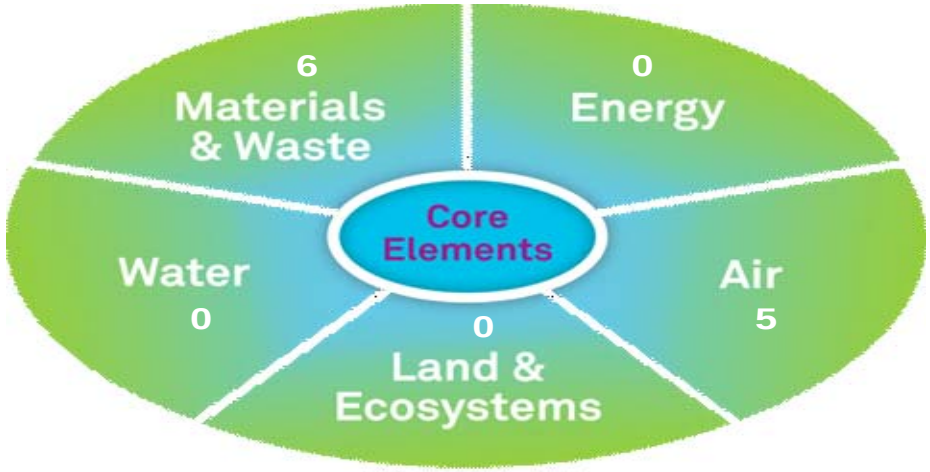
List of Relevant Sustainability Practices Incorporated in This Project

Category and Practice	*Project-Specific Details*
Project_Management	
Identify opportunities for resource sharing with other sites within a portfolio	
Include milestones to complete remedial site optimization process in site schedules	
End_Use_Design	
Carbon footprint has been evaluated for all major activities associated with the site	
Procurement	
Consider the use of products with recycled, rapidly renewable, and bio-based materials.	
Provide materials from local sources (especially backfill material)	
Construction_Practices	
Consider in-situ waste characterization to reduce on-site stockpiling of waste	
Consider solid waste volume reductions when determining acceptable water content limits for off-site disposal	
Disposal_Reuse	
Evaluate onsite disposal and reuse options for waste material.	
Segregate materials for recycling off-site versus disposal in an off-site landfill	
Community	
Implement a plan to include external stakeholders in decision-making	
Consider local sources of field labor	
OnSite_Treatment	
Consider treatment system use only during off-peak utility periods to reduce energy costs.	
Habitat_Ecosystem	
Consider the use of on-site habitats to treat collected stormwater	
Sampling_Monitoring	
Consider the use of direct sensing technologies to obtain geological, geotechnical, and hydrogeological information.	

Management Practices Selected, by EPA Core Element



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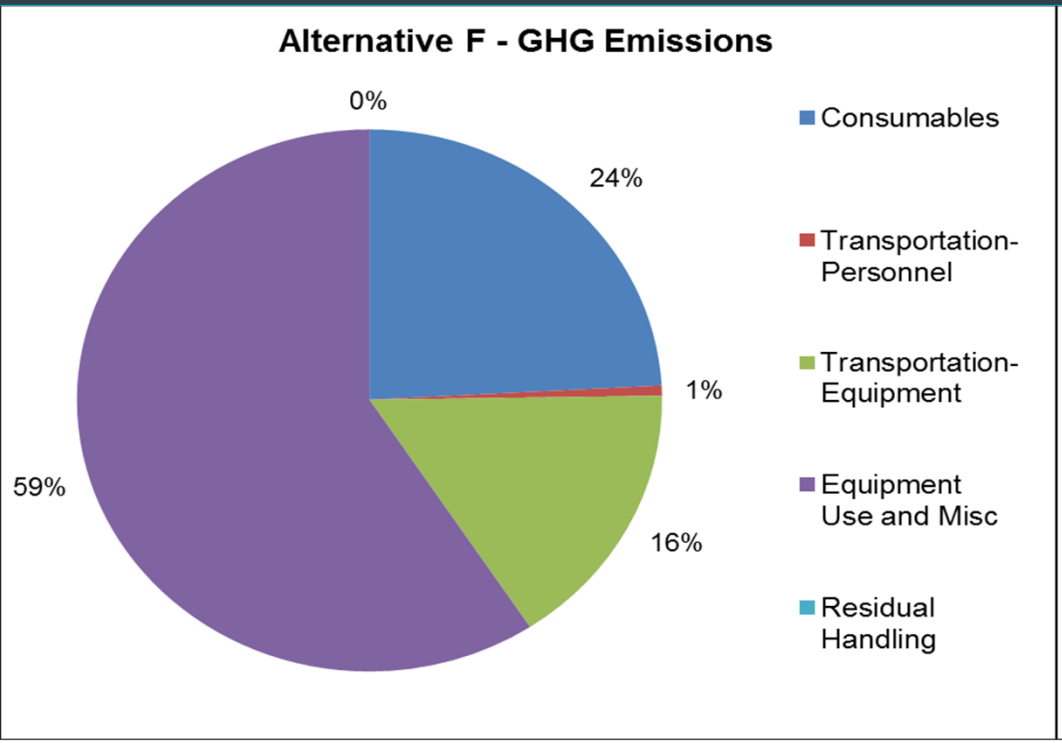
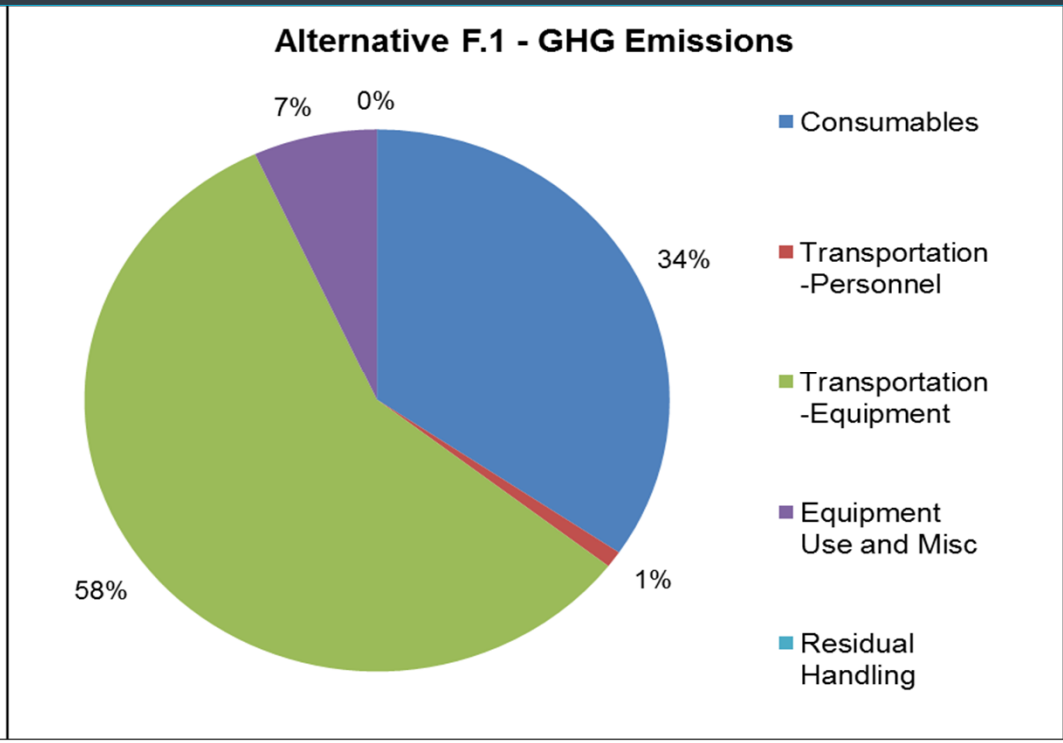
Tier 2: Quantitative Analysis - SiteWise™

- Widely used tool to calculate and compare environmental footprint of remedial alternatives
- Includes inputs for various remediation activities including:
  - Transportation
  - Equipment use
  - Waste handling
  - Raw materials
  - Well installation

- Considers life-cycle impacts from remedial actions including emissions due to manufacturing of materials consumed during remedial action
- SiteWise™ reported metrics align with NSRC priority metrics.

SiteWise™ Outputs Examples – GHG Comparison





Total GHG emissions for Alternative F:
1,844 metrics tons

Total GHG emissions for Alternative F.1:
375 metric tons

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SR Program Implementation to Date

- To date the NSRC SR program has been implemented at 11 AECOM managed sites
  - 3 Tier 2 Assessments
  - 9 Tier 1 Assessments

- Project phases:
  - Investigation
  - Project Planning
  - Construction
  - Operation Maintenance and Monitoring
  - Post Construction Monitoring

Project Profile #1: Mixed Use Lease Property, SC

Assessment Level: Tier 1

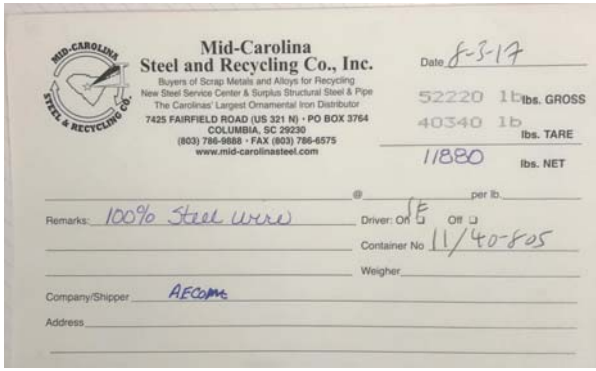
Project Phase: Remedial Construction

Remedial Action: Shallow Excavation,

~ 22,800 tons of soil & debris

Project Sustainability Highlights:

- Waste segregation enabled cost savings and environmental benefits
  - o Local disposal facility – 23 miles
  - o Local backfill materials – 11 miles
- 12.46 tons of scrap metal recycled locally – 8 miles
- 50 railroad ties taken to local railyard for beneficial reuse



Project Profile #2: Former Wood Processing Facility, SC

Assessment Level: Tier 1

Project Phase: Remedial Construction

Remedial Action: Pilot Testing, Interim Excavation,

~ 9,000 tons of soil & debris

Management Practices Selected, by EPA Core Element

Project Sustainability Highlights:

- Waste segregation minimized long distance disposal
- Local disposal facility (<20 miles) utilized when possible
- Minimize mature tree removal
  - o Trees that were removed were chipped to create mulch based roadway onsite
- Estimated 1,680 miles saved by carpooling
- ~18 tons of scrap metal consolidated for local recycling

Project Profile #2: Former Wood Processing Facility, SC

- Phytoremediation pilot study for treatment of residual arsenic currently in progress
- Expected sustainability benefits:
  - o Improve aesthetics of area and neighborhood
  - o Provide beneficial environmental habitat

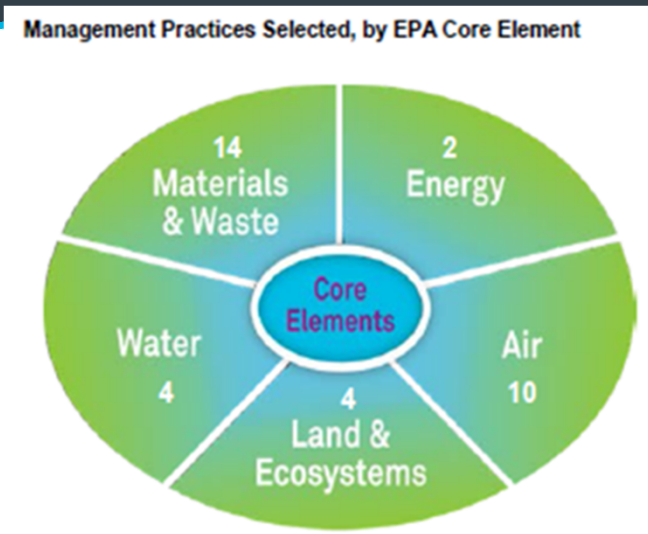
Project Profile #3: Former Fueling Area, GA

Assessment Level: Tier 1

Project Phase: Remedial Construction

Remedial Action: Excavation,

~ 22,800 tons of & debris



Project Sustainability Highlights:

- Estimated 2,175 miles saved by carpooling and utilizing local labor and disposal sources
- 92 tons of material recycled (trees, metal, asphalt)
- Estimated $3,700 project cost savings due to sustainability efforts and BMP implementation

Project Profile #3: Former Fueling Area, GA

Assessment Level: Tier 2

Project Phase: Planning, Alternative Assessment

Remedial Alternative 1: Discharging the treated water to the POTW, via above ground piping, to a manhole approximately 200 feet from the excavation area.

Remedial Alternative 2: Transporting the treated water via vacuum trucks to the rail yard WWTP, located approximately 1.5 miles from the excavation area.

Remedial Alternatives	GHG Emissions	Total Energy Used	Total NO_x Emissions	Total SO_x Emissions	Total PM_{10} Emissions	Costing
	metric ton	MMBTU	metric ton	metric ton	metric ton	$
Treated Water to POTW	33.63	318.16	0.05	0.03	0.01	155,000
Treated Water to Onsite WWTP	254.50	1515.76	6.38	1.36	0.18	360,000

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Lessons Learned

- Starting discussion early on with contractors, i.e. during the bid walk, sets up expectations and clearly shows SR program requirements

- Incorporation of sustainability into daily tailgate meetings keeps field staff engaged and focused

- Frequent discussion of sustainability goals during project status calls helps track progress and identify areas of improvement

- Field implementation of selected BMPs can sometimes be challenging
  - Recycling

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Path Forward – Program Improvements

1. Adopted use of subcontractor bid specifications for tracking of BMP implementation
   - Recognized shortcoming in BMP tracking during field work
   - Used GSRx™ Detail Report for field crew to record observations

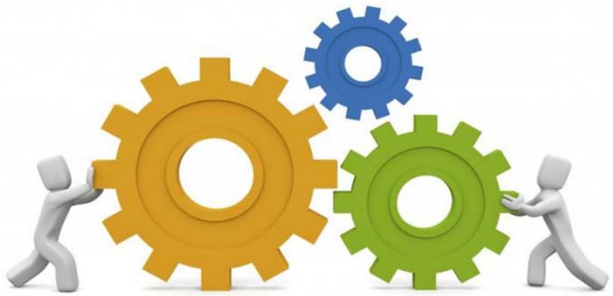
2. Initiation of a subcontractor "scoring/tracking" system to keep track of contractor performance in relation to SR integration into their work

3. Development and implementation of a consistent metric tracking approach for Tier 1 Sites – Field Checklist
   - Qualitative assessments still can have measurable benefits
     - o Recycling
     - o Travel Miles Saved
     - o Beneficial Reuse of Materials
     - o Idle Reduction Time
     - o Cost Savings

The Broader Perspective – Value of SR Programs

- Driving Factors in Program Development:
  - Corporate philosophies of sustainability and environmental stewardship
  - Desire for consistent approach for application of sustainability
  - Corporate sustainability reporting now widely practiced

- Many sustainability benefits are linked
  - Gaining efficiency often results in cost savings
  - Cost saving measures may lead to environmental and social benefits



References

– AECOM, 2016 NSRC Sustainable Remediation Program Guidance Document

– SURF: http://www.sustainableremediation.org

Acknowledgements

– AECOM Project Team Members

– NSRC Project Managers
  - Scott Pittenger
  - Steven Aufdenkampe

Thank You!

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