Welcome to the CLU-IN Internet Seminar

Session 2 of 3:
Your Role in Green Remediation Implementation
and
Case Studies in Green Remediation - This Year's Models and Tools
(The 2010 NARPM Green Remediation Session Follow-on Webinars)

Sponsored by: US EPA Engineering Forum
Delivered: January 11, 2011, 1:00 PM - 3:15 PM, EST (18:00-20:15 GMT)

Instructors: Hilary Thornton, Patricia Overmeyer, Rusty Harris-Bishop, Beth Sheldrake, Stephanie Vaughn, Brad Bradley, Martin Zeleznik
Moderator: Clint Sperry

Visit the Clean Up Information Network online at www.cluin.org

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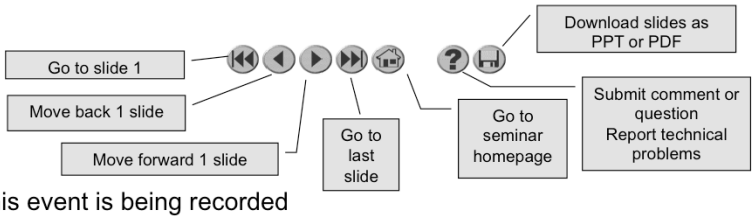
Housekeeping

- Please mute your phone lines, Do NOT put this call on hold
  - Press *6 to mute your line, #6 to unmute your line at anytime
  - This is a two hour webinar with no scheduled breaks
  - We intend to offer time for Q&A near the end of each hour, but you may submit questions at any time using the question submission button in your browser
  - Turn off any pop-up blockers
- Move through slides using # links on left or buttons



- This event is being recorded
- Archives accessed for free **http://cluin.org/live/archive/**

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Although I'm sure that some of you have these rules memorized from previous CLU-IN events, let's run through them quickly for our new participants.

Please mute your phone lines during the seminar to minimize disruption and background noise. If you do not have a mute button, press *6 to mute #6 to unmute your lines at anytime. Also, please do NOT put this call on hold as this may bring delightful, but unwanted background music over the lines and interupt the seminar.

You should note that throughout the seminar, we will ask for your feedback. You do not need to wait for Q&A breaks to ask questions or provide comments. To submit comments/questions and report technical problems, please use the ? Icon at the top of your screen. You can move forward/backward in the slides by using the single arrow buttons (left moves back 1 slide, right moves advances 1 slide). The double arrowed buttons will take you to 1st and last slides respectively. You may also advance to any slide using the numbered links that appear on the left side of your screen. The button with a house icon will take you back to main seminar page which displays our agenda, speaker information, links to the slides and additional resources. Lastly, the button with a computer disc can be used to download and save today's presentation materials.

With that, please move to slide 3.

Overview

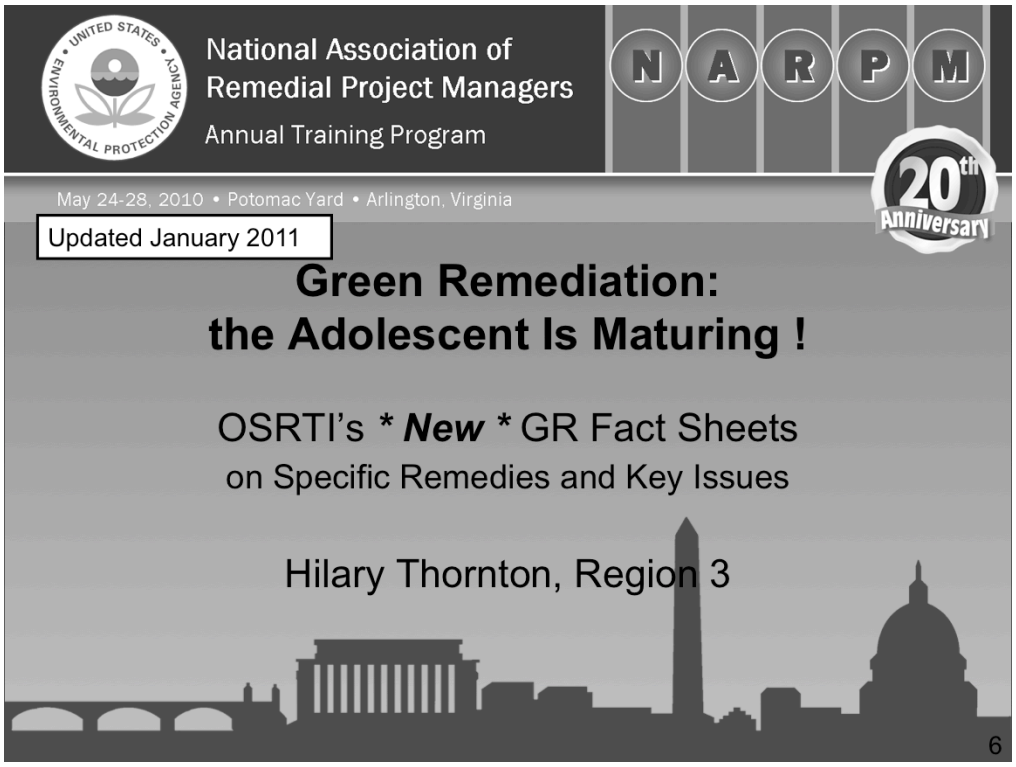
- The purpose of this webinar series is to enhance the audience's understanding of the current status of Green Remediation at EPA through a mix of presentations on GR Policy and real-world case studies.
- Each of the 2-hour webinar sessions (there are a series of 3) includes approximately one hour of policy presentations, followed by one hour of case studies. Each of the 3 webinars contains different material.

Overview (cont.)

- Participants will contribute by submitting questions (either by telephone during one of the Q&A sessions near the end of each hour, or online at any time).

Agenda

- 1:00-1:05 Welcome and Housekeeping – Moderator Clint Sperry, EPA R7
- 1:05-1:20 Rollout of GR Fact Sheets – Hilary Thornton, EPA R3
- 1:20-1:30 Workgroup Updates – Communications, Metrics, ASTM – Patricia Overmeyer, U.S. EPA HQ – OBLR
- 1:30-1:38 R9 Update – Rusty Harris-Bishop , EPA R9
- 1:38-1:45 R10 Update – Beth Sheldrake, EPA R10
- 1:45-2:05 Implementing a Regional GR Policy – Stephanie Vaughn, EPA R2
- 2:05-2:15 Q&A on first half of Webinar
- 2:15-2:40 Post Construction RA Optimization/ Greening of Fisher-Calo Site – Brad Bradley, EPA R5
- 2:40-2:50 OSRTI Pilot – GR Tool for FS Stage – Martin Zeleznik, EPA R9
- 2:50-3:00 Q&A on first half of Webinar


National Association of
Remedial Project Managers
Annual Training Program
N A R P M
May 24-28, 2010 • Potomac Yard • Arlington, Virginia
20th Anniversary
Updated January 2011
Green Remediation:
the Adolescent Is Maturing !
OSRTI's * New * GR Fact Sheets
on Specific Remedies and Key Issues
Hilary Thornton, Region 3
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Using the Fact Sheets As Tools

- To document the best management practices (BMPs) for reducing environmental footprints of:
  - Remedies most commonly used at Superfund sites
  - Activities common to all cleanups
- To facilitate brainstorming during cleanup planning or remedy implementation & optimization
- To provide common ground for many organizations working to make cleanups “greener”
- To describe methods complementing federal and state goals concerning climate change

Using the Fact Sheets As Tools
(continued)

- To identify quantifiable measures for:
  - Energy efficiency and use of renewable energy (onsite or through purchase of renewable energy certificates)
  - Use of materials and services manufactured/provided through sustainable practices and with small footprint
  - Water conservation and beneficial reuse of water
  - Remediation and redevelopment of contaminated property and preservation of currently undisturbed property
  - Preservation of existing ecosystems
  - Recycling and materials reuse

Watch for OSRTI 2011 release of a
methodology for assessing the environmental footprint of a cleanup

Topics of Recent Releases

- Bioremediation *(March 2010)*
- Soil Vapor Extraction & Air Sparging *(March 2010)*
- Clean Fuel & Emission Technologies for Site Cleanup *(August 2010)*
- Earlier releases:
  - Incorporating Sustainable Practices into Site Remediation (an introduction)
  - Excavation and Surface Restoration
  - Site Investigation
  - Pump and Treat Technologies

Sample BMPs: Site Investigation

- Integrate site characterization with remedial plans and site reuse
- Minimize field mobilization and in-person meetings
- Use remote and direct sensing tools and real-time data collection methods
- Deploy DPT for well drilling when possible

Sample BMPs: Site Investigation
(continued)

- Use low-flow sampling devices and test kits
- Institute environmentally friendly and local purchasing strategies for products and services
- Establish paperless data sharing strategies

Sample BMPs: P&T Technologies

- Optimize, optimize, optimize
- Find opportunities for using renewable energy
- Use closed-loop systems and reuse treated water
- Consider modular designs for extraction systems

Sample BMPs: P&T Technologies
(continued)

- Pump in pulsed mode and off-peak utility times
- Use other technologies in source or fringe areas
- Plan options for switching or augmenting with polishing technologies at defined thresholds
- Eliminate treatment train components becoming marginally effective as conditions change

Sample BMPs: Bioremediation

- Thoroughly characterize subsurface conditions and use good models
- Field test the delivery methods to assure proper dispersion, and consider gravity feed
- Use industrial or agricultural waste products as microbial stimulation agents

Sample BMPs: Bioremediation
(continued)

- Employ groundwater recirculation processes
- Deliver any high-volume products by rail
- Reclaim water from other onsite activities for use in injection slurries or as chase water

Sample BMPs: SVE & Air Sparging

- 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
- Determine air flow rates that can meet objectives while minimizing energy consumption

Sample BMPs: SVE & Air Sparging
(continued)

- Regenerate adsorbtive media such as GAC filters
- Minimize noise by using centrifugal blowers, exhaust mufflers, and soundproofing material
- Automate systems with equipment such as electronic pressure transducers and data loggers

Fact Sheet Development Process

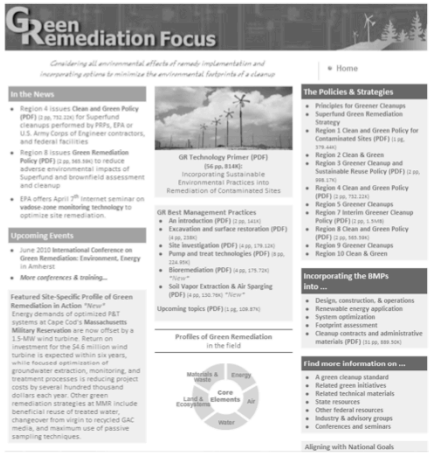
- Draft circulation to OSWER and other Agency program offices
- Regional distribution through Superfund GR Regional Coordinators and workgroups such as GRRR Team
- Distribution to external groups such as FRTR, ITRC, and ASTSWMO
- Technical input from the Engineering Forum Green Remediation Subcommittee

Get involved and add your own ideas !

Upcoming Topics & Other GR Tools

- Integrating Renewable Energy in Site Cleanup
- Underground Storage Tanks
- Landfill Covers & Containment Technologies
- In Situ Thermal Technologies
- Contracting Mechanisms for Site Cleanup
- Environmental Footprint Analysis of Site Cleanup

To suggest additional topics or tools, contact Carlos Pachon
pachon.carlos@epa.gov



www.cluin.org/greenremediation

Brownfields Update
Patricia Overmeyer

- Promoting greener cleanups and reducing the carbon footprint of cleanups is important to EPA's brownfields program.
  - However, no federal brownfields cleanup standards
  - OBLR will work with ASTSWMO to encourage greener cleanup principles in state response programs
- Working with ASTM to develop standard guide for implementing greener cleanups

REGION 9 GREENER CLEANUPS

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Rusty Harris-Bishop, Green Remediation Coordinator, EPA Region 9

Greener Cleanups Policy

- Signed September 2009
- Applies to Superfund and Waste Division Cleanup programs
  - NPL sites
  - Removals
  - UST/LUSTs
  - RCRA Corrective Action sites
  - Brownfields

Status of Greener Cleanups

- RPMs have a high awareness of regional policy
- Varying levels of what can be accomplished
  - Large focus on renewable energy
  - Less aware of green elements available in different phases of program
- One OSC planning to implement one of the greenest removal action in the country
- Brownfields program has sustainability contact
- RCRA piloting footprint analysis protocol

Goals for 2011

- Evaluate sites for renewable energy
  - Fund-lead sites generate RE or purchase RECs
    - As part of remedy
    - As part of site re-use
- Standard that clean diesel technologies are used on all fund-lead projects
  - How to implement/document
  - Require for all sites?
- Education of all staff on policy/elements/ opportunities
- Have every project evaluated for green elements

Challenges to Implementation

- How do we implement policy, and in what phases of projects?
- What technical resources are available to assist project managers in assessing green options?
- How do we pay for greener options that may cost more, i.e., renewable energy to provide power for cleanup?
- Where does climate change fit into nine criteria analysis?

Going Clean and Green in Region 10

January 11, 2011

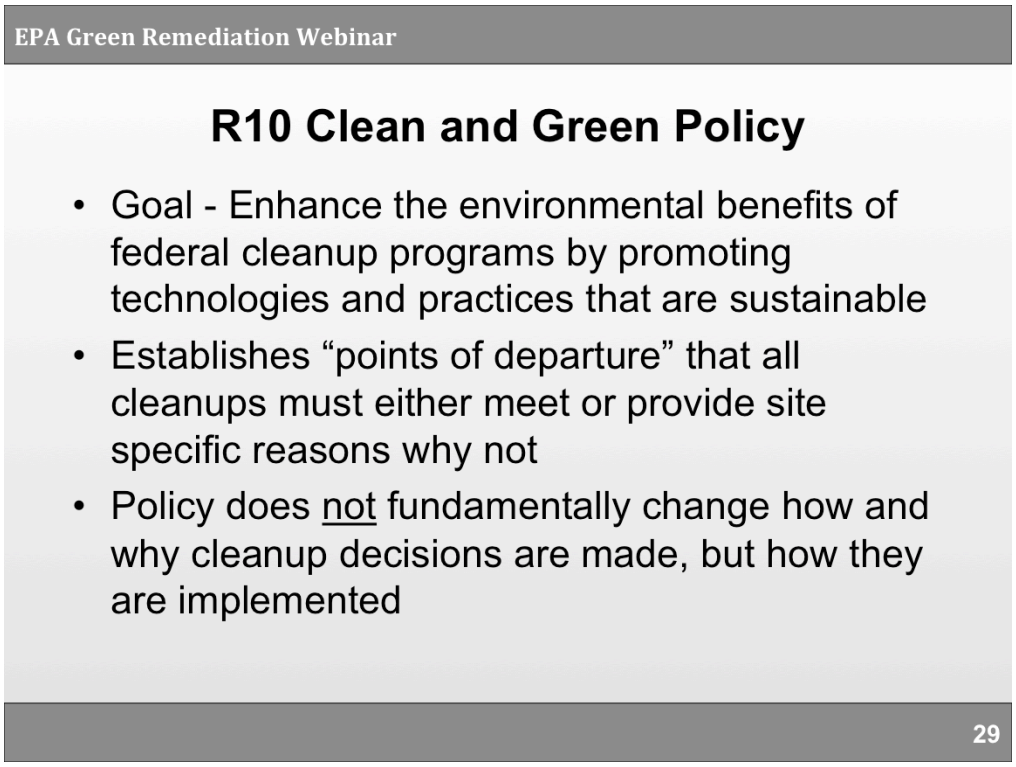
Beth Sheldrake, Manager, Superfund Program

Regional Demographics

- Smallest region in the country by staff, largest by land mass
- Superfund
  - 105 NPL sites, approximately 35 active; many large mining and sediment sites
- RCRA
  - 90 sites on Corrective Action Baseline; 3 of 4 states authorized for RCRA implementation
- Brownfields
  - Approx. 60-70 grantees funded with $25-$30M annually; large growth in response program grants from Alaskan Native Villages (not eligible for competitive grants)
- UST
  - Only 1 of 4 states has full delegation; EPA conducts/oversees 4 to 8 cleanups annually in Indian country; States conduct/oversee approx. 220 annually

GR Awareness in Region 10

- Regional *Clean and Green Policy* signed in August 2009 by Directors of the Superfund, Brownfields, RCRA, and UST programs
- Contractor presentations, webinars, and outreach during regular project manager meetings and trainings
- Internet and intranet sites available as clearing houses for resources
- Brownfields program focusing on creating awareness among state partners, grantees, and contractors and engaging in dialogue as they evaluate different cleanup alternatives and designs
- Superfund Green Team available for one-on-one project consultations



Region 10 Clean and Green Policy modeled heavily after Region 2's policy

Attempts to set a high bar in evaluating and implementing GR practices on sites.

According to the policy, 11 practices that must be addressed (or reasons why not justified) include:

•100% renewable energy

•Use of cleaner fuels, retrofits, and emission control strategies

•Water conservation

•Use of recycled industrial materials

•Reuse/recycling of materials generated from site

•Environmentally preferable purchasing

•Green concrete

•Methane recovery

•Support of greenhouse gas emission reduction technologies

•Use of EMS practices in all aspects of project

But…..these requirements are not strictly enforced….

R10 "Points of Departure"

- 100% use of renewable energy
- Use of clean fuels, diesel emissions controls and retrofits, and emission reduction strategies
- Water conservation
- Use of reused or recycled materials
- Recycling and reuse of materials from site
- Environmentally preferable purchasing
- Green concrete
- Methane capture from landfills
- Use of EMS practices for all projects

GR Implementation Challenges

- Overwhelmed project managers, GR perceived as “just one more thing to do”
- Educating program staff and partners on how to identify opportunities for GR within the cleanup process
- Lack of direct control over LUST cleanups
- Lack of systematic way to collect and track data showing environmental benefits
- Lack of standard language in model AOCs and CDs and concerns from legal counsel regarding enforceability of GR requirements
- Responsible parties trying to use GR to justify less comprehensive remedy

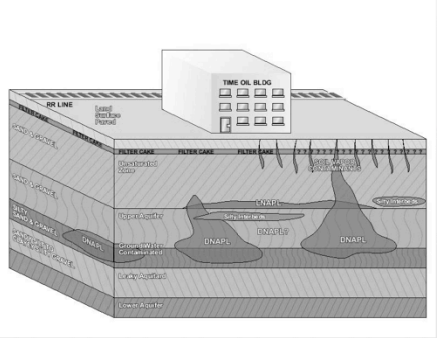
Region 10 Success Stories

- GR remediation language included in all Superfund contracts and Interagency Agreements
- Measures taken must be reported for each remedial alternative evaluated at RCRA corrective action sites managed by EPA RCRA staff
- Brownfields program evaluation of solar power for vapor treatment system (results pending)
- All Superfund grants to States for capacity building ("Core" grants) include green remediation task
- Site specific GR procurement strategies developed for construction-related projects
- Use a minimum of ultra low sulfur diesel in virtually all off-road engines used in cleanups; biofuels used where available
- Engine filter retrofits on all regional diesel vehicles and use of biofuels for boats

Well 12A Superfund Site

- Multi-phase remediation of residual soil and groundwater contamination from former industrial facilities
  - Excavation of source material
  - In-situ thermal treatment of deep vadose zone soils
  - Enhanced in-situ bioremediation of saturated soil and groundwater
  - GETS, if necessary

Conceptual Site Model



The Well 12A site is part of the Commencement Bay – South Tacoma Channel Superfund site. A City of Tacoma drinking water well became contaminated solvents in the early 1980s. Air strippers installed on City well and put back into service in 1983. ROD issued in 1983 and amended in 1985 called for the installation of a GETS system to treat source area. A soil vapor extraction system was added in 1993, but still cleanup levels were not being met. ROD amendment issued in 2009 calls for an adaptive management approach with a combination of additional source removal, in-situ thermal treatment and enhanced biological treatment.

Well 12A Superfund Site

- Design modifications focused on the largest contributors to the environmental footprint
  - Excavation and offsite disposal was determined to have the greatest unit footprint per cubic yard by most metrics evaluated
  - While treatment is energy intensive, >98% of Tacoma's electricity is generated from hydroelectric and nuclear sources and thus has a relatively low environmental footprint by the metrics evaluated

Table 23. Unit Footprints for Each Remedial Technology

		Excavation		ITR		EAB		GETS	
Volume Treated		4,200		26,600		76,900		76,900	
Units for Volume Treated		cy		cy		cy		cy	
		Total Footprint	Unit Footprint per cy	Total Footprint	Unit Footprint per cy	Total Footprint	Unit Footprint per cy	Total Footprint	Unit Footprint per cy
Energy	Used (btu)	1.5E+09	3.5E+05	1.0E+11	3.9E+06	2.2E+09	2.8E+04	2.8E+10	3.7E+05
Water	Used (gal)	1.2E+06	3.0E+02	6.3E+05	2.4E+01	5.1E+06	6.6E+01	2.6E+08	3.4E+03
CO_{2e}	Emitted (lbs)	2.3E+05	5.4E+01	4.4E+05	1.7E+01	3.5E+05	4.6E+00	4.8E+05	6.3E+00
NO_x	Emitted (lbs)	1.3E+03	3.1E-01	1.1E+03	4.1E-02	7.8E+02	1.0E-02	1.3E+03	1.7E-02
SO_x	Emitted (lbs)	6.2E+02	1.5E-01	1.3E+03	4.7E-02	7.3E+02	9.5E-03	4.6E+03	6.0E-02
PM	Emitted (lbs)	3.2E+03	7.5E-01	2.7E+02	1.0E-02	1.1E+02	1.4E-03	3.0E+02	3.9E-03
Landfill Space	Used (tons)	7.9E+03	1.9E+00	2.1E+02	8.0E-03	1.3E+02	1.7E-03	0.0E+00	0.0E+00
Local Electricity	Used (kWh)	0.0E+00	0.0E+00	7.4E+06	2.8E+02	0.0E+00	0.0E+00	1.8E+06	2.3E+01
Local Water	Used (gal)	5.5E+03	1.3E+00	1.9E+05	7.2E+00	3.2E+06	4.1E+01	4.7E+04	6.1E-01
Local NO_x	Emitted (lbs)	1.3E+03	3.0E-01	6.2E+02	2.3E-02	5.3E+02	6.9E-03	1.6E+02	2.0E-03
Local SO_x	Emitted (lbs)	6.0E+02	1.4E-01	4.1E+02	1.6E-02	9.6E+01	1.2E-03	1.2E+02	1.5E-03
Local PM	Emitted (lbs)	3.2E+03	7.5E-01	6.9E+01	2.6E-03	4.5E+02	5.9E-03	9.4E+01	1.2E-03
Groundwater	Used	2.0E+05	4.7E+01	3.6E+03	1.4E-01	2.8E+04	3.6E-01	2.6E+08	3.4E+03
Other Factor 1	Used	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Other Factor 2	Used	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Highest unit footprint for that metric

Lowest unit footprint for that metric

Well 12A Modifications

- Specified preference for local borrow sources and disposal facilities
- Concrete to be segregated and recycled locally ~3 miles from site
- Soil to be pre-characterized for disposal at nearest subtitle C landfill to minimize transportation
- If treatment is required prior to disposal, the selected facility generates energy from the treatment process which goes back into the grid and is sold to the City of Seattle
- Transportation analysis to determine greenest transport method to disposal facility considering rail, truck, and combination methods
- No idling policy for all vehicles and equipment
- Require use of cleaner engines, cleaner fuel, and cleaner diesel emissions control technology on all diesel equipment > 50 hp
- Contractor required to track emissions reduced associated with using cleaner diesel equipment and fuels

Region 10 Points of Contact

- Superfund – Beth Sheldrake and Sean Sheldrake, sheldrake.beth@epa.gov, sheldrake.sean@epa.gov
- RCRA – Christy Brown, brown.christy@epa.gov
- Brownfields – Brooks Stanfield, stanfield.brooks@epa.gov
- UST – Rob Rau, rau.rob@epa.gov

Implementing a Regional Green Remediation Policy

Strategies, Lessons Learned, and New Ideas

Stephanie Vaughn, RPM
Region 2

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Region 2 Clean and Green Policy

- Signed March 17, 2009
  - Updated March 11, 2010
- Applies to all Superfund, RCRA, and Brownfields work
- Applies to both Fund and PRP lead sites
- Includes “Touchstone Practices” that must be implemented at *all* sites

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Current Touchstone Practices

- 100% of electricity from renewable sources
- Clean diesel fuels and technologies
- Methane capture at landfill sites
- Material Reuse, Reduction, or Recycling
  - Industrial materials reuse or recycling within regulatory requirements
  - Construction and Demolition materials
  - Concrete made with Coal Combustion Products (CCP)
  - Recycle and reuse of organic materials generated on-site

➢ Touchstone practices are required unless a site-specific evaluation demonstrates impracticability or favors an alternate green approach.

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Implementation Questions

- Technical Questions
  - How do we do this?
  - Can (or should) a practice be applied at my site?
- Policy Questions
  - How do we make our contractors follow the policy?
  - Can we require PRPs to follow policy?
  - What impact will implementation of these policies have on our budget?
- How do we measure results?

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Workgroup Formation

Five subcommittees:

- Policy/Legal
- Technical
- Training/Outreach
- Contracting
- Measurement/Evaluation
  - Workgroup comprised of individuals from almost every division to allow for cross-divisional knowledge exchange.

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Policy and Legal Decisions

- We are requiring incorporation of GR language into all new RODs and PRP Orders/ Agreements
- We are requesting that PRPs working under orders issued prior to the policy, comply with the policy
  - Letters sent to PRPs
- Will update Touchstone Practices regularly

Key Distinction

➢ Implementation versus Remedy Selection

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ROD Language

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to the remedial alternative selected for the Site.

- Placed at the end of the Selected Remedy section.
- Additional language can be placed in Description of Selected Remedy section.
- Has been placed in all RODs signed since implementation of policy (about 17).

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Enforcement Agreement Language

Tasks to identify how the RD and the RA will be implemented using the principles in EPA Region 2's Clean and Green Policy.

- Language placed in the Remedial Design Activities section of the Statement of Work for a Consent Decree
- Similar language has been placed in at least 3 AOCs, 4 CDs, and 4 UAOs
- Inclusion of language has not held up finalization of any enforcement agreement

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Contracts

- Interagency Agreements
  - Put language in Terms and Conditions section of the agreement
  - It's binding on the USACE, not the USACE's contractor
  - The USACE is modifying their specifications or task orders to include GR requirements
- RACs Contracts
  - Language placed in SOW
  - May be added to contract during next renewal round
- Language has also been placed in site assessment contracts and is being developed for removal action and other contracts

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Technical and Outreach

- Creating region-specific how-to primers for project managers
  - Already have Clean Diesel and Renewable Energy
- Conducting regional training
  - Concurrent with release of primers
- Created Site Assessment, RI/FS, and RD/RA GR “Idea” Checklists

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Metrics

- GOAL: Use of 100% renewable sources of energy
  - Data Needed:
    - Kilowatt-hours (kWh) of electricity used
    - Zip code of site
  - Environmental Metrics:
    - Information will be entered into EPA's Power Profiler (http://www.epa.gov/cleanenergy/energy-and-you/how-clean.html)
    - Report on pounds of CO_2, NOx, and SOx avoided

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Goal: Use of clean diesel fuels and technologies

- Data Needed:
  - Number of vehicles in fleet
  - Vehicle/Equipment Type, Sector, Application, Horsepower Rating and Model Year
  - Fuel Type and Annual Fuel Usage
  - Usage Rate (hours/vehicle/year)
  - Number of Vehicles in Fleet to be Retrofitted
  - Retrofit Technology Type and Model Year
- Environmental Metrics:
  - Information will be entered into EPA's Diesel Emissions Quantifier (DEQ, http://cfpub.epa.gov/quantifier/view/index.cfm)
  - Report on mass of air pollutants reduced (CO_2, NOx, PM, HC, CO)

➢ EPA Region 2's Mobile Source Team is helping run the DEQ. They also plan to track the emission reduction estimates through the National Clean Diesel Campaign Database.

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Goal: Recovery of methane from landfills

- Data Needed:
  - Metric tons methane captured for reuse or flared
- Environmental Metric:
  - Metric tons of methane x 21 = metric tons of CO_2 avoided
  - The information may also be entered into EPA's Landfill Gas Energy Benefits Calculator (http://www.epa.gov/lmop/res/calc.htm) to determine the direct, avoided, and total greenhouse gas reductions, as well as environmental and energy benefits from methane capture.

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Goal: Maximize the amount of materials reduced, reused or recycled

- Data Needed
  - Tons and Type of material reduced, reused, or recycled
- Environmental Metrics
  - The tons of material reduced through purchase or use of items with recycled content will be entered into EPA's ReCon Tool (http://www.epa.gov/climatechange/wycd/waste/calculators/ReCon_home.html)
  - The tons of material reused or recycled will be entered into EPA's Waste Reduction Model (WaRM, http://epa.gov/climatechange/wycd/waste/calculators/WarmForm.html)

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Data Collection and Measurement

- Using existing EPA calculators to measure results
- Received funding to develop a database to track metrics
- Have only limited results so far….once the database is finalized, we will be better able to collect data from all sites

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Verified Results So Far…

Purchase of Renewable Energy

- As of June 2010, all 21 active Corps-managed superfund sites are purchasing renewable energy credits.
- Average annual cost per site for purchasing offsets -- $6,000
  - Impact of less than 1% to total remedial cost
- Verified offsets of 1,166 metric tons of CO_2 already
  - This is equivalent to taking 223 cars off the road annually

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Results (cont.)

Materials Management

- At least 914 metric tons of CO_2 already offset
  - Equivalent to annual greenhouse gas emissions from 175 cars
- Sites are reporting information such as tons of paper/cardboard, metal, asphalt, concrete, GAC, and treated soil recycled or reused on site

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Results (cont.)

Clean Diesel

- Clean diesel technologies and practices have been applied at a minimum of 6 sites
- Retrofits and the use of Tier 3 engines has resulted in reductions of:
  - 0.1058 tons/year of Particulate Matter (PM)
  - 0.0813 tons/year of Hydrocarbons (HC)
  - 0.316 tons/year of Carbon Monoxide (CO)
- Switched 83 non-road vehicles from Low Sulfur Diesel to Ultra Low Sulfur Diesel before the required June 2010 date
  - Resulted in reduction of 0.1043 tons/year of PM

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Results so far…Carbon Offset

Already verified offset of 2,080 metric tons of CO_2, or:

- Annual greenhouse gas emissions from **398** passenger vehicles
- CO_2 emissions from **233,971** gallons of gasoline consumed
- CO_2 emissions from **4,837** barrels of oil consumed
- CO_2 emissions from **27.8** tanker trucks' worth of gasoline
- CO_2 emissions from the *electricity* use of **252** homes for one year
- CO_2 emissions from the *energy* use of **177** homes for one year
- Carbon sequestered by **53,333** tree seedlings grown for 10 years
- Carbon sequestered annually by **443** acres of pine or fir forests
- Carbon sequestered annually by **19.7** acres of forest preserved from deforestation
- CO_2 emissions from **86,667** propane cylinders used for home barbeques
- CO_2 emissions from burning **10.9** railcars' worth of coal
- Greenhouse gas emissions avoided by recycling **700** tons of waste instead of sending it to the landfill
- Annual CO_2 emissions of **0.0005** coal fired power plants

Source: http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results

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Next Steps…

- Evaluate New Potential Touchstones
  - EnergyStar Products and Energy Efficiency
  - Environmentally Preferable Purchasing
  - Onsite Renewables
  - Sustainable Site Design
- Finalize and Deploy Database
- Acknowledge Leaders

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For further information….

- You can find the Clean and Green Policy at:

  http://www.epa.gov/region02/superfund/green_remediation/policy.htmlClean and Green Policy

- Questions?
  - *Stephanie Vaughn, RPM, Region 2 vaughn.stephanie@epa.gov, 212-637-3914*
  - *Kristin Giacalone, RPM, Region 2, giacalone.kristin@epa.gov, 212-637-4407*

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POST CONSTRUCTION RA OPTIMIZATION/GREENING OF FISHER-CALO SITE

Presented by Brad Bradley

Region 5 Superfund Greener Cleanup Coordinator

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Fisher-Calo Superfund Site-

- located in Kingsbury, Indiana
- Former solvent recycling facility
- Buried drums of VOCs- extensive ground water contamination
- Ground water containment system started up a little more that 10 years ago

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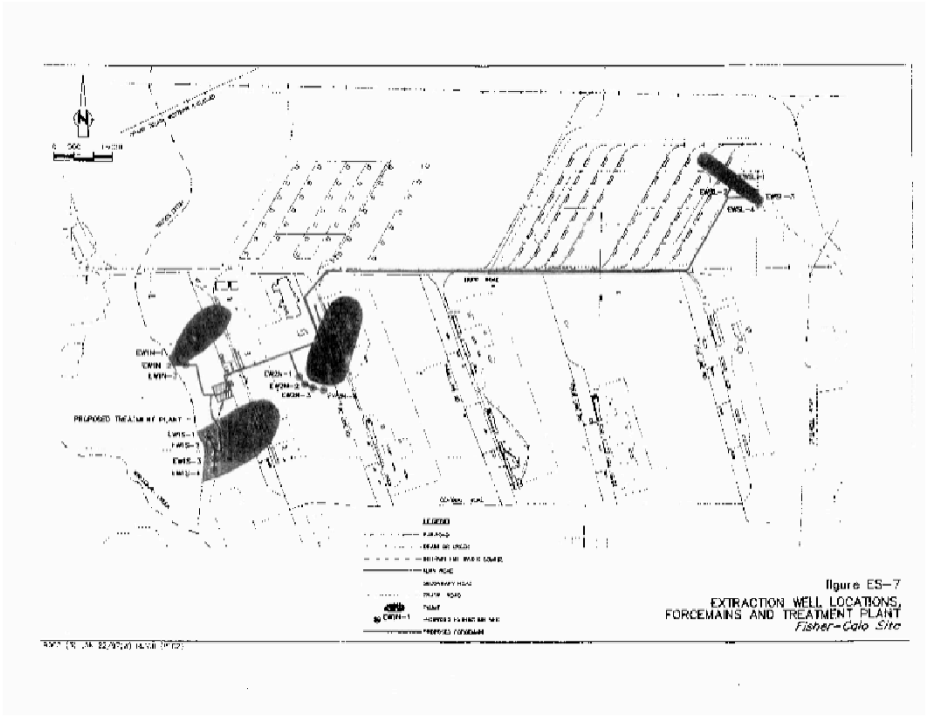
Figure ES–7
EXTRACTION WELL LOCATIONS,
FORCEMAINS AND TREATMENT PLANT
Fisher-Calo Site

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Fisher-Calo Pilot Study

- Funded by OSWER in 2009 as part of greener cleanup pilot studies
- First evaluate, using modified LCA, feasibility of optimization and applying green cleanup measures
- Second, propose suggested modification to PRPs

- PRPs to construct/modify system based on suggestions
- Data collection to establish change in energy consumption, GHG emissions, water conservation, etc
- PRPs have comprehensive energy usage data for past 10 years of system operation

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CURRENT STATUS

- All initial site data have been gathered
- Coordination with Region 9 has been established- note Romic Site in Palo Alto, CA
- Analysis of various green measures and system optimization under way

NEXT STEPS

- Finish Analysis
- Present recommendations to PRPs
- PRPs modify system- possible glitch
- Data gathering for post-modification energy usage, GHG emissions, etc
- If money left, analyze utility of modified LCA used for pilot project

QUESTIONS?

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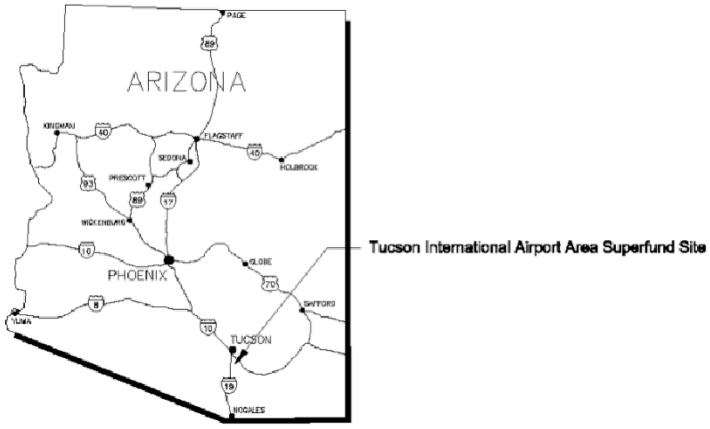
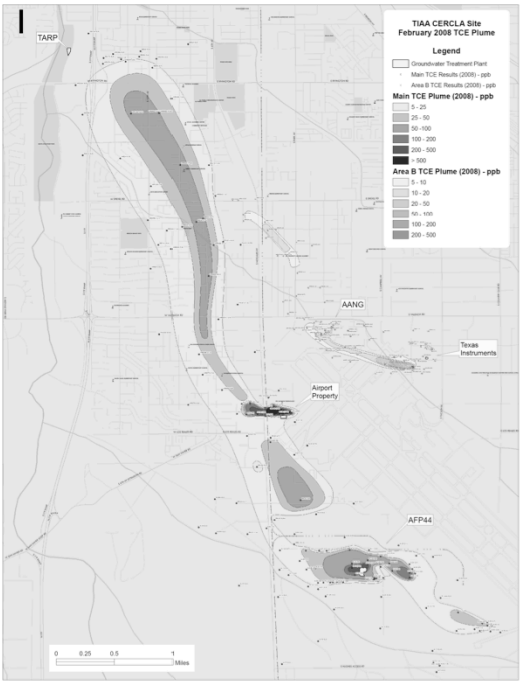
National Association of
Remedial Project Managers
Annual Training Program
N A R P M
May 24-28, 2010 • Potomac Yard • Arlington, Virginia
20th Anniversary
NARPM Green Remediation Session
OTSRI Pilot Study Updates
A GR Tool for the FS Stage
Martin Zeleznik, Region 9
68

Using a Footprint Analysis with the development of a Focused FS

- West Cap is a fund lead OU at the Tucson International Airport Area Superfund site
- Current remedy is P&T but circumstances developed that led us to consider In-Situ Chemical Oxidation (ISCO) as a remedial alternative
- New GR tool under development is applied to this specific site for footprint analysis
- Both Footprint Analysis and Focused FS were being developed concurrently
  - This talk is truly a work in progress

Location of Tucson International Airport Area (TIAA) Superfund site




TIAA CERCLA Site
February 2008 TCE Plume
Legend
Groundwater Treatment Plant
Main TCE Results (2008) - ppb
Area B TCE Results (2008) - ppb
Main TCE Plume (2008) - ppb
5 - 25
25 - 50
50 -100
100 - 200
200 - 500
> 500
Area B TCE Plume (2008) - ppb
5 - 10
10 - 20
20 - 50
50 - 100
100 - 200
200 - 500
TARP
AANG
Texas Instruments
Airport Property
AFP44
0
0.25
0.5
1
Miles

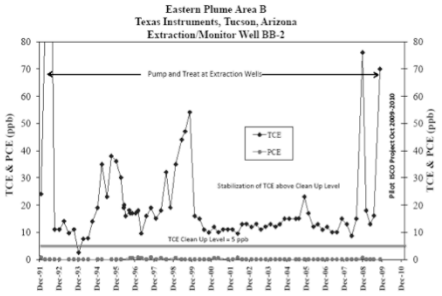

West-Cap: North Building A Footprint
<Preliminary Draft>
TCE Distribution
Upper Zone - Upper Unit
Upper and Lower Subunits
February 2009
TIAA CERCLA Site
Area B
Legend
Well Mixing/Dilution
TCE (not-detected)
TCE Sample Result (detected, ppb)
0.1 - 2.4
2.5 - 5.8
5.9 - 14.0
14.1 - 30.0
30.1 - 130.0
130.1 - 350.0
350.1 - 970.0
Area B TCE (ppb)
min_tce
5-10
10-25
25-50
50-100
100-200
> 200
Texas Instruments
West Cap
0
0.25
0.5
1
Miles

Shared Treatment Plant for Texas Instruments and West Cap

- Texas Instruments used treated water for manufacturing process as opposed to treating municipal drinking water
- Cost sharing of treatment plant between EPA and Texas Instruments negotiated on an annual basis
  - win – win situation
- In 2007, Texas Instruments decided to close down manufacturing operations
  - Ironically EPA and State were already in discussions on possibility on doing In-Situ Chemical Oxidation Treatability Study at West Cap OU

History of Remediation at Texas Instruments OU

- Pump and Treat operation in place since 1992
- Tucson plant manufactured microchips which require highly treated water
  - Even drinking water required treatment
- Closing of plant operations in 2009 provided opportunity to assess progress of remediation



Going down the path with Potassium Permanganate for choice of ISCO

- Several OUs at TIAA have tested with KP for ISCO with positive results
- Community is familiar with tests of KP and comfortable with its application
  - Local High school students did chem lab experiments with KP and TCE at community meeting

The GR Pilot Study – Calculating the Footprint of P&T vs ISCO

- Footprint Tool was initially developed for ROMIC study (also Region 9 study)
- Spreadsheet tool developed that allows the use of basic data to provide preliminary quantitative comparison of footprint of 2 proposed remedies
  - Goal is to use as comparative tool between remedies
  - Normal CERCLA process not affected – this is a supportive tool

Summary of Types of Data Needs for GR Tool to Assess Footprint

P&T

- Construction details on wells and site lay out
- Depth to GW
- Treatment process
- O&M parameters such as extraction rate, frequency of monitoring
- Waste disposal details
- Estimated period of operation of P&T remedy
- Travel distance for operator/ consultants

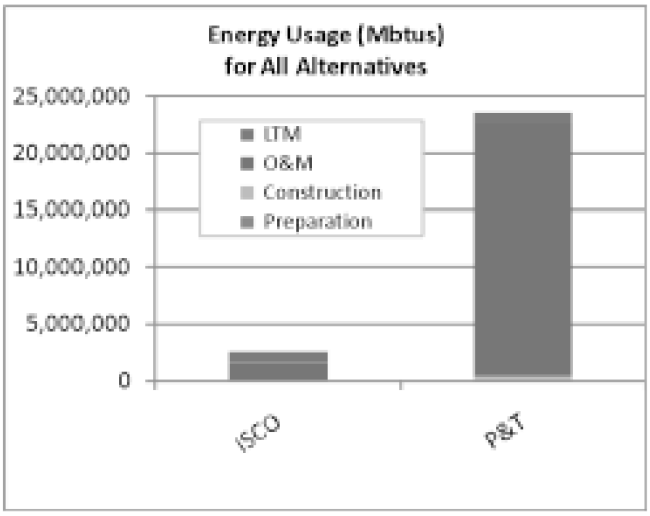
ISCO

- Type and Mass of reagent
- Reagent vendor and location
- Amount of water for injection
- Number of injection points
- Depth, frequency, method, and duration of injection
- Geology
- Level of effort for consultant (days in field/days of rig operation)
- Types of waste, location for waste disposal
- Travel distance for consultants

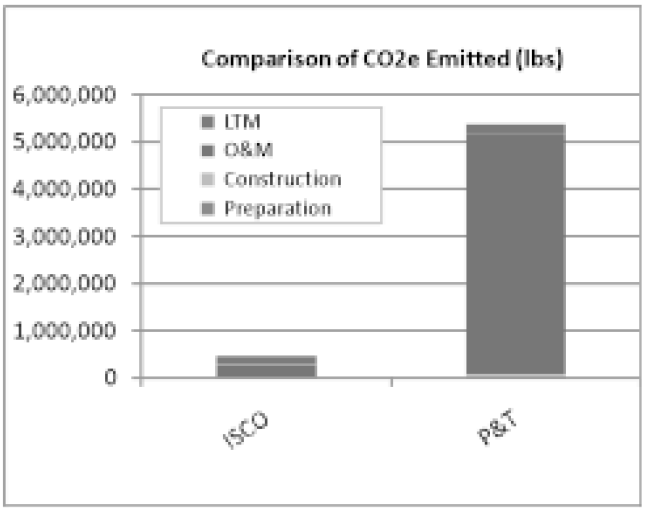
5 Core Elements of GR Footprint Analysis

1. Energy Use
2. Atmospheric Emissions
3. Water Use
4. Materials Use and Waste Generation
5. Land & Ecosystems

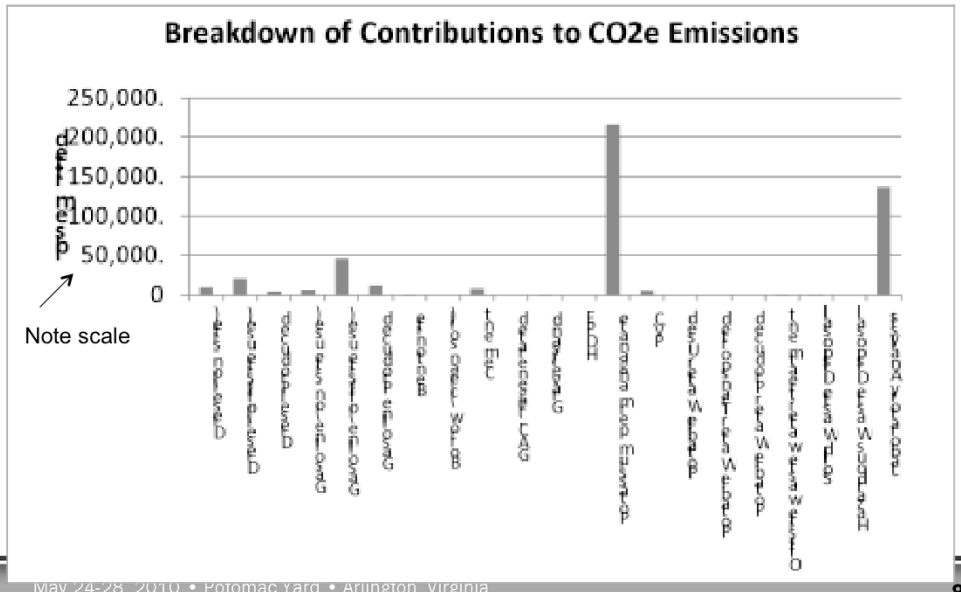
Footprint Comparison - Energy



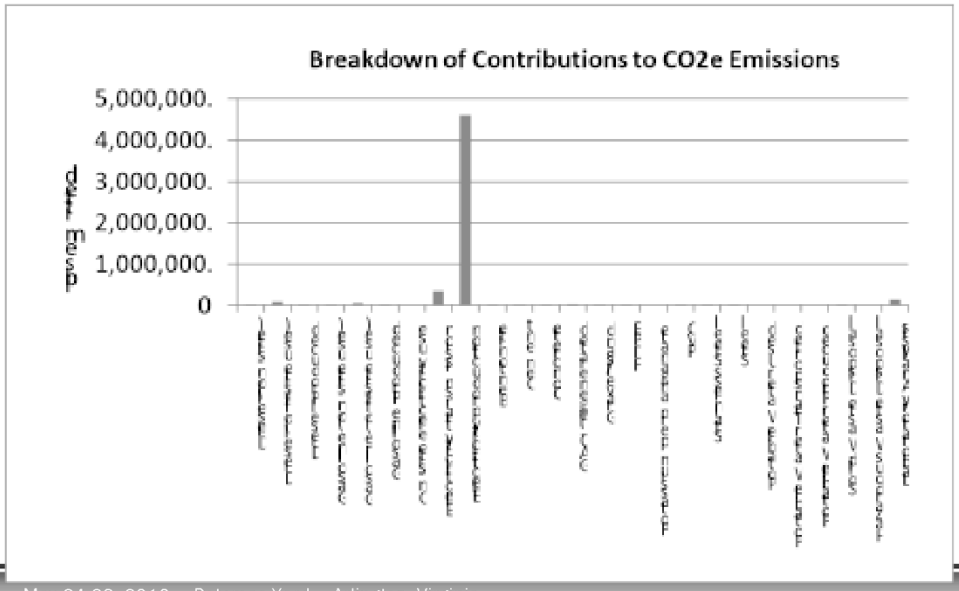
Footprint Comparison – CO2e



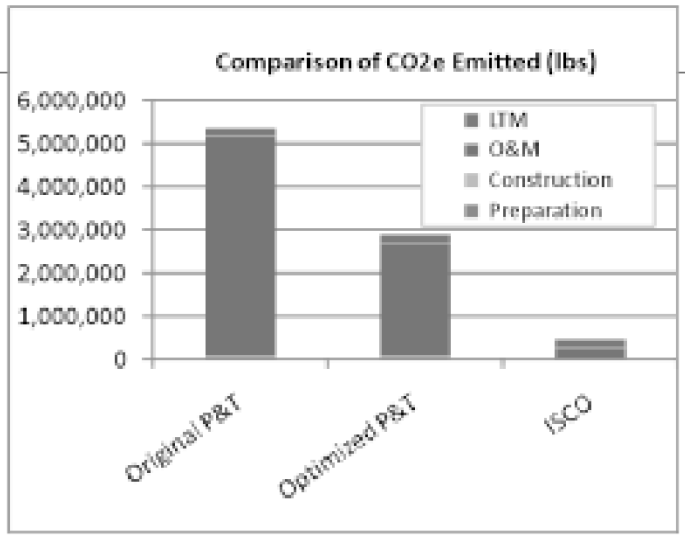
Contributors to ISCO Footprint



Contributors to P&T Footprint



Optimized P&T System



Optimized P&T system uses liquid GAC instead of air stripper, assumes GAC facility is within 500 miles of site, and allows effluent to flow by gravity (instead of being pumped)

Other Footprint Parameters

- Water footprint is very minor
  - P&T remedy reinjects extracted water
  - Monitoring involves removing little water
  - Potable water only used in grout for well installation
- Waste generation is relatively small
  - Primarily limited to drill cuttings
  - GAC regenerated
  - Permanganate manufacturing not well documented (waste volumes may be higher than indicated)
- Affects on ecosystem are insignificant relative to airport traffic

Summary and Conclusions

- Footprint Analysis supports conclusion that ISCO would provide less of a GR Footprint
  - There is value in seeing comparative results in FFS stage
  - Lesson learned is to delay Footprint Analysis until FS in draft final stage, no significant gain with concurrent studies
  - Footprint Analysis report used as attachment in FS
  - Footprint Analysis reasonably priced
- Goal of talk here was to introduce the GR tool more than discussion of actual FFS
  - The more often the Footprint Analysis tool is used and refined, the stronger and more efficient it will become

Questions?

Thank you for your time!

If you have additional questions or comments, please contact

Session Moderator
Clint Sperry
sperry.clint@epa.gov

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