

14th Annual OSC Readiness Training Program

Greening Response Actions III

Date: January 31, 2011

Time: 1:30 p.m. – 5:30 p.m.

Training by OSCs for OSCs



January 31 – February 4, 2011
Orlando, Florida

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Agenda

1. Welcome / Background (Carlos Pachon, EPA HQ)
2. Legal Authorities (Thanne Cox, Region 9)
3. Case Studies
 - o Greg Fife, Region 6
 - o Earl Liverman, Region 10
 - o Jordan Garrard, Region 4
 - o Kevin Matheis, Region 2
4. Tools / Resources (Alyssa Hughes, Region 4)
5. Wrap-Up (Carlos Pachon, EPA HQ)

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1. **Welcome / Background (Carlos Pachon, EPA HQ):** This section will introduce the course, provide updates on national and regional policy, and relay the current challenges to implementing green removal actions.
2. **Legal Authorities (Thanne Cox, Region 9):** This section will discuss how the authorities in CERCLA and the NCP are used to support green removal actions and how green removal actions can be implemented as fund- and PRP-lead actions.
3. **Case Studies:** This section will highlight case studies where OSCs have planned for and implemented green removal actions and will cover how the authorities, funding, action memo, and contracts were addressed for each case study. Case studies to be presented in this section include:
 - Delfasco Vapor Intrusion, Greg Fife, Region 6
 - Idahao Mill and Mine Sites, Earl Liverman, Region 10
 - Gulf States Steel, TDB, Region TBD
 - Barker Chemical, Kevin Matheis, Region 2
4. **Tools / Resources (Alyssa Hughes, Region 4):** This section reviews the tools and resources available to OSCs for planning and implementing a green removal action, including written information and technical experts.
5. **Wrap-Up (Carlos Pachon, EPA HQ)**

What is “Green Remediation”*?

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

*AKA ‘greening response actions’, ‘greener cleanups’, etc

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What is “Green Remediation”?: Green Remediation is the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions. While preventing and cleaning up contamination is inherently “green”, the terms green cleanup, greener cleanup, and green remediation are used by EPA OSWER cleanup programs interchangeably. It is the thought of the EPA OSWER Greener Cleanup Principles that all cleanup approaches, and all elements of the cleanup process, can be optimized to enhance their overall environmental outcome; therefore, green remediation involves more than merely adopting a specific technology or technique.

Policy Drivers at Many Levels

EO 13514: Federal Leadership in Environmental, Energy, and Economic Performance

It is the policy of the United States that Federal agencies shall increase energy efficiency; measure, report, and reduce their greenhouse gas emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and stormwater management; eliminate waste, recycle, and prevent pollution
(President Obama)

EPA Strategic Plan: 2011-2015 Goal 3- Cleaning Up Communities and Advancing Sustainable Development

EPA's hazardous waste programs are working to reduce the energy use and environmental footprint during the investigation and remediation of sites
(Administrator Lisa Jackson).

OSWER Policy: Principles for Greener Cleanups

As a matter of policy, OSWER's goal is to evaluate cleanup actions comprehensively to ensure protection of human health and the environment and to reduce the environmental footprint of cleanup activities, to the maximum extent possible.
(OSWER A.A. Mathy Stanislaus)

EPA Regional Policies: Principles for Greener Cleanups

(Regional Cleanup Program OD/DDs)

Notes:

EO 13514: Federal Leadership in Environmental, Energy, and Economic Performance: In this Executive Order, President Barack Obama stresses that “It is the policy of the United States that Federal agencies shall increase energy efficiency; measure, report, and reduce their greenhouse gas emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and stormwater management; eliminate waste, recycle, and prevent pollution”

EPA Strategic Plan: In Goal 3 (Compliance and Environmental Stewardship) of the EPA Strategic Plan 2011-2015, EPA Administrator Lisa Jackson stated that “EPA’s hazardous waste programs are working to reduce energy use and environmental footprints during the investigation and remediation of sites.” Sub-objective 5.2.1 (Prevent Pollution and Promote Environmental Stewardship) states that EPA will reduce pollution, conserve natural resources, and improve other environmental stewardship practices while reducing costs through implementation of EPA’s pollution prevention programs.

Related to this, Goal 1 (Clean Air and Global Climate Change) has the following components:

Goal: Protect and improve the air so it is healthy to breathe and risks to human health and the environment are reduced. Reduce greenhouse gas intensity by enhancing partnerships with businesses and other sectors.

Objective 1.3: Protect the Ozone Layer

Strategic Targets:

- By 2015, reduce U.S. consumption of Class II ozone-depleting substances to less than 1,520 tons per year of ozone depleting potential from the 2003 baseline of 9,900 tons per year.

Objective 1.5: Reduce Greenhouse Gas Emissions

Sub-objective 1.5.1: Buildings Sector:

- By 2012, 46 MMT of carbon equivalent will be reduced in the buildings sector (compared to the 2002 level).

Sub-objective 1.5.2: Industry Sector:

- By 2012, 99 MMT of carbon equivalent will be reduced in the industry sector (compared to the 2002 level).

Sub-objective 1.5.3: Transportation Sector

- By 2012, 15 MMT of carbon equivalent will be reduced in the transportation sector (compared to the 2002 level).

OSWER Policy: Principles for Greener Cleanup: On August 27, 2009, EPA OSWER Assistant Administrator Mathy Stanislaus stated that “As a matter of policy, OSWER’s goal is to evaluate cleanup actions comprehensively to ensure protection of human health and the environment and to reduce the environmental footprint of cleanup activities, to the maximum extent possible.”

EPA Regional Policies: All ten EPA Regions have established policies to implement the Principles for Greener Cleanups. All of these EPA Regional policies cover multiple cleanup programs, and 50 percent apply to all programs. Individual states also have similar policies and state associations are partnering together to work more efficiently.

OSWER Principles for Greener Cleanups

- Consistent with existing laws and regulations, it is OSWER policy that all cleanups:
 - Protect human health and the environment
 - Comply with all applicable laws and regulations
 - Consult with communities regarding response action impacts consistent with existing requirements
 - Consider recommended five core elements

This is an incremental improvement in the implementation of our mission.

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Consistent with existing laws and regulations, it is OSWER policy that all cleanups:

- Protect human health and the environment
- Comply with all applicable laws and regulations
- Consult with communities regarding response action impacts consistent with existing requirements
- Consider recommended five core elements

As tools are developed and deployed, when it is feasible to use greener cleanup approaches, OSWER cleanup programs will document how these five elements were considered and implement best practices to reduce the environmental footprint of cleanups. The nature of greener cleanup assessments can vary with the complexity of the site, program and community priorities, and the availability of tools. Assessment activities should be performed in a transparent manner involving the community and other stakeholders and describe how the programs have considered the items above.

Core Elements of Greener Cleanups

- Fits within existing frameworks
- Opportunities exist throughout process
- Addresses core elements



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Common Themes

- Fits within existing frameworks:** Removal actions and the eventual reuse of contaminated sites will likely consume significant amounts of energy, considerably impact natural resources, and affect the infrastructures of surrounding communities. The EPA OSWER Green Cleanup Principles states that when considering green remediation, cleanup programs will assure that the cleanups and subsequent environmental footprint reduction occur in a manner that is consistent with statutes and regulations governing EPA cleanup programs and without compromising cleanup objectives, community interests, the reasonableness of cleanup timeframes, or the protectiveness of the cleanup actions. Cleanup and reuse of contaminated sites will consume significant amounts of energy, considerably impact natural resources, and affect the infrastructures of surrounding communities.
- Opportunities exist throughout process:** Site-specific strategies must take into account the unique challenges and characteristics of a site and the fact that no single solution exists. At all sites, however, key opportunities for integrating core elements of green remediation can be found when designing and implementing cleanup measures. As cleanup technologies continue to advance and incentives evolve, green remediation strategies offer significant potential for increasing the net benefit of cleanup, saving project costs, and expanding the universe of long-term property use or reuse options without compromising cleanup goals.
- Address core elements:** The following elements of a green cleanups may assist in the evaluation and documentation used in selecting and implementing protective cleanup activities during removal actions.

Air: Green remediation strategies for air quality protection build on requirements or standards under the Clean Air Act, Energy Policy Act, and Energy Independence and Security Act. Cleanup at many sites involves air emissions from soil or groundwater treatment processes and often requires use of heavy diesel-fueled machinery to install and sometimes modify treatment systems. BMPs focus on opportunities to further reduce emission of greenhouse gas and criteria pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead).

Water: Green remediation strategies for water quality protection and conservation build on federal mandates such as the Clean Water Act, Energy Independence and Security Act, and Executive Order 13423. Cleanup at many sites involves high consumption of water for treatment processes such as contaminated sediment dewatering or soil washing, and at all sites requires management plans for stormwater runoff control during remedy construction and maintenance. BMPs focus on opportunities to reduce quantities of water consumed (intensity) during cleanup, re-use treated water, store or divert stormwater for beneficial use, and preserve natural hydraulic conditions.

Land and Ecosystems: Green remediation strategies for land and ecosystems capitalize on a "whole-site" approach that accelerates cleanup while returning a site to its natural conditions. Ecological restoration and preservation at sites anticipated for full or partial reuse as greenspace are best managed through site surveys and careful master planning. BMPs focus on opportunities to preserve natural land features, maintain open space, sequester carbon, enhance biodiversity, increase wildlife habitat, and minimize surface and subsurface disturbance.

Materials and Waste: Green remediation strategies for materials and waste management build on federal mandates such as Executive Order 13423 as well as related programs of state and local agencies. The strategies encourage decision makers to consider product life cycles during remediation planning, and to collaborate with local organizations such as recycling businesses and municipal waste authorities. BMPs focus on opportunities to reduce waste generation, recycle spent products, reuse materials, salvage items for donation or resale, beneficially use industrial byproducts, and purchase environmentally preferred products.

Energy: Green remediation strategies for energy build on requirements or standards under the Energy Policy Act of 2005, as strengthened by Executive Order 13423, and the Energy Independence and Security Act of 2007. Cleanup at many sites involves use of energy-intensive technologies such as pump-and-treat (P&T), thermal desorption, multi-phase extraction, air sparging, and soil vapor extraction. BMPs focus on opportunities to improve energy efficiency of onsite equipment and buildings, meet electricity demands of treatment systems through renewable energy instead of fossil-fuel based energy, and reduce consumption of petroleum-based fuels for routine vehicles and heavy machinery.

Core Elements: Air

- Reductions
- Alternative vehicles
- Advanced diesel technology
- Alternative fuels and additives
- Vehicle and equipment efficiency



Diesel multistage filter retrofitting of this emergency response vehicle was completed in 2008 as part of Region 10's ongoing clean emission initiative.



Diesel oxidation catalysts, diesel particulate filters, selective catalytic reduction, and ultra-low sulfur diesel are options for reducing emissions from onsite equipment.

Notes:

Core Elements: Air

-Reductions: Lower air emissions lead to reductions in harmful particulate matter, ground-level ozone precursors, and the atmospheric release of toxic or priority pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead). This includes modifying field operations through combined activity schedules as well as reducing equipment idle.

-Alternative vehicles: Includes replacing conventional engines of existing vehicles when feasible, and purchasing new vehicles that are equipped to operate on hybrid systems or alternative fuel and meet the latest engine standards.

-Advanced diesel technology: Includes retrofitting machinery for diesel-engine emission control and exhaust treatment technologies such as particulate filters and oxidation catalysts.

-Alternative fuels and additives: Includes refueling with cleaner fuels such as ultra-low sulfur diesel.

-Vehicle and equipment efficiency: Includes maintaining engines of service vehicles in accordance with manufacturer recommendations involving air filter change, engine timing, and fuel injectors or pumps and minimizing the use of vehicles and heavy equipment requiring high volumes of fuel.

Core Elements: **Water**

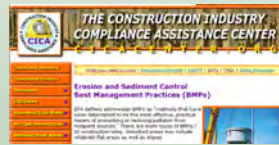
- Minimum fresh water use & maximum reuse
- Prevention of water quality impacts
- Reclamation
- Alignment with proposed EPA rule on construction effluent



Rock-filled stormwater channels and erosion control blankets used for excavation and backfilling at former U.S. Navy landfill



Portable closed-loop wheel washing systems for reducing onsite and offsite trackout during construction



<http://cicacenter.org/cs.cfm>

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Core Elements: **Water**

-Minimum fresh water use and maximum reuse: Includes minimizing fresh water consumption, possibly through the substitution of potable with non-potable water whenever possible, and maximizing water reuse during daily operations and treatment processes. This could also include the use of native vegetation that requires little or no irrigation,

-Prevention of water quality impacts: Includes preventing impacts such as nutrient loading in nearby water bodies, as well as reducing and controlling stormwater runoff in manners that mimic the area's natural hydrologic conditions,

-Reclamation: Includes maximizing efforts to reclaim treated water for beneficial use, such as irrigation, or re-inject it into an aquifer, rather than discharging to surface water.

-Alignment with proposed EPA rule on construction effluent: Where treatment processes result in wastewater discharge to surface water or POTWs, green remediation strategies build on criteria of EPA's effluent guidelines. Best practices for wastewater treatment, including any resulting in pollutant discharge significantly below regulatory thresholds, can be recorded in associated NPDES permits.

Core Elements: Land and Ecosystems

- Minimal habitat disturbance
- Soil and sediment protection
- Use of local byproducts
- Ecosystem restoration and protection practices



*Metal salt crust **before** Superfund removal actions on 20 target acres along the river*



*Ten years **after** applying municipal biosolids and assorted nutrients along the upper Arkansas River in Colorado*



"I promise I'll walk and feed him"

... alligator rescues during removal actions at contaminated swampland in Georgia

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Core Elements: Land and Ecosystems

-Minimal habitat disturbance: Includes activities that minimize unnecessary habitat disturbance or destruction and reducing noise and lighting that could affect sensitive species, while appropriately relocating affected animals.

-Soil and sediment protection: Includes the prevention of soil or sediment loss from erosion, compaction, or uncontrolled traffic. Potential strategies for erosion and sedimentation control include stockpiling of topsoil for reuse, temporary and permanent seeding, mulching, earth dikes, silt fencing, straw-bale barriers, sediment basins, and mesh sheeting for ground cover.

-Use of local byproducts: Includes the use of available, low-cost materials such as mulch, woodchips, fly ash, or agricultural byproduct.

-Ecosystem restoration and protection practices: Includes planting native plants that require minimal irrigation, mowing, or chemical inputs such as fertilizers, while prohibiting invasive plants or noxious weeds.

Core Elements: Materials and Waste

- Streamlining site cleanups
- Reuse and recycling of materials
- Reduction of secondary wastes
- Passive sampling devices
- Minimized extraction and disposal of natural resources



10,000³-yd soil removal in Georgia yielding 280 tons of scrap steel and 58 tons of tin left by past wood treating



Triad planning for 10-day mobilization to investigate plus conduct removal at Paducah GDP in Kentucky, and only 23 lab samples



Concrete salvaging during cleanup at Barksdale AFB in Louisiana to help meet federal "greening the government" goals

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Core Elements: Materials and Waste

-Streamlining site cleanups: Site cleanups often inherently require demolition work, the use of raw materials, and generation of large volumes of waste. A site management plan should include waste planning practices that apply to all cleanup and support activities and aim to minimize consumption of virgin materials .

-Reuse and recycling of materials: Includes the beneficial reuse of waste materials (e.g., concrete made with coal combustion products replacing a portion of the Portland cement) and considering every opportunity to recycle materials such as land-clearing debris, cardboard, metal, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet, and insulation.

-Reduction of secondary wastes: Includes the reduction of secondary wastes such as soil corings, wastewater, expended chemicals, routine supplies, and single-use materials.

-Passive sampling devices: Includes the use of passive sampling techniques for monitoring quality of air, sediment, and ground or surface water over time. In contrast to traditional methods involving invasive spot-checking, these methods provide for steady data collection at less cost while generating less waste.

-Minimized extraction and disposal of natural resources: Green remediation practices for waste management encourage consumers to consider lifecycle cost (including natural resource consumption) of products and materials used for response activities.

Core Elements: Energy

- Optimized technologies
- Energy efficient equipment
- Renewable energy systems



Portable microsolar weather stations for rapid response or long term actions; vendors such as Weatherhawk offer EPA "first responder" preferred pricing



Portable PV system for 5-month SVE operations after oil pipeline break at Rocky Mountain House air base in Alberta, Canada



PV array for pumping 2-3 gpm of water through a low-energy mulch bioreactor at Altus AFB

Solar powered skimmers for removing floating oil from wells or holes up to 100 feet deep, without the need for pumps



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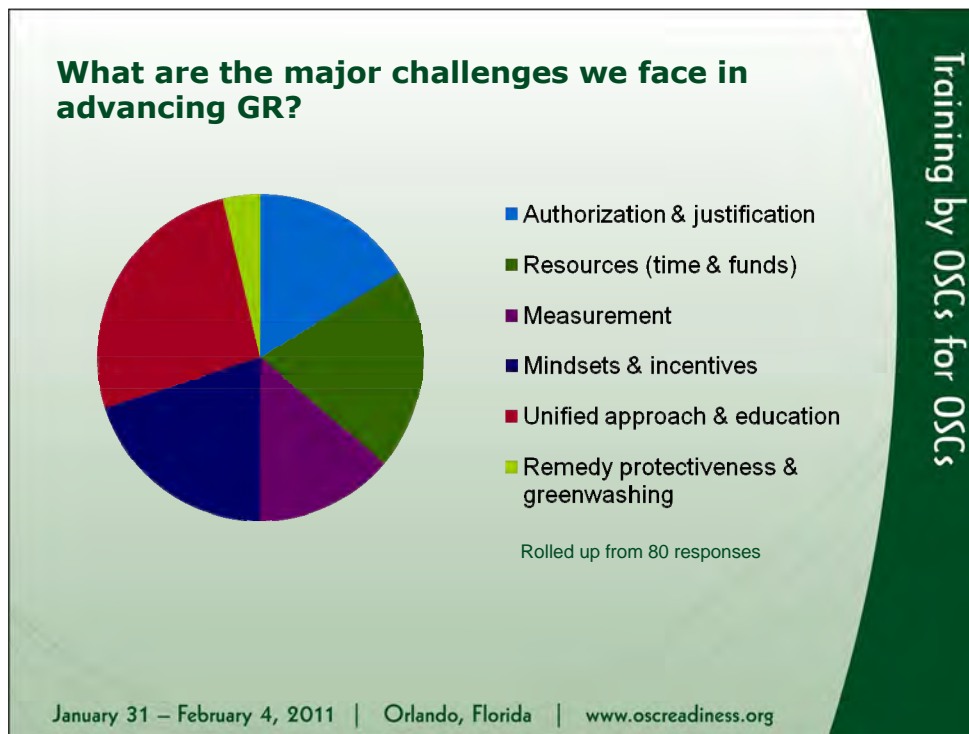
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Core Elements: Energy

Optimized Technology: Includes the consideration of optimized passive-energy technologies (with little or no demand for external utility power) that enable all cleanup goals to be met. Energy intensive equipment such as pumps and blowers are often oversized or set at operating rates or temperatures higher than needed, resulting in excess energy consumption.

Energy efficient equipment: Includes the utilization of energy efficient equipment and the maintenance of equipment at peak performance to maximize efficiency. Equipment with high energy demands should be periodically evaluated to ensure energy efficiency.

Renewable energy systems: Includes the installation of renewable energy systems (possibly in remote locations) to replace or offset electricity requirements otherwise met by the utility. Energy alternatives already available for removal actions include solar, wind, landfill gas, and waste-to-energy sources and emerging technologies such as geothermal and tidal power also could be used for site-wide applications or as means to optimize treatment system components.



Notes:

What are the major challenges we face in advancing GR?: When this question was recently posed to EPA Regions and Programs, the six common responses were:

- Authorization and justification
- Resources (time and funds)
- Measurement
- Mindsets and incentives
- Unified approach and education
- Remedy protectiveness and greenwashing

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Module 2: Legal Authorities

Thanne Cox, Assistant Regional Counsel, EPA Region 9

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Green Remediation and CERCLA Removal Actions

- Once statutory and regulatory triggers are met, NCP Section 300.415(b)(1) states:
 - o "... the lead agency may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release."
 - o NCP does not dictate how actions are to be conducted

Green Remediation is an Implementation Issue

- Implementation issues are determined by the OSC considering many different factors, including best management practices, health and safety, and community interests
- Examples of just a few implementation issues
 - o Operating hours
 - o Specific equipment to use
 - o Need for internet connection
 - o Office space and office equipment
 - o Landscaping for site restoration
 - o Future use of site
 - o Use of local subcontractors

Removal v. Remedial

- Removal Factors: factors to consider when determining if a response action is warranted. These factors have no bearing on how the response action is implemented. See NCP § 300.415(b)(2).
- Remedial Nine Criteria: criteria used to evaluate different remedial alternatives. Within this analysis, EPA must consider how the response will be implemented before choosing a remedial action. See NCP § 300.430(e)(9)(iii).

NCP Section 300.415(b)(2) Factors:

- Actual/potential exposure to humans, animals, or the food chain
- Actual/potential contamination of drinking water or sensitive ecosystems
- Haz substances, pollutants or contaminants in containers which pose a threat of release
- Haz substances, pollutants or contaminants in soils that may migrate
- Weather conditions which could cause a release or migration of haz substances, pollutants or contaminants
- Threat of fire or explosion
- Other federal response mechanisms
- Other threats not listed above

Nine Criteria for Remedial Actions NCP Section 300.430(e)(9)(iii)

- 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 through Treatment
- Short-term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

Cost Recovery

- Can EPA Recover Costs for Fund-Lead Removal Actions that employ Green Remediation concepts?
- CERCLA Section 107(a)(4)(A) and NCP Section 300.700(c)(1):
 - o Responsible parties shall be liable for all response costs incurred by the United States government or a State or an Indian tribe not inconsistent with the NCP

Consistency with the NCP

- All response costs can be recovered as long as those costs are “not inconsistent with the NCP”
 - CERCLA and the NCP provide the lead agency great discretion in how removal actions are implemented once the lead agency determines that a removal action is necessary
- Implementation of green remediation concepts should not be inconsistent with the NCP

Potential Cost Recovery Issues

- What arguments do we anticipate from PRPs?
 - Nine Criteria were not considered
 - The increase in overall site costs (i.e., costs doubled, tripled) was exorbitant
 - If the PRP did the work, EPA could not have required GR technology; therefore, PRP should not reimburse EPA for these costs
- None of these arguments present an inconsistency with the NCP problem.
 - However, be aware of decisions which might invite legal challenges

What About PRP-Lead Removal Actions?

- Actions conducted under Administrative Orders on Consent
 - The use of green remediation concepts could be negotiated with the PRP and made a part of the work plan
- Actions conducted under Unilateral Administrative Orders
 - There would be less flexibility in this case
 - UAOs would not necessarily compel the use of green remediation concepts
 - OSCs could, however, encourage the use of green remediation concepts on a voluntary basis
 - Don't forget to consider state ARARs which may require the use of cleaner technology

Delfasco Vapor Intrusion – A Green Remedy

Presenter: Greg Fife
Date: February 1, 2010
Time: Afternoon

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Delfasco Forge

- Delfasco Forge
- Grand Prairie, TX
- Vapor Intrusion
- RCRA Enforcement

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Delfasco Forge - History

- Delfasco, as in Delaware Forge and Steel Company
- Made practice bombs for DOD
- Outgrew the facility
- Auto repair shop now

Delfasco Forge

- Trichloroethylene used in the process
- Spills, releases, and poor housekeeping led to contamination of groundwater
- Residential to the north and east
- Direction of groundwater, Northeast.

Delfasco Forge Neighborhood.



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Delfasco Forge Neighborhood.

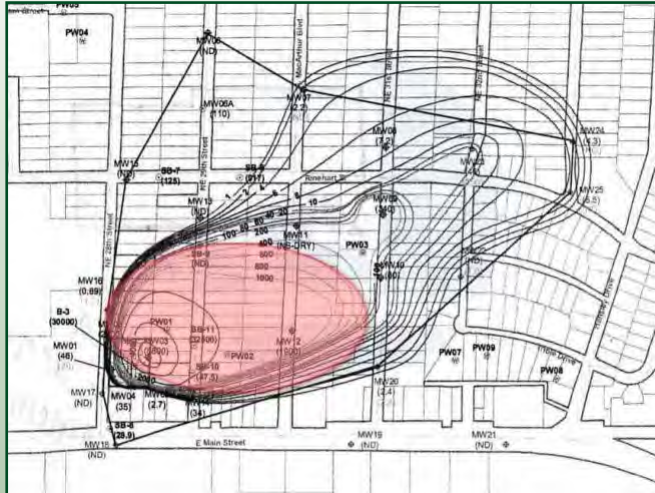


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Delfasco Groundwater Plume



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RCRA & TX Indoor Air Sampling



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Passive Soil Gas Sampling

- Semi-quantitative
- In-Ground
- 100 points
 - + dups, blanks
- 1-2 weeks
- \$18/sample
- Beacon Environmental

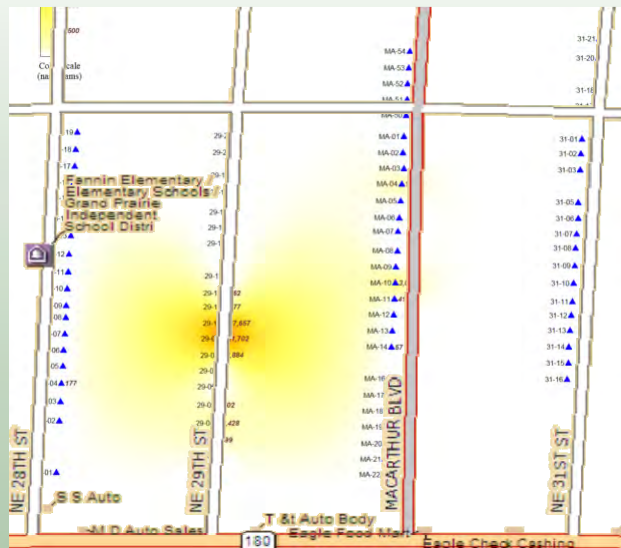


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Soil Vapor Results



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Crawl Space Fan

- Pier and beam construction
- Commercially available exhaust fans



Fan Comparison

- Radon fan - - 60-90 CFM
\$1,500 per unit
- Crawlspace fan - - 200 CFM
\$200 per unit
- Each fan running 24/7/365
- \$3 to \$8 per month

Impact of Electrical Cost on Budget

- \$8 per month, \$96 per year
- Compare to increase price of gasoline
- Federal Standard is 15,000 miles per year
- Avg miles per gallon is 21
- That is 714 gallons per year.
- The \$96 in additional electricity cost is equivalent to **\$0.134 per gallon**

Solar Power Exhaust Fan

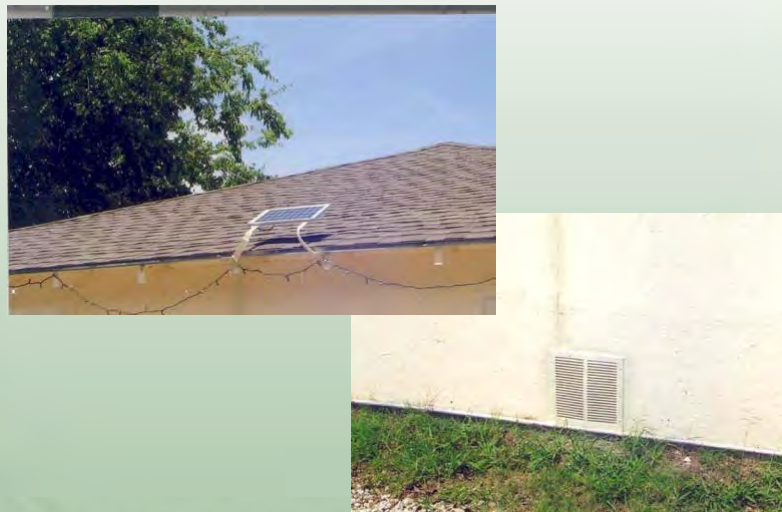
- Solar powered
- Panel: 10"x16"x0.7"
10 Watt
- Fan: 6" dia.
2500 RPM
200 CFM
55 DB



Crawl Space Fan Effectiveness

- Reduced the concentration in the first home to right at the action level.
- The concentration in the other home was orders of magnitude below the action level.
- Subsequent system include a battery for longer duration of run time.
- As well as the original two homes.

Solar Powered Fan Installed



Solar Panels

- Solar panels and the fans were commercially available
- Same source, package.
- EcoVantage Energy, Weatherford, TX
- Hail and wind resistant

Installation of Solar Panels

- Point South.
- Unobstructed southern exposure to the sun
- Sun is overhead in the summer, south in winter
- Somewhere between 25 and 50 degrees
- 45 minutes to an hour install time.

Maintenance

- Relatively no maintenance
- Battery is 5 to 7 years

Solar Radon Fans

- Wattage
- Radon fans require 20 to 70 watts
 - For a 200 CFM radon fan, 65 watts
- 10 watts per 10" x 16"
 - Roughly a sheet of paper per 5 watts

65 watt radon fan require a panel 36" x 36"
\$600 - \$800 per panel

Principles for Greener Cleanups applied to Cleanup of Inactive Mine and Mill Sites located in Idaho

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Overview

- Integration of sustainable practices into removal decision-making, while presenting opportunities and challenges, is not new
- Removal Program routinely integrates the OSWER Principles for Greener Cleanups and recommended elements for greener cleanup environmental footprint assessments and best practices
- Challenge is to analyze and evaluate the range of environmental, economic, and social benefits in a framework that reflects site-specific conditions and that is acceptable to internal and external stakeholders



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Overview

- OSWER concept focuses on not just cleaning up historical contamination to meet regulatory standards but also evaluating the overall impact of the cleanup action
- Principles requires consideration of:
 - o Total energy use and renewable energy use
 - o Air pollutants and Greenhouse gas emissions
 - o Water use and impacts to water resources
 - o Materials management and waste reduction
 - o Land management and ecosystems protection
- Examine application of these considerations to cleanup of several inactive mine and mill sites in Idaho

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Continental Mine and Mill - 2003



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Lakeview Mine and Mill - 2005

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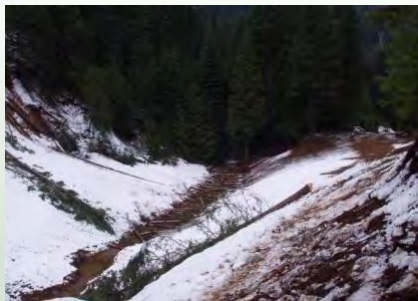
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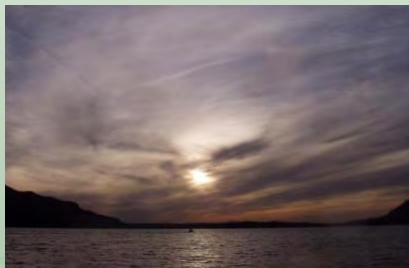
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Conjecture Mine and Mill - 2007



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Anderson-Calhoun Mine and Mill - 2010

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In Review

- Not all OSWER Principles for Greener Cleanups can be applied to every site
 - What can be considered is influenced by many and varied site-specific conditions
- Close coordination with natural resource and environmental management agencies is essential

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Questions?

Barker Chemical Site Somerset, NY Greening Response Actions

Kevin Matheis, OSC Region 2

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Barker Chemical Site Background

- Operated as an agricultural chemicals blender. Primarily produced fungicides and herbicides that were used in local area orchards.
- 10 acres site, consisting of 4 buildings in front of site, a drainage ditch, two acidic lagoons, and one filled lagoon.

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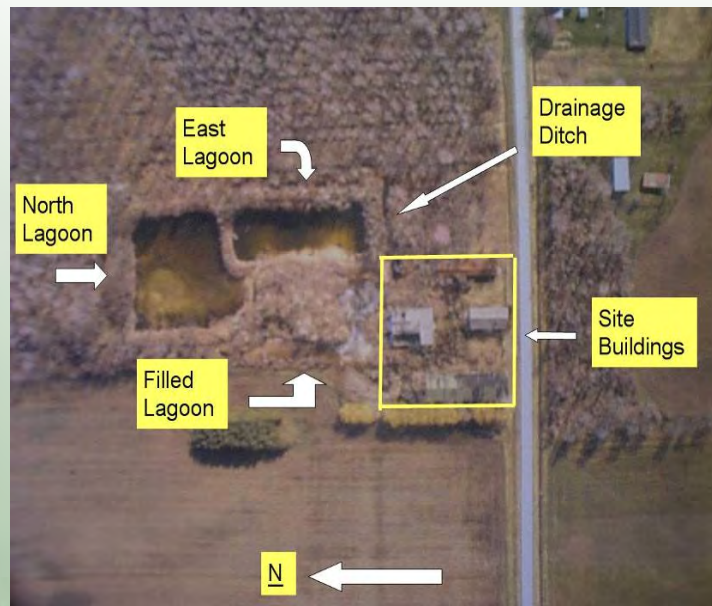
Regulatory History

- 1999 – Niagara County Brownfields program places site on inventory; requests NYSDEC assistance.
- December 1999 and January 2000 – NYSDEC collects samples at the site.
- January 2000 – NCHD notifies citizens of low pH conditions at the site, issues a Public Health Advisory

Regulatory History

- February 2000 – NYSDEC erects fence around low-pH areas and posts warning signs.
- May 2000 – NYSDEC requests assistance from EPA to assess conditions at site.
- June 2000 – EPA on-site to collect samples.
- October 2000 – EPA on-site to begin site cleanup. Action Memo approved – Fund-lead cleanup.

Barker Site Background 1998 aerial



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Site Aerial Post-Removal ~ 2005



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ERT Sampling



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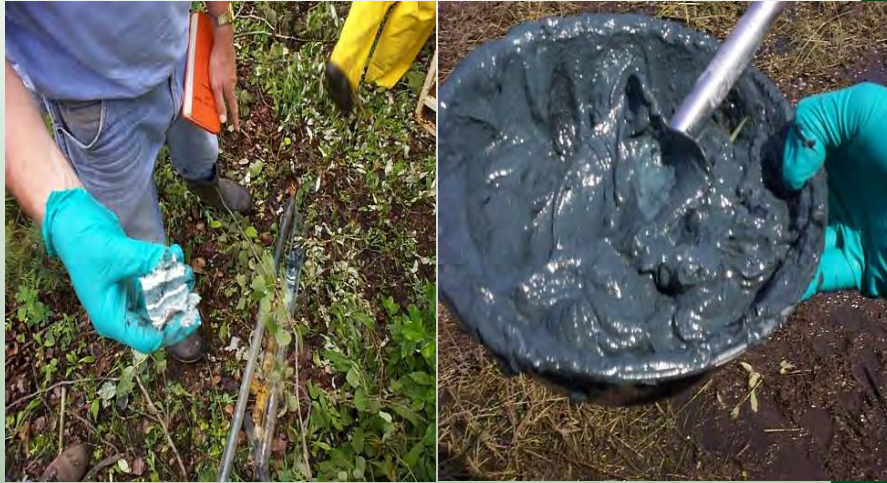
ERT Sampling



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ERT Sampling



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ERT Sampling



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ERT Sampling



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Results of ERT Assessment

- Low pH levels confirmed in 2 lagoons. North Lagoon had 1-2 feet of sludge, East lagoon 6 feet of sludge, and filled lagoon 4-8 feet of sludge.
- Drainage ditch contaminated with 321ppm arsenic.
- Northern area of North Lagoon contaminated with 2,100ppm or arsenic.

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Pleasant Surprises

- Lagoon sediment metals low, no pesticides and herbicides, non-haz, with low amounts of sulfur, iron and copper.
- Filled lagoon sediments also non-haz for metals and herbicides / pesticides. Elevated levels of sulfur.
- Drainage ditch, though low in pH, had slightly elevated levels of arsenic, with no impact on creek.

Scope of EPA Cleanup

- Excavation and off-site disposal of sulfur- and arsenic-contaminated soils.
- Pump water from ponds into an on-site waste water treatment system; verify treatment system is working properly and discharge into sewers. Operation to be coordinated with local sewer authority.
- Stabilize sediments from ponds and either cap sediments or dispose off-site.²²

Scope of EPA Cleanup

- Demolish two on-site buildings and assess flooring to determine if contamination exists. Remove contamination, if necessary.
- Clean tank on-site (pesticide tack oil) and remove contaminated soils if found.
- Restoration of site at completion of on-site actions.

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Site Operations - Demolition



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Site Operations - Demolition



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Cleanup Operations – Site grading



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Lagoon Access

- Due to high water table, and sludge and stability, a loop roadway, capable of supporting trucks was constructed.
- East Lagoon acid water pumped into North Lagoon to dewater.
- Roadway with geo-textile, larger stone capped with smaller stone. Used existing pond berms to construct.

Roadway Construction



Roadway Construction



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Loop Roadway Construction



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Loop Roadway Construction



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Ditch Excavations



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Ditch Excavation



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East Ditch Consolidation



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Lagoon Test Pit



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Stabilization Materials

- Lime from Brownfields site in Buffalo
- Fly ash from Local Power Plant
- Portland Cement from local quarry

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Stabilization Process

- Trucked in Lime
- Trucked in Fly Ash
- Trucked in Portland

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NYSDEC Restoration



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Lime Source

- 90 Hopkins Street Site in Buffalo, by product of acetylene gas production



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NYSDEC Restoration



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Lime Source

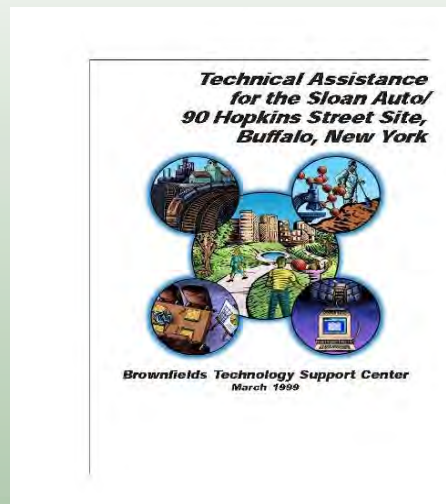
- High pH material, but pH was 11-12, below 12.5 for cleanup eligibility.



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Lime Beneficial Use Study

- Lime studied by EPA contractor and one beneficial use identified was stabilization



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Capping Site

- Clay, Topsoil, Seeding of East Lagoon
- Clay, Topsoil, Seeding of historical lagoon

Seed Mixture and planting process

- Once lagoon was capped, 1 foot of clay and 1 foot of unscreened toposoil was put onto cap.
- Site was seeded with **Big Bluestem Grass - 15 pounds per acre, Little Bluestem Grass - 15 lbs per acre**
- **Indian Grass - 7 to 10 pounds per acre**
- **Switch Grass - 10 to 12 pounds per acre**

Seed Planting

- Phase 1 - Broadcast the seed and let germinate, water as needed to establish.



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Seed Planting

- Phase 2, Till into soil, rebroadcast, and cover with clean straw.



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Year 8 Picture



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Big Bluestem and Little Blue Stem

(*Andropogon gerardii* and *Schizachyrium scoparium*)



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Switch Grass and Indian Grass (*Panicum virgatum* and *Sorghastrum nutans*)

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Nesting cover and food for wildlife

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Benefits of Native Grasses

- Though it may take 2 years to establish, grasses are drought tolerant, send out rhizomes and thicken turf, provide habitat and food source, and will crowd-out invasive weeds and species.
- Great for erosion control, grows in low to high pH conditions, thrives in poor soils when establish properly, and it native to North America.

North Lagoon

- Water buffered with lime solution and neutralized. Sent off-site as waster water for treatment.
- Sludge not as deep, and dried with lime and sent for non-haz disposal.
- Clay lined bottom of pond, and it tested as clean.

North Lagoon

- Restoration of pond viable.
- Buckhorn marsh sediments available and EPA had used at a previous site.
- After site preparation, dredge material trucked to site. Bedded at 1 foot across surface, then flooded with hydrant water.
- Nature takes over after that.

Buckhorn Marsh Dredge Material

- Along the Niagara River, channels were dredged through wetlands to provide fish habitat. Dredged material was staged in open field and available to State or Federal Partners for reuse.
- Dredge material contains cattails, bullrush, and other native wetland vegetation.

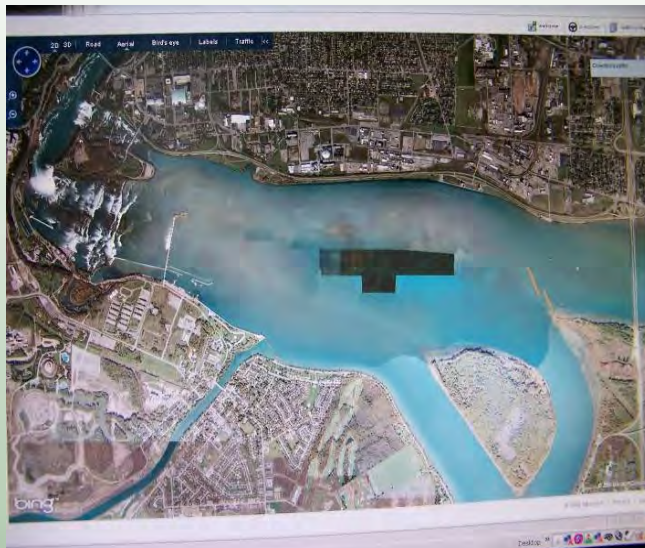
Buckhorn Marsh Source



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Buckhorn Location



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Buckhorn Dredge Area

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Restoration of North Lagoon

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Restoration of North Lagoon

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Restoration of North Lagoon

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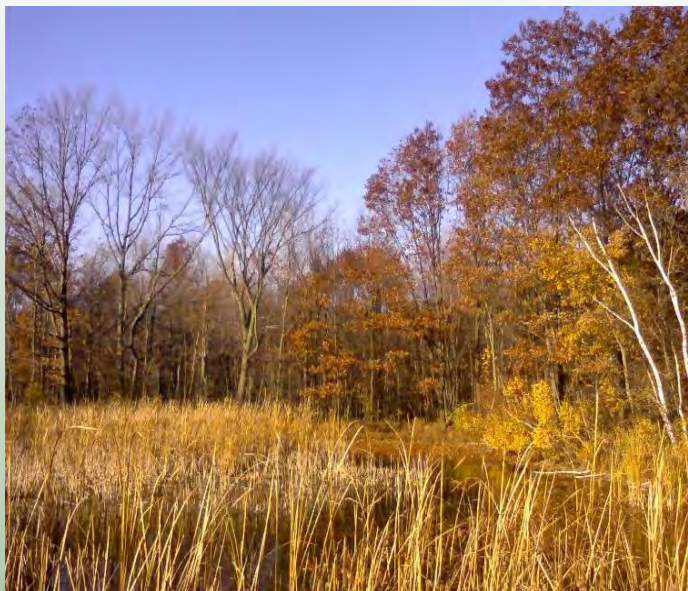
Tribute sign with American Chestnut



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Post Restoration – Year 3



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Post Restoration Year 8



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Muskrat Habitats



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Wildlife Species at Barker

- Great Blue Heron, Canadian geese, wood ducks, muskrats, foxes, deer, wild turkeys, and numerous finches, swallows, dragonflies, and aquatic wildlife (frogs, turtles, and fish).
- Tree Species – Native American elm, birch, shagbark hickory, beech, black ash, red oak, white oak, pin oaks.

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Wildlife



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American Elm Habitat



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American Elm Plantings

- Survivor elm trees became available from local tree farmer and EPA obtained them for free. Citizen Volunteer planted 20 elms, and 15 have survived for 8 years.

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American Elm Tree Plantings



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Drainage Ditch Restoration



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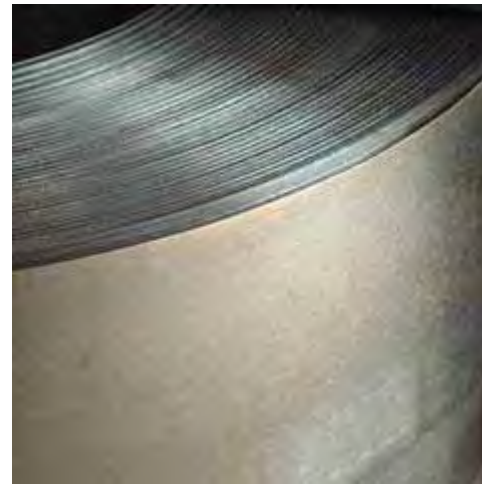
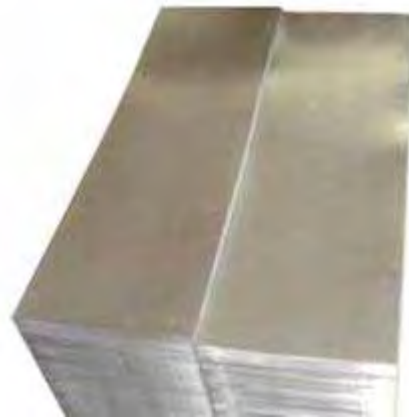
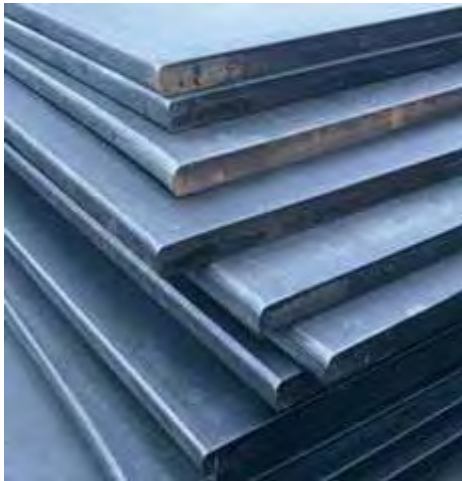
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In Summary

- If restoration is feasible, based upon site conditions, by all means try it. It may not cost that much and ecologically it makes sense.
- Try to gather community or neighboring property support.
- Try to use resources available to you that may keep costs down, such as marsh dredge, trees, or other sources of eco-materials.
- Set aside part of site where buildings were located to encourage future development if possible.

Gulf States Steel

- Gulf States Steel (GSS) was a fully integrated steel manufacturing facility that manufactured a diversified product line including steel plates, hot and cold rolled steel sheets, and galvanized steel sheets.
- Due to numerous violations and the cost of doing business, on July 1, 1999, GSS filed a voluntary petition for bankruptcy under Chapter 11. After a lengthy attempt to reorganize and emerge from bankruptcy, on November 14, 2000, the Chapter 11 reorganization bankruptcy was converted to a Chapter 7 liquidation bankruptcy.



GSS Regulatory History

- Gulf States Steel was listed in the CERCLIS facility with a discovery date of August 1, 1980.
- GSS has a significant history of RCRA waste management violations. During the period from 1982 – 1998, GSS was cited for failure to maintain compliance with interim status, financial responsibility, closure, ground-water monitoring, container storage, safety, record keeping, and waste analysis requirements under RCRA.
- Discharges that exceeded NPDES permit – several fish kills in Black Creek. Other violations involved the release of chemicals (phenols, zinc, cyanide, and lead) which lead to a civil action in 1992.
- Required corrective actions for many USTs by ADEM.
- GSS also had a history of federal and state air permit violations. Visible particulate emissions from the coke batteries were documented from the early 1980s through 1994.
- On November 13, 2003, the EPA ERRB initiated an emergency removal action at the GSS lagoons. This was performed in response to both ongoing and potential releases of sulfuric acid and waste oil from the GSS lagoon area.

SITE



COKE PLANT



Coke Plant



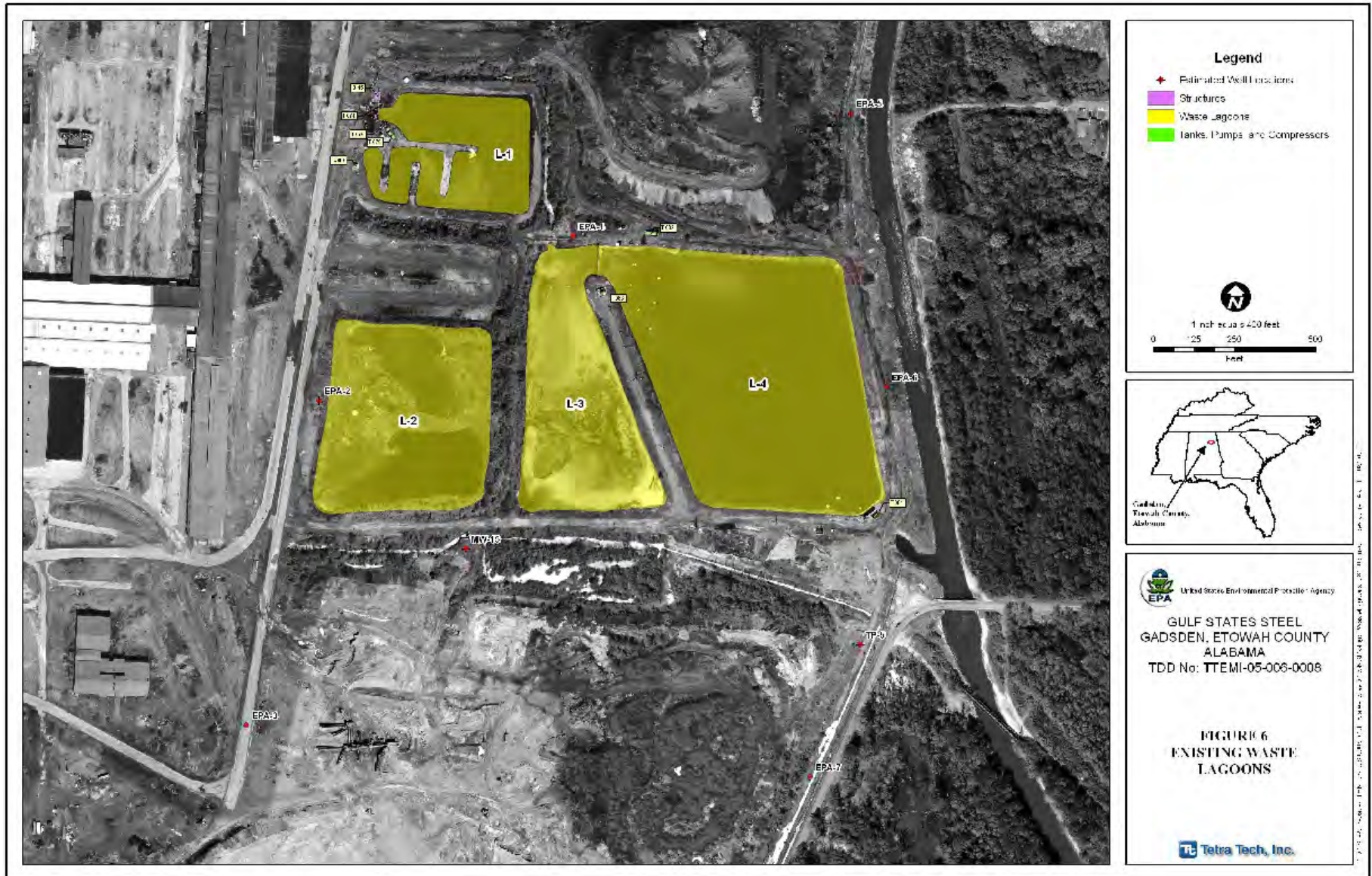
Coke Plant – Post Removal



Waste Stream

- 2,500 gallons of sulfuric acid – consolidated L-3 – savings \$7,500
- Ammonia Sulfate – 140 tons disposed of for free – savings \$6,300
- Precipitator Pipes filled with coal tar – 800 tons estimated \$350,000 for disposal, received \$85,000.
- 1,000,000 gallons of ammonia water – original disposal plan was roughly \$500,000. Final cost of disposal was \$80,000 – Safety Clean-> distiller, which sold material to fertilizer manufacture – savings \$420,000
- 35,600 gallons (176 tons) sludges – used 10% quick lime for stabilization \$10/ton, incineration \$500/ton, landfill and offsite stabilization \$1000/ton – savings \$490-\$990/ton, total savings - \$86,240 - \$174,240
- 35,300 gallons bulk oil – sent to fuels blender \$0.32/gallon – savings \$1.68/gallon – total savings \$59,304
- Onsite materials brick and concrete utilized in lagoon construction – savings \$47/ton – total savings - \$94,000

Lagoons



Lagoon 1

- Dewater and solidification of (up to) 15 feet of oily sludges



Lagoon 1 – Post Removal



Powerhouse



Powerhouse



Powerhouse Removal

- 25 ASTs and process vessels
 - Ranging in size from 500 – 27,000 gallons
 - RCRA characteristics hazardous wastes (pH < 1 or > 13)
 - Estimating 27,000 gallons of wastes
- 50 - 60 electrical transformers or oil circuit breakers
 - Contain PCBs – Sample GSS-PH-16 – 45.3 mg/kg
 - Approximately 40,000 gallons
- Various other drums and containers throughout the structure
 - Containing flammables, poisons, and CERCLA hazardous wastes
- Numerous mercury spills and hundreds of mercury containing gauges, switches, control valves, and thermometers
- Asbestos dust and insulation throughout the powerhouse
 - 307,000 ft²

Powerhouse Removal



Powerhouse – Post Removal



Metal Recycling

- Coke Plant Removal
 - 9351 Tons (18,703,679 lbs) of metal recycled for \$3,239,018.74
 - \$346 / ton for prep P&S
- Powerhouse
 - Ferrous – Prepped (<40" x 18")
 - 7,000 Tons - \$1,700,000
 - P&S \$242/ton
 - Non-Ferrous – Copper, Brass, Stainless, ect.
 - Clean vs Dirty – increase metal value by segregating
 - \$275,000 in non-ferrous metals
 - Iron Pellets – \$33,000 (1100 tons @ \$33/ton)

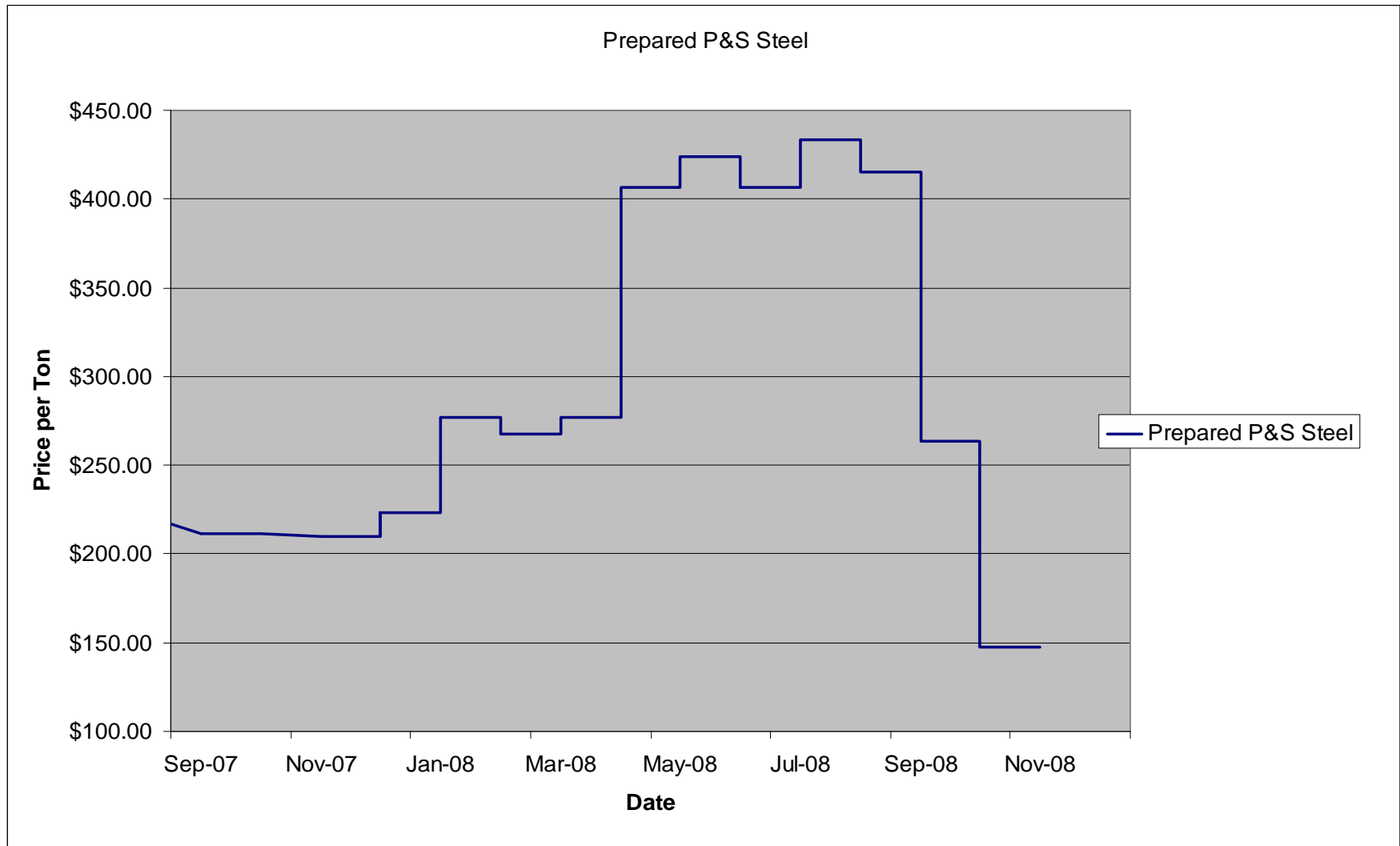
Metals Recycling



Metals Recycling



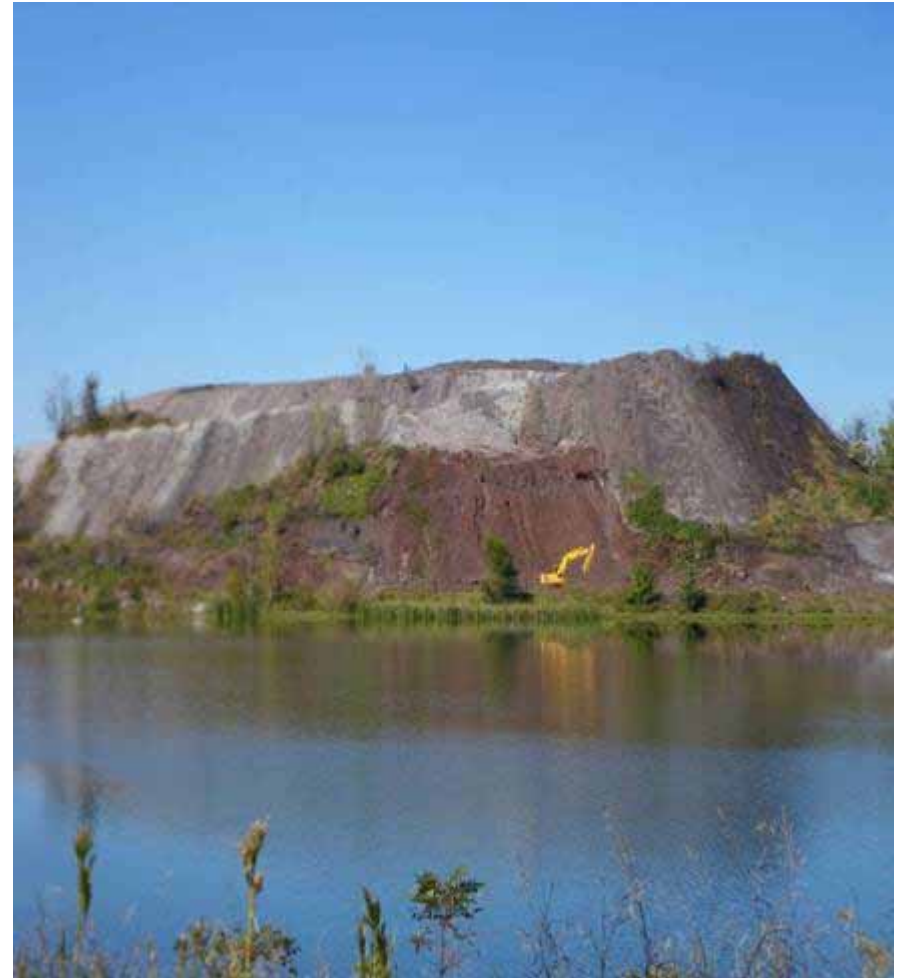
Metal Recycling



Slag Pile Removal

- Slag Piles
 - Approximately 3,000,000 cubic yards in two piles – Northern and Southern Piles
 - Leachate from slag piles discharging into Black Creek and over Hickory Street into the residential neighborhood
 - Leachate over 12.5 pH – RCRA Hazardous Waste
 - January 2008 have been conducting a pilot study with Harsco Metals to determine viable remediation options to address slag piles
 - January 2010 – Began full scale slag processing

Slag Piles



Slag Pile Leachate



Slag Piles

	No Action	Slag Pile Drainage Ditch, Rerouting Main Drainage	Cap in Place 76.5 acres	Excavation and Off-site Disposal	Slag Pile Reclamation with Harsco Metals
Risks Addressed	No	Only leachate	Yes	Yes	Yes
Reduction in Mobility, Toxicity, Volume	No	Yes	Yes	Yes	Yes
Permanence	No	50 years	Permanent	Permanent	Permanent
Recycling	\$0	\$0	\$0	\$600,000 - \$1,000,000	\$10,000,000
Costs	\$0	\$4,000,000	\$12,000,000 - \$15,000,000	\$139,000,000- \$149,000,000	\$0

Slag Pile Reclamation with Harsco

- Harsco Metals – will process slag piles to recover ferrous metallics
 - Metallics will be separated and sized
 - Oversized / Skulls - >16"
 - A scrap - 16" - 3"
 - B scrap - 3" – 0.50"
 - C Fines - <0.50"
 - Est. 30% reduction in volume of piles
 - ERRS will load waste material and place into on-site containment cell, which will be capped to prevent leachate generation
 - Royalty payments from the sell of separated metallics will pay for the disposal and capping of waste material

Slag Reclamation Plant



Slag Reclamation Plant



Slag Reclamation Plant



Slag Pile Reclamation

- Reclamation began January 2010, but did not reach full capacity until April
 - Processed 583,000 tons (27% of North Pile), 110,000 tons (4.5% of South Pile)
 - Currently 35% recovery
- Royalty payments have not been as much as expected due to multiple reasons
 - Scrap prices, started in worst spot, production delays
 - But recent months have been increasing

Recycling Benefits

- Estimated to produce 400,000 tons of scrap metal
 - 340,000 tons of finished steel
 - 377,000 4 door sedans
 - Reduction of 112,000 tons of carbon emissions compared to producing the equivalent amount of steel from virgin materials
 - 31,500 cars from US roadways for a year

Gulf States Steel

- Three Separate Time Critical Removal Actions
- Projected Budget -
 - Regional Removal Allowance - \$4,166,319
 - Total Recycling - \$19,489,018
 - Special Account - \$2,090,000
 - Total Site Budget - \$25,745,337
- Total Site Savings ~ \$21,000,000

14th Annual OSC Readiness Training Program

Green Response Action Job Aids

Presenter: Alyssa Hughes, Region 4
Date: January 31, 2011



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Orlando, Florida
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Overview

- Recap on authorities
- Working with contractors up front
- Tools for using the best management practices
- Leveraging contracts and other vehicles
- Capitalizing on green momentum of stakeholders
- Additional tools and resources

You Have the Authority !

- Once statutory and regulatory triggers are met, Section 300.410(b)(1) states:
“. . . the lead agency may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release.”
- Regional management can help incorporate aspects of your regional “greener cleanup policy” directly into the action memo
- All response costs can be recovered as long as those costs are “not inconsistent with the NCP”

You Have the Authority ! (continued)

- Examples of issues that can be addressed in early documentation:
 - o Operating hours
 - o Specific field equipment
 - o Onsite vs. offsite sample analysis
 - o Internet connection and automated controls
 - o Office space and equipment
 - o Virgin vs. re-used materials
 - o Waste recycling vs. disposal
 - o Expertise of local subcontractors
 - o Landscaping techniques for site restoration
 - o Existing vs. future infrastructure

Working with the Contractors

- Collaborate with the response action contractor in planning green response actions by:
 - Establishing a manageable approach to minimize and track big-ticket contributions to the environmental footprint, e.g. energy, potable water, and materials consumption
 - Incorporating green specifications into RFPs, new TOs/WAs, new and revised contracts, and site-specific contracts
 - Taking into account community assets and short- and long-term interests

Set the stage for green practices throughout the life of a project
Approximately half of the Agency's ERRS contracts are followed by work under remedial contracts

Working with the Contractors

(continued)

- Capitalize on new expertise and market competition

"We are at the forefront ... our approach to green and sustainable remediation includes implementing best management practices and minimizing environmental impacts of remedial systems"

"We safely eliminate contamination through the only green, high tech and sustainable remediation technologies on the market"

"Our commitment is to provide our clients with the option to choose between sustainable or greener remediation technologies and more traditional and possibly more energy intensive techniques"

"We have maintained an unparalleled focus on developing products that reduce the overall energy requirements of the site remediation while limiting air emissions including GHGs"

Tools for Using Best Management Practices

- OSRTI fact sheets describing BMPs for:
 - Site investigation
 - Excavation & site restoration
 - Bioremediation
 - Clean fuel & emission technologies
- Upcoming BMP fact sheets:
 - Renewable energy applications
 - USTs
 - Landfills & methane-to-energy systems
 - Footprint assessment
 - Contracting



Examples of Best Management Practices

- General planning
 - Establish paperless data-sharing strategies
 - Institute environmentally friendly and local purchasing strategies for services/products
 - Use portable electricity generators powered by PV panels or wind microturbines
 - Automate or remotely control data collection and management systems
- Site investigation
 - Integrate strategies such as Triad for dynamic, real-time data collection and decision-making
 - Use low-flow sampling devices and test kits
 - Choose tools involving no soil disturbance, e.g. laser-based gamma "walkover" surveys and x-ray fluorescence equipment
 - Use direct-push technology instead of rotary drilling rigs



Examples of Best Management Practices

- Excavation & restoration

- Equip all machinery with advanced diesel technologies, e.g. diesel oxidation catalysts, diesel particulate matter filters, or selective catalytic reduction fittings
- Place machinery/vehicle rumble grates with a closed-loop graywater washing system at site exits
- Assure adequate site characterization to allow surgical soil removal and minimize off-site disposal
- Overlay synthetic barriers and fluid collection systems on ground surface of staging areas and during dewatering
- Use low impact development techniques such as snag placement to promote natural movement of surface water
- Reclaim and stockpile uncontaminated soil for use as fill or other purposes such as habitat creation
- Choose products with recycled and bio-based instead of petroleum-based contents

Examples of Best Management Practices

- Long-term removal actions

- Use industrial or agricultural waste products when microbial stimulation agents are needed for bioremediation
- Reclaim water from other onsite activities for use in injection slurries or as chase water
- Employ recirculation processes for groundwater treatment
- Use vacuum pumps and blowers (including multiple low-flow blowers) that can accommodate changes
- Select equipment motors with variable frequency drives that automatically meet energy demands
- Minimize noise by using centrifugal blowers, exhaust mufflers, and soundproofing material
- Investigate renewable energy sources for potential use in removal actions and follow-on remediation or future site use

Using BMPs in the Field



All Region 10 ERU trucks use biodiesel and diesel multistage filters to reduce air emissions
- Sean Sheldrake, OSC



Region 3 used gravity-fed and solar processes to irrigate ferns for Crozet Orchard phytoremediation
- Myles Bartos, OSC



Region 2 biosolid and nutritional amendment restored 20 acres along the Arkansas River
- Harry Compton, OSC, ERT East



Using BMPs in the Field



Region 8 used low impact development techniques for removal action along the Poudre River
- Paul Peronard, OSC



Region 4 recycled over 279 tons of scrap steel (and promised to care for wildlife) during removal action at the Camilla Wood Preserving site
- Leo Francendese, OSC



Region 6 uses solar-powered exhaust fans to mitigate residential vapor intrusion from Delfaso Forge
- Greg Fife, OSC



Leveraging ERRS Contracts

Green Response and Remedial Action
Contracting and Administrative Toolkit



- Sample language in Regions 4 and 6:

*"The Contractor shall submit an annual report, no longer than ten pages in length, detailing the **environmentally preferable activities** accomplished or purchases made within the previous 12-month period [from/to specified dates], and a monthly summary shall be included in the Monthly Progress Report."*

Region 6 "Green Report" Structure					
Site	Period	Action	Volume	Estimated Cost Savings	Estimated Environmental Benefit
Site A	10/08	Salvaged and sold scrap metals	5,000 lbs	Received \$300 from sale; saved \$400 in transfer and disposal (T&D) costs	Reduced burden on landfill; avoided T&D-related greenhouse gas emissions
Site B	11/08, ongoing	Used solar-powered vents	3 vents	\$8/vent each month	Reduced ongoing project costs; grid electricity available to alternate consumers
Site C	11/08-12/08	Used onsite water for dust suppression	10,000 gal	Saved \$100 for water; saved \$1,000 in T&D	Reduced consumption of utility-supplied water

Leveraging ERRS Contracts

(continued)

- Sample language in Region 8:

*"The contractor shall **report the quantities of energy used on-site at removal action** project operations. Energy includes, but is not limited to, electrical power for on-site equipment, liquid fuels (diesel, gasoline, biofuels) for on-site equipment and vehicles, and natural gas, propane or other gas for any on-site operations."*

- Sample language in Regions 9 and 10:

*"The contractor shall **use clean technologies and/or fuels on all diesel equipment** to the extent practicable and/or feasible. The preference is for clean diesel technologies, but alternative fuels, such as biodiesel or natural gas-powered vehicles are also acceptable For equipment retrofits, the contractor will employ the Best Available Control Technology (BACT) on non-road and on-road diesel powered equipment used at a site..."*

Leveraging START Contracts

- Sample language in Region 3:

*"As directed by the OSC/WAM, the contractor shall explore, evaluate and implement (where practicable) **green cleanup strategies** and applications in the performance of the requirements of this contract to maximize sustainability, reduce energy and water usage, promote carbon neutrality, promote industrial materials reuse and recycling, and protect and preserve land resources."*

- Sample language in Region 7:

*"The contractor shall, to the greatest extent practical, utilize environmentally preferable practices in their course of business. "Environmentally Preferable" is defined as **products or services that have a lesser or reduced effect on human health and the environment** when compared with competing products or services that serve the same purpose. Consideration of environmentally preferable practices must be consistent with price, performance, availability, and safety conditions. "*

Leveraging Other Vehicles

- Region 2 and Region 10 IAGs with the USACE now include GR specs in contracts or directives at Corps-managed Superfund sites
- Region 2 Superfund enforcement agreements include GR language
- Region 3 utilizes a green checklist paired with green documentation instructions to guide OSCs in greening response actions
- Each Region 10 decision-document briefing to Superfund division management explains:
"How does this further implement our Clean and Green Policy?"

Finding More Help

- Collaborative tech support
 - OSRTI staff and support contractors
 - Superfund Green Remediation Workgroup
 - TSP Engineering Forum's Green Remediation Subcommittee
 - Regional GR pilot project managers and other champions
 - ERT "Green Team"
- Network of OSC colleagues
 - Kevin Matheis, Region 2
 - Myles Bartos, Region 3
 - Leo Francendese, Jordan Garrard, Alyssa Hughes, & Matthew Monsees, Region 4
 - Greg Fife, Region 6
 - Steve Calanog, Region 9
 - Earl Liverman & Sean Sheldrake, Region 10
- Tools on the horizon
 - Footprint assessment methodology to be released by OSRTI

Collaborating with Stakeholders

- State agencies with sustainability goals linked to climate change, renewable energy, and acquisition
- Regional employment programs working to expand green job training and placement
- Local agencies building networks to enhance materials recycling and waste reduction
- Academic and non-profit organizations dedicated to fostering environmental stewardship

"A group of intrepid volunteers embarked on a project to clean up oil at San Francisco's beaches using an unusual, yet totally organic, method of waste removal: hair mats and mushrooms ... to absorb slicks of oil on the shore that washed up after the Cosco Busan spilled 58,000 gallons of oil." [inhabitat.com; 11/19/07]

Online Compendiums

- GR Focus of CLU-IN, www.cluin.org/greenremediation
- EPA On Scene Coordinator Web site, <http://www.epaosc.org/greenresponse>

