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Green Remediation: Opening the Door to Field Use

Exercise in Applying Strategies

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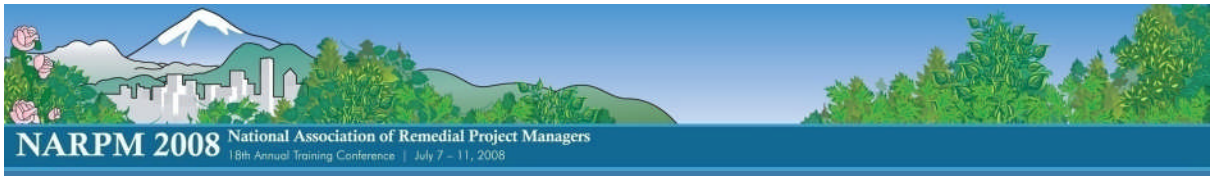


Overview of Exercise

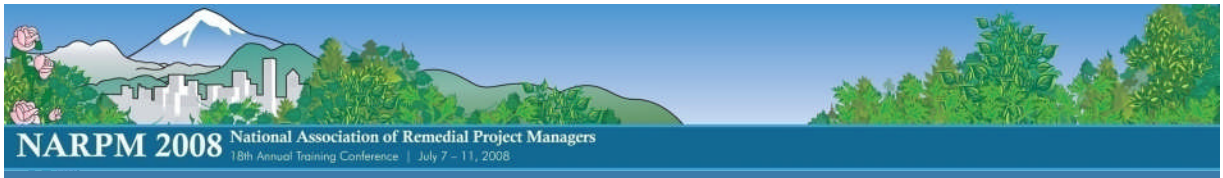
- Objective: Apply strategies and findings of case studies and other experiences to identify opportunities for implementing green remediation approaches

In your role as RPM . . .

What has been your own experience in using green approaches?

Have you identified additional opportunities?

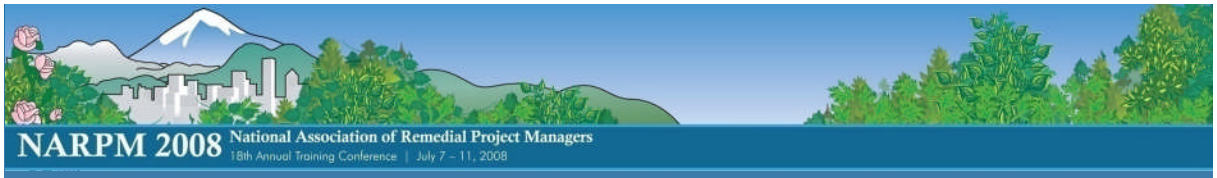
How can we best open the door to sustainable strategies?



Overview of Today's Study Site:

Finding Green Strategies during Design of Selected Remedies

- Property covers 20 acres in mixed agricultural/residential setting
- Buildings and infrastructure of abandoned chemical manufacturing facility remain
- Multi-phase extraction with UV/OX treatment and air stripping
- SVE as primary soil remedy
- Other source controls include a small landfill with chlorinated solvent waste
- Reuse plans target one or more undefined industrial facilities and open space



Learning from Case Studies and Each Other

- How is a green strategy different from a conventional one?
- Does a green strategy impact any remediation goals?
- What fosters or limits a project's success?
- Can any up-front costs be recovered?
- What factors indicate sustainability improvements?
- Can a strategy be integrated with other public/private sustainability programs?
- Could a different strategy be used at one of your sites?

"it takes a village" of thoughts . . . there is no single solution

Anticipated Outcomes of Exercise: *Keeping the Door Open to Field Use*

- Illustrating different strategies for same problem
- Fostering similar or novel applications in your region
  - Strategies that can be implemented right away
  - Strategies needing longer-term planning
- Identifying assistance needed from Headquarters
  - Technical tools
  - Venues for additional brainstorming and partnering
- Integrating site-specific green remediation approaches into regional strategies for climate change and sustainability

Green Remediation Exercise:
Steps to Incorporate Best Management Practices

Objective: **Apply strategies and findings of case studies and other experiences to identify opportunities for implementing green remediation approaches**

Schedule:

10:45 – 11:00	Introduction to case studies and exercise
2:30 – 2:40	Description of hypothetical site, structure of exercise, and anticipated products
2:40 – 3:00	Break into discussion groups (~ 5/group of mixed regions) and begin brainstorming
3:00 – 3:15	Afternoon break: opportunity for detailed questions and use of online calculators or other materials and tools
3:15 – 3:45	Collaborative documentation of 4-6 strategies with corresponding mechanisms and success measures (on flip charts)
3:45 - 3:55	"Walk along" and "call out" reporting on strategies (as outlined on flip charts)
3:55 – 4:00	Summarize key findings for follow-on discussion in panel session

Breakout Group Process:

- Step 1: **Discuss BMPs** for typical factors of green remediation (considering examples provided in today's case studies, attached examples, and your own experiences or ideas) and identify those with potential for application at study site
- Step 2: Collaboratively formulate a general **implementation strategy** for each BMP selected by the group
- Step 3: Identify a **PRP enabling approach** outlining the activities that an RPM can undertake for each BMP implementation strategy
- Step 4: Identify **success measures** for evaluating progress and results of each strategy

Sample Worksheet,
***Approach to Implementing Best Management Practices at Study Site*:**

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Reclaim treated water for beneficial use	Incorporate engineered systems into RD allowing diversion and use of treated water for onsite irrigation of plantings needed for ecorestoration	During community stakeholder planning meetings, present site-specific information on the estimated environmental and economic benefits of water reclamation	Percent reduction in discharge to surface water, and contribution to regional watershed management plans
Use cleaner fuels and retrofit diesel engines to operate heavy equipment	Give contract/subcontract procurement preference to cleanup services meeting high-performance fuel/engine criteria, and incorporate provisions into site-specific project plan	Identify fuel alternatives and high-performance equipment available to the site, and incorporate specific information into the project's communication strategy	Percent of machinery used meeting high performance criteria set by transportation sector, and estimate of associated reduction in GHG emissions

Green Remediation Exercise:
Description of Study Site

General Site Characteristics:

State:	*Minnesota*
Property size:	*20 acres*
Current ownership:	*Municipality with population of 40,000*
Current use:	*None; closed industrial facility*
Past use:	*Chemical manufacturing*
Anticipated reuse:	*Small industrial park (undefined facility[s]) and greenspace*
Regulatory status:	*Superfund non-NPL, PRP lead*
Prior cleanup actions:	*Emergency removal of chemical storage containers*

Site Setting:

Topography:	*Medium-sized river 0.5 miles from site; scrub vegetation in all areas without man-made structures; abandoned 10,000-sf facility with remaining infrastructure*
Sensitive environments:	*Downstream surface water designated as portion of state wild and scenic river; burrowing owl (endangered) habitat three miles away*
Adjacent/nearby property use:	*Agricultural, residential, and recreation*
Transportation access:	*Adjacent railroad and federal highway corridors*
Service/product provider access:	*Nearest major metropolitan area 100 miles away*
Community:	*Low/moderate income*
Local business types:	*Major horticultural nursery, light industry, small retail and agricultural services*
Utilities/Services:	*Existing onsite electricity, natural gas, and public water lines; landfill 10 miles away*
Zoning:	*Industrial*
Government/private incentives:	*Partnership, funding, and technical coordination available under Minnesota Sustainability Communities Network*

Ground Water Contamination/Treatment:

COCs:	*Chlorinated solvents including TCE*
ROD-specified remedies:	*Multi-phase extraction including UV/OX treatment and air stripping*
Anticipated O&M duration:	*20 years*

Soil Contamination/Treatment:

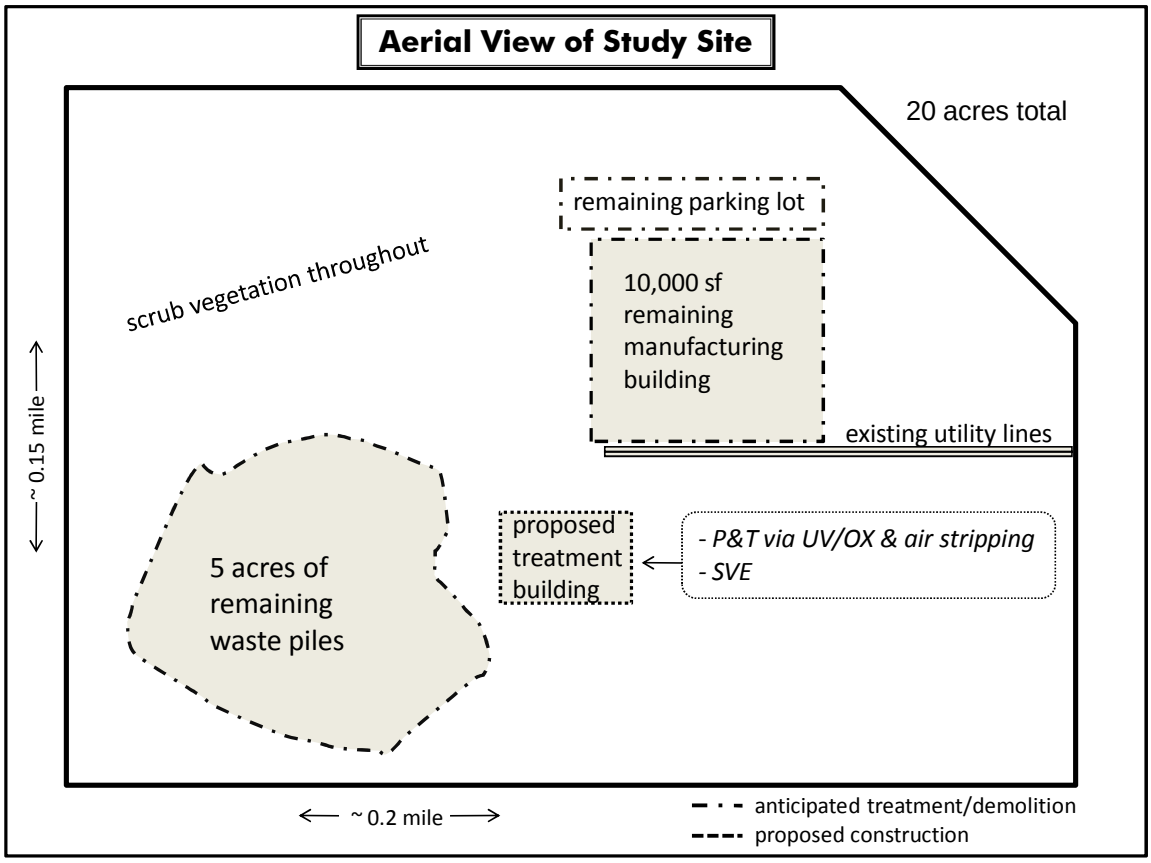
COCs:	*Chlorinated solvents including TCE*
ROD-specified remedies:	*Soil vapor extraction*
Anticipated O&M cost/duration:	*3 years*

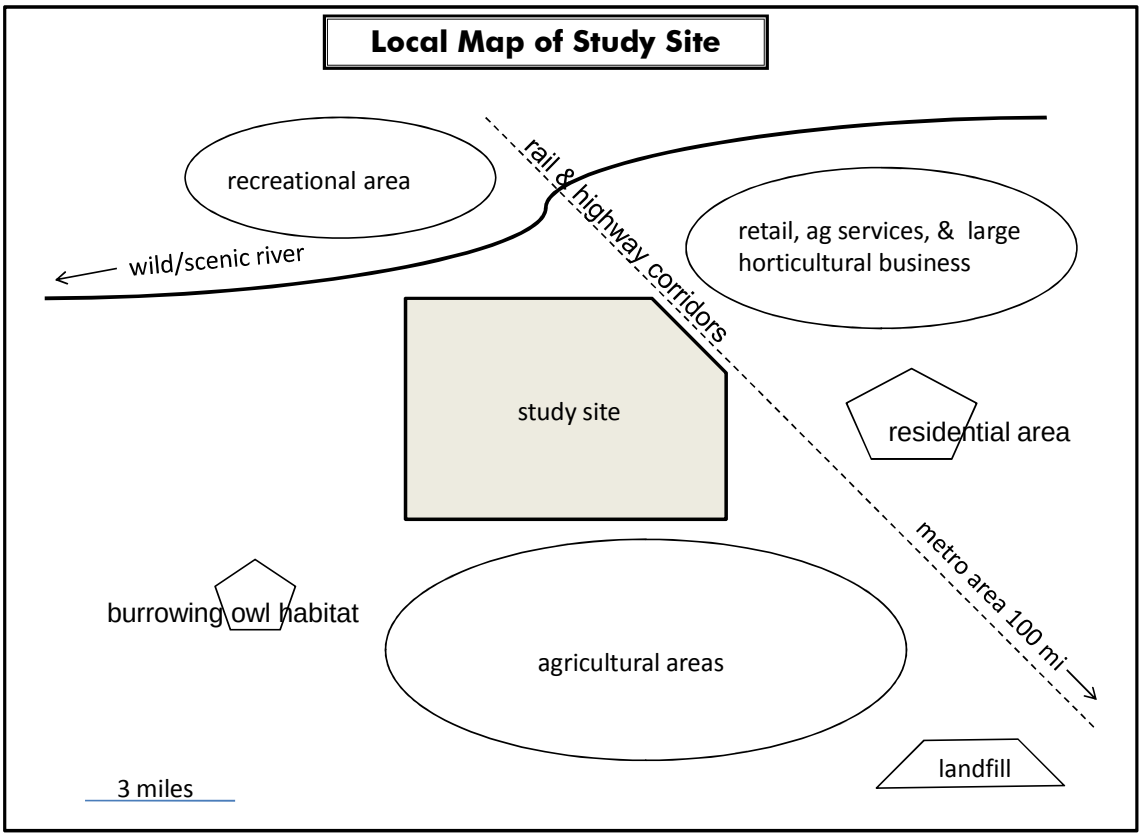
Other Source Controls:

ROD-specified containment:	*Cap 5 acres formerly used for uncontrolled industrial waste piles and later for illegal dumping by other businesses*

Long-Term Controls/Responsibilities:

ROD-specified ICs:	*Cap maintenance; restricted use for drinking water purposes*
Duration and O&M responsibility:	*PRP responsible until cleanup objectives are met, estimated 20 years; municipality responsible for greenspace restoration and maintenance indefinitely*


Aerial View of Study Site
20 acres total
remaining parking lot
10,000 sf remaining manufacturing building
scrub vegetation throughout
existing utility lines
~ 0.15 mile
5 acres of remaining waste piles
proposed treatment building
- P&T via UV/OX & air stripping
- SVE
~ 0.2 mile
anticipated treatment/demolition
proposed construction


Local Map of Study Site
recreational area
rail & highway corridors
wild/scenic river
retail, ag services, & large horticultural business
study site
residential area
metro area 100 mi
burrowing owl habitat
agricultural areas
landfill
3 miles

Breakout Group Summary:
Best Management Practices at Study Site

Energy Requirements of the Treatment System

- ► Evaluate applicability of wind, solar, methane gas, biosolid, and hydro energy resources, with potential capital equipment sale to future onsite businesses
- ► Pursue formal agreement allowing return of surplus electricity to the grid for utility credit/purchase, sale to offsite businesses, or sale to future onsite industrial businesses
- ► Use Energy Star® equipment wherever possible
- ► Operate the multiphase extraction system at off-peak times to take advantage of lower electricity rates
- ► Minimize fossil fuel energy needed for soil vapor extraction by employing passive-energy barometric pumping
- ► Upgrade the existing electricity lines and interconnections with high-performance material/fittings to reduce electricity loss

Air Emissions

- ► Use rail lines or river for transport of construction materials, contaminated debris disposal, and routine supplies
- ► Use ultra-low sulfur diesel fuel and retrofit-diesel engines to operate heavy machinery and alternate fuel for non-diesel vehicles
- ► Suppress dust export of contaminants through periodic water spraying
- ► Use high-performance off-gas treatment systems to address carbon contaminants

Water Requirements and Impacts on Water Resources

- ► Contract with the nearby agricultural and/or horticultural businesses for reuse of treated water in business needs such as irrigation or livestock drinking water
- ► Use treated water onsite to irrigate the landfill cap and control dust
- ► Divert treated water to the nearby river through ways that allow infiltration to support wildlife habitats
- ► Reinject treated water to replenish aquifer and take advantage of water credits if available

Land and Ecosystem Impacts

- ► Use a vegetated evapotranspiration cover for the onsite landfill
- ► Use native vegetation for the onsite landfill cover
- ► Redevelop onsite capped area as a bird habitat
- ►Use agricultural or horticulture waste products from the nearby businesses as soil amendment for landfill cover and an additional carbon sink
- ► Build a constructed wetland for cleanup polishing while enhancing existing ecosystem
- ► House all mechanical/electrical processes inside the existing building to control noise

Material Consumption and Waste Generation

- ► Retrofit the existing building, if uncontaminated, to accommodate treatment systems
- ► Use LEED green building techniques for any new structures
- ► Reuse existing utility lines
- ► Reuse suitable building and parking lot demolition debris as base for landfill cover

Long-Term Stewardship Actions

- ► Negotiate directly with the community to reduce local impacts such as project lighting and noise
- ► Redevelop the capped/revegetated landfill as a community park within regional recreation area
- ► Build a local market for renewable energy and other natural resources such as water
- ► Offer the existing building to local government or non-profit groups for community use
- ► Pursue development of a wind farm on all empty land, with consideration of NEPA requirements applying to land redevelopment beyond the site, impacts on burrowing owl as an endangered species, and offsets to natural resource damages already incurred

Breakout Group Summary:
RPM Approaches to Foster PRP Use of Best Practices

PRP Negotiations

►Add renewable energy provisions in the PRP consent decree
►Integrate green remediation aspects into the site-specific CERCLA planning or enforcement documents
►Request the PRP to use design, construction, and operation contracts that include specification for renewable energy sources, clean diesel and retrofit diesel engines, infrastructure reuse, and other green remediation strategies
►Request the PRP to give procurement preference to green products and services in same way required at federal facilities
►Enable public/private use of project areas, such as
- Immediate access to the existing building for community purposes
- Continued maintenance of the existing building until it is reused
- Long-term integration of the capped/revegetated landfill as a park within the regional recreational area
- Large-scale energy production arranged through a formal partnership

Direct Assistance to PRPs

►Join the PRP in co-designing treatment systems that use green remediation strategies
►Help or conduct any needed life cycle analysis, cost/benefit analysis, risk reduction study, transportation study, natural resource damage assessment, or renewable energy resource assessment
►Investigate federal or state rebates/credits for renewable energy production or green product purchasing
►Negotiate utility purchase or credit for surplus electricity generated by the PRP's grid-connected renewable energy systems
►Assist in pilot studies on renewable energy use, energy co-generation, or other green remediation strategies
►Investigate potential for natural resource damage offsets/credits and NEPA considerations in redevelopment alternatives
►Identify available and appropriate vehicle/machinery fuel, fuel sources, and high-performance transportation technology
►Encourage corporate responsibility aligned with national trends in business leadership and environmental stewardship

Community Involvement and Outreach

►Hold stakeholder meetings to:
- Communicate information about potential or implemented green strategies
- Collect additional ideas
- Show examples of cost savings, energy and natural resource savings, and GHG reductions
- Encourage PRP and businesses to share natural resources, infrastructures, and processing byproducts
- Establish partnerships with local businesses, non-profit organizations, and technical experts
- Gain general support of all stakeholders

►Issue joint press release with the PRP and site owner to publicly announce green remediation strategies
►Incorporate ideas received during public comment periods
►Work with environmental groups to combine remediation polishing with ecological enhancements

Breakout Group Summary:
Success Measures

►Reduction in new materials needed during construction, and associated reduction in cost and natural resource extraction
►Immediate and long-term savings in monthly expenses for electricity, natural gas, transportation fuel, and water
►Lower quantity of imported fossil fuel required throughout the life of the project
►Lower rates of GHG and particulate emissions throughout the life of the project
►Additional carbon sequestration and potential carbon credits
►Reduction in regional fresh water consumption
►Increased corporate responsibility
►Economic gains from building a renewable energy market
►Increased acreage available for reuse
►Increases to environmental quality

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP A

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Reuse existing building and utility lines	Incorporate building/line reuse specifications into construction contracts	Incorporate community ideas received during public comment period	Increased project viability, and construction savings due to reduced consumption of new material and energy
Integrate wind power into the cleanup system	Include wind energy specifications into design and construction contracts, and return excess electricity to the grid	Help PRP to conduct life cycle analysis and EIS (if needed) for wind energy production	Actual cost savings due to reduced need for grid electricity, and potential profit from utility purchase of excess electricity
Reclaim treated water for beneficial reuse	Contract with nearby agricultural business needing irrigation or livestock water, and work with horticulture business to find other opportunities for water reuse	Hold project stakeholder meetings to communicate information about water reclamation techniques and the value of providing a new source of water for local businesses	Percent reductions in fresh water consumption and storm water runoff
Use cleaner fuels and fuel filters for vehicles and machinery	Incorporate fuel specifications in cleanup contracts and site management documents	Identify available and appropriate fuels and fuel sources	Reduction in GHG and particulate emissions

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP B

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Consider generating electricity from wind or solar resources	Analyze suitability of wind and solar resources	Investigate state rebate for renewable energy production, foster utility buy-back of surplus power, conduct cost/benefit analysis, and hold stakeholder meetings to gain community support	Potential long-term cost savings, and reduction in fossil fuel energy consumption
Consider generating electricity from methane gas captured from the onsite landfill	Conduct a pilot study to confirm suitable quality and quantity of methane gas emitted by the landfill	Investigate state rebate for renewable energy production, foster utility buy-back of surplus power, conduct cost/benefit analysis, and hold stakeholder meetings to gain community support	Potential long-term cost savings, and reduction in fossil fuel energy consumption
Reuse effluent from ground water treatment system	Use treated water onsite for irrigation and dust control, and coordinate with local agricultural and horticultural businesses to identify uses	Present related information at stakeholder meetings to foster community and PRP involvement	Local fresh water savings achieved by substituting treated project water for fresh water in local business operations
Reuse the existing onsite structure	Retrofit the existing industrial building to accommodate the project treatment systems	Present related information at stakeholder meetings to foster community and PRP involvement	Reduced consumption of new material during construction, increased recycling, and reuse of old materials by onsite or local users
Conserve energy during treatment operations	Use Energy Star® equipment wherever possible		
Reduce transportation-related energy use	Investigate potential for using rail lines for removal or demolition activities, and use clean fuels for onsite and offsite operations if possible		
Reduce impacts on land and ecosystems and foster long-term stewardship	Use an evapotranspiration cover for the onsite landfill, and install native wildflowers above the cover		

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP C

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Reduce energy consumption of the treatment system	Operate treatment system at off-peak times to take advantage of lower electricity rates, consider using renewable energy sources, and minimize energy needed for air stripping		
Reduce transportation-related air emissions	Use ultra-low sulfur diesel fuel and retrofit diesel engines for on/offsite needs, use alternate fuel for non-diesel vehicles, and rely on rail for transport of construction or demolition materials		
Minimize dust export of contaminants	Use treated water for dust suppression		
Reuse treated water	Arrange for adjacent horticulture or agriculture businesses to use treated water		
Integrate ecosystem enhancement into the landfill remedy	Use native plants for cap vegetation, and redevelop area as a bird habitat		
Reduce impacts on community	Negotiate directly with community on ways to reduce lighting and noise		
Reduce raw material consumption during construction	Recycle building materials, re-use the existing building slab, and use green building techniques for new structure		

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP D

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Conserve energy and materials consumed during building construction	Reuse infrastructure by locating treatment operations in existing building	Estimate energy/material cost savings, and join PRP in co-designing SVE and P&T UV/OX treatment systems to be housed in existing structure	Construction cost savings for energy and building materials, and increased corporate responsibility
Conserve energy during treatment operations	Evaluate potentials for using energy from wind, an agricultural manure-based biodigester, and hydropower from the nearby river	Identify state incentives and credits, estimate cost savings, investigate utility net metering, and encourage corporate responsibility	Lower utility expenses, reduced GHG emissions, and improvements to long-term stewardship related to community economics and environmental quality
Consider land use/reuse in cleanup planning, including enhancement of carbon sequestration	Use local agricultural material to cap contaminated soil, apply soil amendments to foster plant growth, and integrate an onsite community park	Work with community and public officials in periodic meetings, and solicit involvement of environmental groups	Increased acreage available for reuse
Reclaim or reuse treated water	Divert treated water for river infiltration to restore wildlife habitats, and/or reinject treated water to replenish aquifer	Work with environmental groups able to help "polish" cleanup in future, investigate potential for natural resource damage offsets and water credits	
Reduce air emissions	Use high-performance off-gas treatment system to address carbon, choose rail instead of truck transport whenever possible, and ensure diesel engines operate with particulate filters and ultra-low sulfur fuel	Estimate risk reduction, conduct transport studies, and integrate CERCLA criteria/enforcement elements into planning documents	
Minimize impacts on land and ecosystem	Use on-site material to cap the landfill (while not disturbing endangered owl) and reduce noise to limit habitat disruption		
Build a market for renewable energy and other natural resources	Share the produced electricity and/or conserved water with local nursery and/or farmers		

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP E

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Integrate renewable energy production into long-term stewardship	Develop grid-connected wind farm on all empty land	Evaluate NEPA requirements in context of overall redevelopment and impact on endangered species, investigate renewable energy rebates, and conduct community outreach	
Use renewable energy to power the treatment system	Install grid-connected solar energy system on the treatment building roof	Investigate renewable energy rebates, and conduct community outreach	
Reduce consumption of raw materials during construction	Re-use the existing building		
Reclaim treated water	Divert treated water for use by agriculture and horticulture neighbors		
Use engine-retrofit and clean-diesel technologies for onsite activities, and rail systems for soil transport	Incorporate specifications (such as use of low-sulfur diesel fuel for earthmoving machinery) into cleanup contracts		

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP F

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Consider use of renewable energy to power the P&T system	Incorporate renewable energy sources into P&T design and implementation	Add provisions in consent decree, provide PRP/site owner with information on renewable energy strategies and government incentives or financing, and show examples of cost savings	Lower energy consumption, lower energy expenses, reduced GHG emissions, and potential carbon credit
Reduce noise, negative aesthetics, or other detrimental impacts on community	Identify project activities that can be modified to reduce negative impacts on community	Issue joint press release with PRP and site owner to publicly announce green activities	
Reuse treated water	Identify use for treated water, such as onsite cap irrigation		Reduced fresh-water consumption
Use most efficient transport methods	Identify project opportunities for fuel conservation, such as rail transport of construction material or contaminated demolition materials requiring offsite disposal		
Reclaim demolition material	Reuse uncontaminated debris from parking lot and building for purposes such onsite landfill cap material		
Integrate ecosystem enhancement into the remedy	Build a constructed wetland for the polishing phase of ground-water treatment		
Reduce fossil fuel needed to operate SVE equipment	Use passive-energy barometric pumping for vapor extraction		
Reduce consumption of raw material and energy during construction	House treatment equipment inside the existing structure if possible		
Enhance the existing ecosystem	Use native species for onsite landfill cap		

Green Remediation Exercise Worksheet:
Approach to Implementing Best Management Practices at Study Site

Report-Out: BREAKOUT GROUP G

BMP	BMP Implementation Strategy	Approach to Fostering PRP Use of Strategy	Success Measure
Reuse the existing building	Construct the treatment plant inside the existing building, and use the existing/adjacent utility corridor	Conduct life cycle analysis to identify ways for conserving natural resources	Reduced consumption of natural resources and lower constructions costs
Reuse air-stripping treatment water	Divert treated water for use by horticulture neighbors		
Enhance ecosystem	Use neighboring horticultural waste as compost amendment for onsite landfill cap to enhance vegetative growth and provide greater carbon sink		
Enhance long-term stewardship	Integrate capped land into community's existing recreational area		

Panel Session: Moving Forward with Green Remediation

The panel session provided an opportunity to further discuss specific issues arising during the training exercise. Session participants also posed to the panel various questions about the best ways to move forward with green remediation and the manner in which green strategies relate to the CERCLA process and requirements.

Question: How do NEPA requirements fit into green remediation strategies, particularly concerning redevelopment activities such as renewable energy production on land extending beyond the CERCLA site?

Answer: CERCLA policy and processes for remedial investigations and feasibility studies generally are considered equivalent to those under NEPA. Thorough consideration of NEPA requirements would be needed, however, for redevelopment extending beyond a CERCLA site.

Question: Should we accept the premise that a remedy is not to be changed in order to use green remediation strategies?

Answer: We recognize the potential for PRPs to broadly claim that less aggressive treatment is greener. PRPs may wish to simply equate the avoidance of cleanup-generated CO_2 emissions with green cleanup; however, the CERCLA process requires that cleanup time and site reuse potential also serve as major factors for remedy implementation. The entire life of a cleanup project should be considered. Both headquarters and regional caution should be taken to avoid acceptance of this type of rationale.

Question: Can we incorporate green remediation into the nine CERCLA criteria for remedy selection?

Answer: Green remediation can be used as an additional tool to balance but not replace CERCLA criteria. Incorporating these strategies into remedy selection might involve balancing long-term climate change problems with local contamination issues; however, the balancing process for using this type of approach remains unclear. Air contaminants, for example, may carry more weight.

Question: Is there a loss in fuel efficiency (miles per gallon, or MPG) when using a diesel particulate filter (PDF)?

Answer: The MPG of a new or newly retrofit vehicle equipped with a PDF may be slightly lower than that of vehicles without a PDF. Over the life of the vehicle, however, MPG is not lower due to long-term reduction of particulate buildup and stress to the fuel line and engine.

Question: How do we move past any resistance from a community, co-workers, or other agencies such as the U.S. Army Corps of Engineers (USACE)?

Answer: You simply decide that you're going to use these strategies, which was the case at the Pemaco Superfund site in California. Inclusion of discussion regarding value engineering helped implement Pemaco's photovoltaic system and other green strategies. Region 9 received no resistance from the Pemaco cleanup contractor, although the USACE resisted. Support can vary considerably. At the Nebraska Ordnance Plant (NOP), for example, no resistance whatsoever was encountered when installing or operating the wind turbine supporting ground water cleanup and all stakeholders were extremely supportive.

Headquarters representatives recently presented the draft "green remediation contracting toolkit" at the Agency's recent project officer/contractor officer training session, and continues to work with contract officers in finding additional opportunities for incorporating green remediation specifications into cleanup contracts. RPMs are encouraged to work closely with regional contracting counterparts.

All reputable and experienced contractors may not be listed in standard procurement material provided by the General Services Administration. Prime contractors are quickly learning about or investigating these strategies but may need assistance in finding suitable subcontractors, particularly for alternative energy applications. RPMs are encouraged to conduct more research on potential subcontractors for special needs and provide the names of qualified firms to the PRP for follow-up subcontract competition.

Question: How can we work with other federal agencies in green remediation efforts?

Answer: The U.S. Department of Energy (DOE) does have resources and experience and has released information about numerous applications. Remediation cost savings seem to drive DOE applications. Multiple government partners were involved with the NOP wind application. Both the USACE and University of Nebraska partnered with Region 7 in implementing the project, and the USACE provided triple the amount of project funding provided by EPA. Some U.S. Department of Defense (DOD) services have begun to identify best practices for use at DOD sites. DOD's interest may stem from military logistics because access to U.S. biofuel may help ensure military mobility. DOD methods for achieving sustainability are quite different from those of EPA, due in part to the difference in federal agency missions.

One opportunity for sharing information with other federal agencies is the Federal Remediation Technologies Roundtable, which meets on a semiannual basis. Green remediation is the theme of the next FRTR meeting (December 11, 2008). The Strategic Environmental Research and Development Program (SERDP) provides another interagency opportunity for moving green remediation forward. Nearly one-third of SERDP's $28 million budget for fiscal year 2007 is allocated to environmental restoration. As program executor, DOD currently is soliciting EPA input on future research projects focused on environmental restoration. Each project operates for one to five years at an average funding of $400,000 each year.

Question: How do we bring PRPs into green remediation?

Answer: If we can demonstrate cost savings, PRPs will be more than willing to use these strategies. PRPs also are aware that "going green" provides a positive boost in public perception. While green costs vary significantly, most stakeholders agree that additional start-up costs are often involved with new methods for controlling air emissions from fossil fuel burning. Cost reductions are the primary driver for some PRPs. Other PRPs such as British Petroleum are willing to pay high up-front costs in order to gain long-term savings through large-scale renewable energy applications that replace fossil-fuel consumption.

Bringing in a third party can help bring PRPs into the green movement. Property developers, for example, are already involved in cleanups at some sites and may contribute financially to remediation if publicly favorable green strategies are used. This is illustrated at one Region 9 pilot project where the developer is providing financial resources to test a biodigester that could serve the larger community.

If a PRP faces outstanding noncompliance penalties, integration of green remediation strategies might be structured as a supplemental environmental project (SEP) for penalty offset. RPMs may find that a SEP approach could be used more readily under RCRA rather than CERCLA. Negotiations during consent decree can revisit past and future penalties in the same manner.

Question: What has been your experience in turning over greener cleanup/redevelopment projects to states?

Answer: Since state responsibility for cleanup includes both management and operation, sites are very interested in using renewable energy to reduce project costs. Many of these sites involve remediation with long durations (some up to 500 years) and use of renewable energy systems would greatly reduce energy costs over the life of such projects.

At the same time, states are actively seeking and helping to implement renewable energy applications contributing to state renewable energy portfolios. One example of merging these goals is the State of Massachusetts' current investigation of a co-generated heat and power system to support remediation at the Baird & McGuire Superfund site. Many states also need to find new ways for remediating and redeveloping large mining sites, and large-scale renewable energy production provides significant potential. Currently, RPMs may have greatest success in using green remediation at Fund- or state-lead sites.

Question: Can a TSP green remediation forum be formed?

Answer: OSRTI will investigate the possibility of forming a new TSP forum.

Potential Questions in Future Panels

The following individual questions were recorded on trainer or trainee notes throughout the training session; many were grouped into formal questions posed to the closing panel but some were not addressed.

Question: What is the role of Headquarters/OSWER versus the region or ORD in the Agency's climate change and green remediation strategies?

Question: How can we build better partnerships with local communities to reuse treated groundwater, which commonly results in too much piping of ground water to local POTWs, high Superfund costs, and wastefulness?

Question: State representatives (including those from California) have been resistant to pay their 10% cost share for solar panel installations; do you have any ideas to help RPMs secure such funding for Fund-lead sites?

Question: Community outreach might have decreased the potential/concern for equipment theft at the Pemaco site; was community outreach conducted prior to installation of the onsite photovoltaic panels?

Question: Many RPMs have had negative experiences with being part of "pilot projects;" can you clarify how pilot-project involvement will not translate to extra work for RPMs?

Question: Capability and cost structures for net metering of renewable energy production varies across states; can federal agencies receive money to help recover capital costs for renewable energy systems at Fund-lead sites, possibly through "augmentation" of the federal agency budget?

Question: Clean diesel provides a good fuel alternative, but is there any hope for a technology that provides renewable fuel for large earth-moving machinery?

Question: Rebates currently are not available for solar panel installations at Fund-lead sites; can that be changed?

Question: How can EPA "encourage" PRPs to implement green remediation at PRP-lead sites?

Question: What types of infrastructure and royalty issues are involved in generation of renewable energy on mining sites, which often are remote and sometimes involve tribal lands?

Question: Is an effort underway to partner EPA with DOD and DOE in screening their lands for potential renewable energy production during cleanup and reuse of the properties?

Question: Are we engaged with other federal agencies such as DOD and DOE to conduct pilot projects or applications of green remediation during federal facility cleanups?

Question: Similar to strategies of integrated watershed management, why don't you incorporate factors that may halt projects (such as citizen or community opposition) to develop a stronger contracts toolkit?

Question: When using diesel exhaust filters, what is the tradeoff between the loss of MPG (miles per gallon) and the gain in cleaner emissions?

Question: How do we consider the time and impacts/benefits of a given alternative, e.g. an alternative that reaches cleanup goals faster but involves more intensive short-term emissions?

Question: Inclusion of green remediation language in contracts and formal agreements such as MOUs is a good idea but the concept needs to filter into the "hearts and minds" of contractors, EPA, and other federal agencies such as the Corps of Engineers; how can we ensure that (1) management strongly backs green remediation provisions, makes staff accountable, and provides structural assistance, (2) OGC, ORC, and DOJ accepts such provisions, and (3) EPA staff rise to the challenge of becoming advocates when faced with resistance? Is additional technical support needed?