Sustainable Remediation Forum (SURF) SURF 7: June 10 and 11, 2008 Houston, Texas

SURF 7 was held in Houston, Texas on June 10 and 11, 2008. Those individuals that participated in the two-day meeting are listed in Attachment 1 along with their contact information. The meeting marked the seventh time that various stakeholders in remediation—industry, government agencies, environmental groups, consultants, and academia—came together to develop the ability to use sustainability concepts in remedial decision-making. Previous meeting minutes are available at www.ibackup.com. The username is surfarchive, and the password is surf.

Meeting Opening

The meeting began with Dave Ellis (DuPont) welcoming all participants and thanking Stephanie Fiorenza of BP for hosting the meeting. Dave stated the theme of the meeting: "How do we balance on-site cleanup with off-site impact? Who should decide?"

Stephanie Fiorenza and Mike Rominger (meeting facilitator) discussed meeting logistics. Mike thanked the Meeting Design Team for their work in planning the meeting agenda. SURF 7 Meeting Design Team members were as follows: Dora Chiang (EarthTech), Dave Ellis (DuPont), Paul Favara (CH2M Hill), Stephanie Fiorenza (BP), Paul Hadley [California Department of Toxic Substances and Control (DTSC)], Stella Karnis [Canadian National (CN)], Mike Rominger (On-Board Services), and Dave Woodward (EarthTech).

The draft mission statement from the February 2007 meeting was read as follows: "To establish a framework that incorporates sustainable concepts throughout the remedial action process that provides long-term protection of human health and the environment and achieves public and regulatory acceptance." Sustainable concepts were further defined as those that "balance economic viability, conservation of natural resources and biodiversity, and enhancement of the quality of life in the surrounding community." Participants were reminded that this mission statement served as a starting point and could be revised.

Participants introduced themselves, and the meeting agenda was reviewed. Mike reminded everyone of the need to abide by anti-trust regulations. He discussed meeting logistics and ground rules (e.g., expectation that attendees will be active participants, show respect for others, appreciate and encourage divergent opinions, refrain from marketing, and be familiar with previous meeting minutes so the meeting can focus on new information). Mike also noted that it was assumed that nothing discussed or presented contains confidential information. Prior to the meeting, export control compliance was verified.

At SURF 5 (November 2007), participants discussed how to make SURF carbon neutral. Efforts to achieve "sustainable neutral behavior" continued at this meeting. Name badges and tent cards were reused, and plastic and trash used during the meeting were recycled. Many participants stayed at a nearby hotel and took a shuttle to the meeting location. In addition, a bus transported about 40 attendees to dinner after the first day of the meeting. Efforts to achieve sustainable neutral behavior are ongoing and will continue at future meetings.

Stephanie Fiorenza (BP) kicked off the meeting, welcoming all SURF members and discussing meeting logistics. Then, she introduced Larry Malnor, Regional Manager, U.S. South and Latin America. Larry described BP's involvement in alternative energy projects and sustainability practices. As discussed in SURF 2, BP has 12 environmental requirements for all projects. Larry described BP's challenge of determining how to incorporate these environmental requirements into remediation projects. He expressed his support of SURF and noted that, even with tools for measuring sustainability in remediation projects, cultural, sociological, psychological, and political barriers will need to be overcome. Finally, Larry said that the concepts discussed by SURF are applicable to many BP programs.

News Items

Participants discussed the news items listed below. At the end of the discussion, participants agreed that the amount of news items mentioned at this meeting shows that interest in the concept of sustainable remediation is growing.

- ☐ Two sessions on sustainable remediation were held at the Battelle conference in Monterey, California. SURF participants that attended the conference provided feedback to the group, noting that there was a high level of interest in the topic as seen by the standing-room only crowd. In addition, one SURF participant noted that Battelle audience members felt revitalized after the sustainability sessions, feeling that their efforts at cleaning up sites finally were going to make a difference. However, SURF members also discussed that some Battelle audience members were fearful that sustainable remediation is a "do nothing" approach and that it focuses too much on financial parameters with a goal to avoid large costs. Other Battelle audience members noted that the concept of sustainable remediation is "fuzzy," reinforcing that a lot of work needs to be done to formalize a framework for thinking.
- □ Louis Bull (Waste Management) told participants that a *Smart Energy Resources Guide* was released in March 2008 (EPA/600/R-08/049). The guide provides information on the available mechanisms to reduce greenhouse gas emissions at cleanup sites. Louis said the document has been well received and could be a useful tool for dispelling some of the perceptions mentioned at the Battelle conference. The guide is available at http://www.epa.gov/nrmrl/pubs/600r08049/600r08049.pdf>.
- □ SURF members recently led a panel discussion and technical presentation at ConSoil 2008 in Milan, Italy (June 3 through June 6). The discussion and presentation were well attended and received a favorable response from audience members. One participant noted that although sustainable remediation is a new idea in the regulatory arena in Europe and the United Kingdom, the thought processes in these countries seem to be more advanced than in the United States. As an add-on to the ConSoil conference, SURF UK members held their quarterly meeting. One result of the meeting was that sustainability will be integrated into contaminated land regulations in 2009. SURF members who had not previously participated in a SURF UK meeting expressed excitement at seeing the parallel efforts underway on both sides of the pond.

- □ John Ryan (ENSR) mentioned that the U.S. Business Council for Sustainable Development (BCSD), a regional affiliate of the World Council of Sustainable Development, is looking for collaborators for their Green Brownfields initiative. More information about the Green Brownfields initiative is provided at http://www.usbcsd.org/ecosystem.asp.
- ☐ Maile Smith (Northgate Environmental) mentioned a 1½—day symposium sponsored by the California Groundwater Resources Association. The symposium focuses on the implications of climate change on groundwater supplies and will be held August 13, 2008, in Sacramento, California. Additional information can be found at http://www.grac.org/climate.asp.
- □ Erica Becvar [Air Force Center for Engineering and the Environment (AFCEE)] stated the following news updates:
 - The Interstate Technology & Regulatory Council (ITRC) Remediation Risk Management team is proposing a new project on green and sustainable remediation to provoke discussion about the impacts of selecting sustainable remediation technologies versus other technologies. A decision on the proposal is expected by October 2008, and the project will be initiated in 2009. For additional details about the proposal, visit http://www.itrcweb.org/strategicplan.asp>.
 - The next meeting of the Federal Remediation Technology Roundtable (FRTR) will address sustainable remediation and will be held in December 2008 in Arlington, Virginia.
 - The Battelle '09 conference will be held in Baltimore, Maryland, from May 5 through 9, 2009. In an effort to create a session on sustainable remediation at the conference, SURF members are encouraged to submit abstracts to Battelle by the deadline of July 31, 2008. More information is available at http://www.battelle.org/conferences/bioremediation/>.
- □ Stephanie Fiorenza told participants that the County of San Diego Site Assessment and Mitigation Group will dedicate a ½ day of their annual meeting to the topic of sustainable remediation. The meeting will be held September 17, 2008, in San Diego and is usually attended by local environmental professionals and members of the regulatory community.
- □ SURF members Deb Goldblum [Environmental Protection Agency (EPA) Region III], Bob Greaves (California DTSC), and Bryan Ashby (Delaware Department of Natural Resources and Environmental Control) and their colleagues Mike Jacobi (EPA Region III) and Richard Criquie (Virginia Department of Environmental Quality) recently received the 2007 Office of Solid Waste and Emergency Response (OSWER) Sustainability Team Award for their work on a sustainability pilot with DuPont (see previous SURF meeting notes for details on the pilot program). This national award recognizes an outstanding team effort that has created, implemented, or promoted tools, approaches, or solutions that have helped OSWER programs achieve greenhouse gas reductions through

- energy efficiency, the use of renewable energy sources, carbon capture, and/or other activities. Congratulations to the team!
- □ To demonstrate the increased interest for sustainable remediation by the regulatory community, Deb Goldblum (EPA Region III) presented an overview of the Climate Change and Contaminated Lands (CCCL) initiative. The objective of the CCCL work group is to implement activities that measurably reduce greenhouse gas emissions while improving the EPA's ability to clean up contaminated sites and return these sites to communities for beneficial reuse. The work group has the following three focus areas: green remediation, carbon sequestration, and renewable energy. Presentation slides are provided in Attachment 2.
 - Green Remediation—Key tasks completed to support green remediation include the green remediation primer, the green remediation web site, and the Superfund carbon footprint analysis. Deb discussed other work being pursued in this area, including the development of contract language for Superfund project managers, regional initiatives, outreach, and training.
 - Carbon Sequestration—The carbon sequestration subgroup has completed its literature search and developed a draft protocol for measuring carbon sequestration by using biosolids on contaminated lands. Deb said that this subgroup is currently looking for pilot sites to evaluate the protocol.
 - Renewable Energy—The renewable energy team has been working with the National Renewable Energy Laboratory to develop maps that overlay the location of contaminated property [e.g., Resource Conservation and Recovery Act (RCRA), Superfund, Brownfields] with land screened for renewable energy potential. Maps were developed for biomass, solar power, and wind. The team also created fact sheets for each state that describe the available incentives for renewable energy and brownfields, and Deb showed examples of the maps and incentive fact sheets. EPA Headquarters will post these tools on the web in the near future.

Team Building Exercise

At each SURF meeting, attendees participate in an activity that allows members to get to know each other better or share knowledge in the field. At SURF 7, participants were asked to describe (and bring if possible) a relevant publication or article that would be of interest to the group to help create a reference library. Participants shared their thoughts, which ranged from web sites to peer-reviewed journal articles to a *Wall Street Journal* article about the presidential candidates' views on energy goals. A reference listing is provided in Attachment 3.

Presentations

As noted previously, the meeting was designed to answer the following question: "How do we balance on-site cleanup with off-site impact? Who should decide?" Presentations were designed to address this question. Each presentation and subsequent discussion is summarized briefly in the subsections below.

Development of a Sustainability Screening Tool for Site Remediation Planning

Stella Karnis (CN) presented a sustainability screening tool developed by Golder Associates Ltd. that her company is using for remedial project planning. The tool was customized to address CN operations and sustainability issues. A pilot-scale test was conducted to demonstrate the tool's effectiveness in identifying the most sustainable remedial option based on environmental, social, and economic impacts for a diesel-like product plume under an operational rail yard in Ontario. Monthly product extraction from interceptor sumps is the current remedy. The remedial options under consideration include an interceptor trench with pumping for product recovery, a multiphase extraction system, a well-based hydraulic barrier with pumping for product recovery, and injection of oxygenated water for plume containment and in situ bioremediation. The primary concerns at the site involve potential plume migration off-site or under existing infrastructure as well as potential impacts on groundwater receptors.

The pilot-scale test identified two remedial options that performed well with respect to environmental, social, and economic issues: multi-phase extraction and injection of oxygenated water. Some technical uncertainties existed for these options regarding anticipated effectiveness under site conditions, so recommendations for additional site assessment and testing were made. Monitoring key environmental, social, and economic indicators should ensure sustainable long-term performance. Presentation slides are provided in Attachment 4.

Discussions focused on scoring and weighting the 14 environmental indicators, 10 social indicators, and 11 economic indicators presented. Pierre Beaudry (Golder Associates) stated that boundaries were defined for the indicators and then 10,000 Monte Carlo modeling runs were performed that used probabilities for environmental, social, and economic indicators to obtain weighting factors for each option. Stella stated that CN used the tool as part of the feasibility study, thereby integrating sustainability into the framework of the feasibility study.

The Social Dimension of Sustainable Remediation

Paul Nathanail (University of Nottingham) presented three case studies demonstrating that the social dimension of sustainable remediation revolves around the acceptability of the proposed remediation process and its outcomes. All three case studies showed that if a community is not engaged early in the process or is not informed about the technical aspects of the project, they will not trust its civil servants and will rely increasingly on unaccountable parties or the story--hungry media. The case studies also demonstrated that the process of engagement seems to matter less (formal vs. informal) than building and maintaining openness and trust. Only then can alternative options consider social issues such as employment; traffic congestion; nuisance; loss of public parkland or recreational land; and actual or perceived impact on health, property values, cultural heritage, or local aesthetics. In conclusion, Paul used the word "trust" to describe the key elements of communicating with stakeholders:

T-alk with stakeholders in plain language		
R-aise realistic expectations		
U-nderstand local concerns and history		
S-pend time listening		
T-ake the action you promised to take		

Presentation slides are provided in Attachment 5.

Discussions focused on how to persuade unwilling clients to involve stakeholders and how to address stakeholders' perception of risk. Paul suggested using case studies to demonstrate to clients that secrecy does not work, only open and honest communication. Paul recommended a guidebook by the Network for Industrially Contaminated Land in Europe (NICOLE) that includes case studies along with the key communication lessons distilled from them. (The guidebook is titled *Communication on Contaminated Land* and is available at http://www.nicole.org/news/downloads/NICOLE%20COMMUNICATION%20ON%20CONTAMINATED%20LAND.PDF.) One participant reminded attendees that, once stakeholders are involved and engaged, it is important to let them voice their frustrations without rushing onto conversations about solving the problem. Another participant mentioned that stakeholders may perceive a risk even when exposure assessments indicate that no risk is present. It is this perception of risk (and other intangibles such as safety) that could drive the project. This perception of risk ties into environmental justice, which may be a factor at some sites. Participants seemed to agree that quantifying the risk of these intangibles (e.g., the value of a person's house) is a difficult and thorny issue.

Use of Sustainability Indicators to Assess the Suitability of Cleanup Strategies

Karin Crosby (Haley & Aldrich) presented a case study and discussed the results of a feasibility study evaluating six remedial alternatives at a former landfill site in the Midwest. Over 50,000 drums and 300,000 gallons of bulk liquid waste were disposed of at a Superfund site, posing a risk to shallow groundwater. Karin stated that the potential cleanup options were no action, on-site groundwater containment, on-site groundwater containment with a cut-off trench, on-site treatment and off-site disposal, off-site treatment and disposal, and off-site disposal. Cleanup costs ranged from \$6.5 million to \$54 million. All of the alternatives were assessed against the seven evaluation criteria established by the National Contingency Plan. Then, a feasibility study was performed, incorporating sustainability analyses to address the evaluation criteria. Sustainability indicators included carbon footprint, priority pollutant emissions, occupational risk, transportation risk, and community acceptance. The study revealed substantially greater environmental and societal impacts for off-site cleanup strategies, which extended well beyond the site boundary. These impacts were positively correlated with remedial costs, indicating that, in this case, on-site cleanup alternatives were more sustainable. Presentation slides are provided in Attachment 6.

Discussions focused on clarifying the methods involved in the sustainability analyses and discussing a recurring theme in SURF meetings: the time required for cleanup vs. environmental impact. For example, one participant asked if the rate of emission in this case study is important (e.g., which is better—18,000 tons emitted today vs. 18,000 tons emitted over 30 years?). Another participant suggested normalizing the value on an annual basis, but also acknowledged that normalization does not consider the changing carbon trading market.

Source Treatment Carbon Footprint

Brandt Butler (URS Diamond) presented a comparison of the estimated and actual carbon footprint of a remedy at a DuPont site in Florence, South Carolina. Liquid waste containing chloroform; 1,1,2,2-tetrachloroethane; phenol; carbon tetrachloride; and xylenes was disposed of at the site. Source control was necessary to prevent further groundwater impacts. DuPont

evaluated several remedial options for sustainability along with other criteria, including risk reduction, cost, and long-term effectiveness. Colorado State University's zero-valent iron (ZVI) clay technology was selected as the best option because estimated calculations showed a lower waste generation and lower occupational exposure than other remedial options. In addition, the ZVI clay technology eliminated further plume impacts and was identified as the most carbon-efficient of the remedies considered. After the remedy was implemented, the actual carbon footprint was calculated and compared with estimated values. The differences were due many factors—some of which could have been better estimated and others which could not. The selection of the remedial technology, however, would not have changed. Presentation slides are provided in Attachment 7.

Discussions focused on the value of attempting to account for some differences that are controlled by the contractor (e.g., travel distance, delivery distances). To this end, Brandt mentioned that DuPont intends to perform a post-analysis for every sustainability assessment it performs and would encourage others to do so for their projects. The goal would be for SURF members to identify the important drivers of sustainability and determine if these drivers are consistent among different sites. One participant stated that there are a number of factors that influence decision making during remedy selection and identifying these factors would result in more accurate sustainability assessments. It was suggested that this topic could be an agenda item at the next SURF meeting. Another participant suggested integrating methanogenesis into the process. Brandt agreed and stated that methane being released into the atmosphere also needs to be considered. Participants seemed to agree that a worst-case calculation could be made via soil modeling. Another participant asked the group how it plans to address long-term energy trends (e.g., increased use of nuclear power, railways) and the resulting impact on remedy selection. It was noted that the sustainability tool used by the AFCEE provides scenario planning in an effort to account for future energy changes.

Finally, one participant asked about the need to obtain additional information from the contractor before performing a sustainability assessment. Brandt responded that the assessment results provide the relative impact, which is adequate. Brandt reiterated that the sustainability evaluation informs the remedial selection and strengthens it. He stated that although sustainability is not the deciding factor at a given site, it gives the regulated community a currency different than cash to consider. In addition, sustainability evaluations allow industry and the regulated community to find common ground that they value and can control.

Sustainable Remediation—Progress and Needs

Paul Favara (CH2M Hill) presented an evaluation of the major sustainability impacts related to four alternatives for managing a large and dilute trichloroethylene plume at the Massachusetts Military Reservation located in Cape Cod, Massachusetts. The AFCEE has responsibility for multiple groundwater remediation systems at the site and has implemented a series of energy and process optimizations over the past five years to reduce greenhouse gas emissions and use wind power as a source of long-term renewable energy. Impacts such as greenhouse gas and sulfur oxide emissions, collateral risks to workers and the community, solid waste generation, and resource degradation were quantified and compared for groundwater pumping and non-pumping alternatives. The results point to a growing need for public policy to define the net environmental benefit of groundwater restoration when compared to the negative impacts of energy-intensive remediation systems. Presentation slides are provided in Attachment 8.

Discussions focused on the fact that, at times, institutional controls are the driving mechanism for technology selection. Some participants mentioned that some states have mechanisms to implement, track, monitor, and enforce land use controls and deed restrictions. Other states (e.g., Arizona) are requiring the responsible party to pay in advance to administer institutional controls. Other questions during the discussion were aimed at clarifying details of the case study, such as whether water resources are an issue at the site. Paul responded that, in this evaluation, the team was balancing the risks of treatment vs. no treatment. One participant stated that the goal of many sustainability evaluations is to look factors that account for large differences and significant contributors to the evaluation. Another participant mentioned that it is unclear if sustainability evaluations should balance actuarial risk vs. hypothetical risks. The discussion ended with participants debating whether sustainability should be an additional balancing criteria or whether it is inherently embedded into the threshold criteria of protecting human health and the environment.

Guidance on Incorporating Sustainability into the Army Environmental Remedy Selection and Optimization Process

Carol Dona (U.S. Army Corps of Engineers) discussed the structure of a guidance document to incorporate sustainability into Army environmental remediation projects. The background of existing federal sustainability practices from which the guidance will be drawn was presented, along with the basic structure of a decision flow chart. In addition, Carol discussed procedures for projects in the planning phase as well as the optimization of on-going projects. Aspects of sustainability primarily involved with on-site cleanup were contrasted with sustainability aspects that have broader, more off-site impacts. Finally, Carol discussed the development of an Army policy concurrent with the guidance that will incorporate off-site impacts and bring sustainability into the mainstream of the environmental remediation planning and optimization processes. Presentation slides are provided in Attachment 9.

Discussions focused on clarifying items in the decision flow charts and understanding the drivers for the guidance. One participant asked how performance-based contracting fits into the step of incorporating sustainability into the remedial investigation report. Carol stated that a goal is set with the contractor and it is the responsibility of the contractor to determine the strategy to meet the goal. Because there is no mandate for sustainability with respect to site restoration, it is necessary to take the qualitative goals and quantify them. Additional questions related to coordinating this effort with other entities, such as the Navy and Air Force, and identifying the driving force behind the guidance. Carol said that the goal is to have a tri-services guidance between the Army, Navy, and Air Force that uses this tool to achieve remedial process optimization (RPO). One participant mentioned that the Air Force has over 1,400 sites slated for remediation to meet the remedy-in-place (RIP) goal of 2012.

Status of Sustainable Remediation White Paper

SURF members continue to work on a white paper about sustainable remediation. The draft title of the white paper is *Integrating Sustainability Principles, Practices, and Metrics into Remediation Projects*, and the purpose of the white paper is to collect, clarify, and communicate the thoughts and experiences of SURF members on sustainability in remediation. At a previous meeting, facilitators for major chapters were assigned, and participants volunteered to help specific facilitators based on the chapter topic and their area of interest or expertise.

At SURF 7, participants gathered into breakout groups according to their assigned chapters. New SURF members joined a breakout group based on their interest in the chapter topic and the existing size of the chapter team present at the meeting. Attachment 10 provides the most recent listing of volunteers for each chapter. Chapter facilitators led the breakout group discussions, and each group used the face-to-face time to discuss reorganization of the draft outline, the appropriate content for their chapter, and action items for their chapter. Based on the discussion, general action items are as follows:

Complete draft of all chapters by August 31, 2008.	
Write in active voice.	
Include an executive summary, with take-home points visually emphasized.	
Develop conclusions and recommendations for each chapter.	
Provide reference information for each chapter.	
Begin to collect figures (e.g., illustrations, photographs) for each chapter.	
Consider using matrices in each chapter to concisely convey information.	
Contact Brandt Butler (URS Diamond) if you need examples to demonstrate a point (see Attachment 1 for contact information).	
Develop a glossary of terms using a document from Dave Ellis (DuPont) as a starting point.	
Develop a formal liaison with a contact in SURF UK to ensure accuracy of international aspects of paper.	
Obtain an external peer review prior to publication.	

Participants discussed the concept of using an acronym that encompasses elements and attributes of sustainability to help evaluate case studies presented in the white paper. Some acronyms were discussed without detailing the acronym definition (e.g., SURF's UP, REMEDY). Others were submitted with definitions and are provided in Attachment 11. Participants were encouraged to brainstorm more acronyms and forward them via e-mail to Kathy Adams (see Attachment 1 for contact information).

Participants discussed the definition of sustainable remediation. Some participants believe that sustainable remediation is a process, not a product. Participants seemed to agree that consensus on the definition of sustainable remediation was necessary. A definition of sustainable remediation will be provided in the introduction of the white paper.

Sustainable Remediation Exercise

Participants reviewed the sustainable remediation exercise discussed at SURF 6 (March 2008). The goal of the exercise was to explore the diversity of the thought processes involved in applying sustainable concepts to a hypothetical site. At SURF 6 (March 2008), members shared their methods and results after examining the sustainability aspects of the following four technologies: pump and treat, in situ thermal treatment, accelerated reductive dechlorination, and excavation. It is important to note that it was assumed that the technology would be implemented by itself (vs. combined with other technologies). Although it is clear that this

assumption may not be true in the real world, members were asked to adhere to this restriction for the purposes of completing the exercise.

At this meeting, participants briefly summarized the results presented at SURF 6 (see notes from SURF 6). The questions below were asked to spur discussion. Participant responses are included below each question.

- ☐ How do we balance what we have learned about technology and sustainability, and how would we use this information to make decisions?
 - Develop a narrow list of sustainability parameters for each technology, acknowledging that each technology will not have the same number of parameters.
 - Rank technology against net benefit indicators (e.g., minimize or eliminate energy consumption, harness or mimic a natural process).
 - Consider evaluating technology in terms of risk reduction over time.
- ☐ What boundaries should we place on the metrics within the sustainability evaluations?
 - Focus on balancing environmental, economic, and social aspects of remedy for a more complete evaluation of sustainability (i.e., do not restrict analysis to carbon dioxide emissions).

The discussion continued and participants emphasized that key stakeholders need to be identified and engaged in the process from the beginning to achieve success. One participant asked why sustainability would be treated differently than other remedy selection criteria in which it is common practice to make subjective, qualitative assessments. Another participant stressed that successful sustainability assessments performed to date have not incorporated valuation.

Open Discussion of Meeting Theme

Participants discussed the meeting theme, which was "How do we balance on-site cleanup with off-site impact? Who should decide?" In attempting to answer the first question, discussions focused on defining "off-site." While "off-site" could be defined as outside of the contaminated property boundary, participants agreed it also could be defined as societal impact. One participant asked if it is possible to mitigate broader problems than those at contaminated sites. For instance, participants discussed whether benefits at one site could be captured and applied to another site elsewhere to achieve a greater net environmental benefit. One participant responded that the San Francisco Regional Water Quality Board currently practices this approach on some projects. Another participant cautioned that the concept of net environmental benefit does not consider groundwater management zones and that there needs to be some consideration in the event that groundwater use changes at the contaminated property. Finally, one participant questioned whether it is the mission of SURF to evaluate societal and economic parameters when performing remediation sustainability assessments.

In attempting to answer the second question, discussions focused on the difficulty of determining who should be participating in remedy discussions. One participant stated that interested stakeholders may play a more critical role in remedial decision making in the future. Another participant proposed that the decision maker should be the affected parties, not merely interested

parties. Participants seemed to agree that it is necessary to cautious about what interested stakeholders may want.

Path Forward

The following path forward items were identified at the meeting:

- 1. The next meeting will be held in the Philadelphia area on October 6 and 7, 2008. These dates were selected to coordinate with a meeting of the EPA's CCCL group. Additional meeting logistics will be forwarded as they become available. Possible agenda items were discussed at SURF 7 and are listed in Attachment 12. A draft agenda will be developed by the Meeting Design Team and will be circulated via e-mail. Active feedback and suggestions are encouraged.
- 2. Based on feedback at the meeting, volunteers for the design team are as follows:
 Julia Bussey (Geomatrix Consultants), Brandt Butler (URS Diamond), Karin Crosby
 (Haley & Aldrich), Dave Ellis (DuPont), Deb Goldblum (EPA Region III),
 Lowell Kessell [Good EarthKeeping Organization (GEO)], Phil McKalips
 (Environmental Standards), Dick Raymond (TerraSystems), Brad Barquest
 (United Technologies), Carol Winell (GEO), Dave Woodward (EarthTech). Additional
 members are welcome. Meeting Design Team members should expect to spend about
 eight hours on the effort between now and the next meeting.
- 3. In recognition of SURF's expanding membership and the increased interest in sustainable remediation, participants discussed the need for creating a smaller ad hoc group to address issues of size, direction, etc. After much discussion, participants agreed to form a Work Group consisting of a balanced team of problem owners, consultants, and regulators. Work Group members were nominated and consensus on the members was reached. The Work Group consists of the following individuals: Dave Ellis (DuPont), Stephanie Fiorenza (BP), Curt Stanley (Shell Global Solutions), Paul Favara (CH2M Hill), Dave Major (GeoSyntec), Dave Woodward (EarthTech), Deb Goldblum (EPA Region III), and Paul Hadley (California DTSC). These individuals were charged with gathering before the next meeting and making recommendations to the larger group on the following issues:
 - a. Determine optimal size of organization or maximum size for meetings.
 - b. Consider developing criteria for being a SURF member.
 - c. Consider a more formalized organizational structure with defined roles and responsibilities.
 - d. Determine long-term future of group so that decisions can be made about direction, etc.
 - e. Consider the pros and cons of creating a legal entity and seeking a host organization.
 - f. Consider SURF-sponsored training activities, perhaps via the Internet.scope for training activities
 - g. Define sustainable remediation and develop mission statement.
 - h. Recruit members from social sciences.

4.	Lowell Kessell (GEO) volunteered to host and develop a web site for SURF, which will be located at <www.sustainableremediation.org>. A proposed format will be available for review in the near future.</www.sustainableremediation.org>

Attachment 1
SURF 7 Participant Contact Information

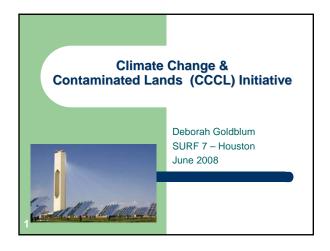
SURF 7 Participant Contact Information

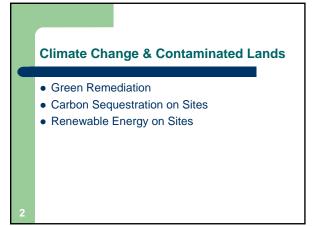
Participant	Affiliation			
Kathy Adams	Writing Unlimited			
Brad Barquest	United Technologies Corporation			
Pierre Beaudry*	Golder Associates			
Erica Becvar	Air Force Center for Engineering and the Environment			
Louis Bull	Waste Management			
Julia Bussey	Geomatrix Consultants			
Brandt Butler	URS Corporation			
Deni Chambers	Northgate Environmental Management			
Robert Coffman	ENVIRON			
Karin Crosby	Haley & Aldrich			
David Curnock	United Technologies Corporation			
Carol Dona	U.S. Army Corps of Engineers			
Richard Dulcey	ERM			
Dave Ellis	DuPont			
Paul Favara	CH2M Hill			
Stephanie Fiorenza	British Petroleum			
Angela Fisher	GE Global Research Center			
Deb Goldblum	USEPA Region III			
Elie Haddad	Locus Technologies			
Paul Hadley*	California Dept. of Toxic Substances and Control			
Elisabeth Hawley*	Malcolm Pirnie, Inc.			
Rory Johnston	Malcolm Pirnie, Inc.			
Stella Karnis	Canadian National			
Lowell Kessel	Good EarthKeeping Organization, Inc.			
Stephen Koenigsberg	WSP Environment & Energy			
Janine MacGregor	New Jersey Dept. of Environmental Protection			
David Major	Geosyntec Consultants			
Larry Malnor	Atlantic Richfield/BP			
Phil McKalips	Environmental Standards			
Paul Nathanail*	University of Nottingham			
Chuck Newell	GSI Environmental			
Tom Peargin	Chevron			
Dick Raymond	Terra Systems			
Issis Rivadineyra	Naval Facilities Engineering Service Center			
Mike Rominger	DuPont Retiree			
John Ryan	ENSR			
Jeanne Schulze	USEPA Region VI			
Maile Smith	Northgate Environmental Management			
Curt Stanley	Shell Global Solutions			
Tiffany Swann	GSI Environmental			
Dan Watts	New Jersey Institute of Technology			
Carol Winell	Good EarthKeeping Organization, Inc.			
Maggie Witt	USEPA Region IX			
Dave Woodward	EarthTech			
Notes:	•			

Notes:

^{*} Individual participated via conference call

Attachment 2 Climate Change and Contaminated Lands (CCCL) Initiative





Green Remediation

- Green Remediation Primer
- Green Remediation Web Page
- Integration into Contract Language
- Green Remediation Pilot project (e.g. Region 3/DuPont)
- Regional Initiatives (Region 9 & Region 10 Cleanup/Clean Air Initiatives)
- Training and Outreach

Carbon Sequestration on Sites

- Literature review
- Draft technical protocol for accounting for carbon assets on cleanup sites
- Identification of pilot sites for evaluation
- Training and Outreach

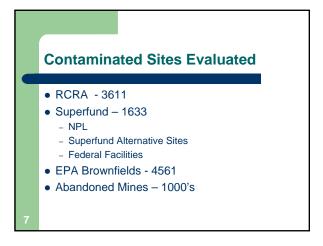
Renewable Energy on Sites

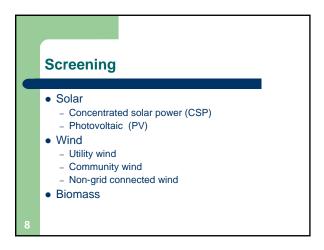
- 50 State Incentive Fact Sheets
- Screening/mapping project
- Training and Outreach

Benefits of Renewable Energy on **Contaminated Lands**

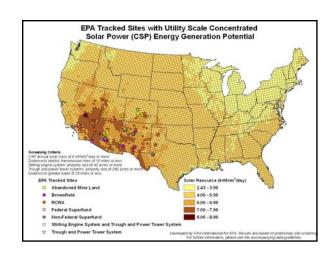
- Provides economic reuse value for otherwise unattractive properties

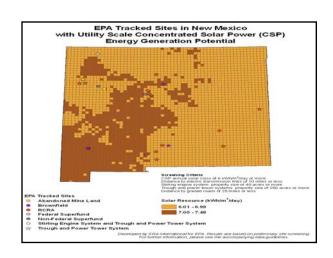
 - Institutional controls may limit use options
- Economically undesirable locations
- Conserves greenspace (including agricultural)
- Attractive reuse option for large-scale land acquisition
- · Greenhouse Gas Reductions
 - Contaminated lands often have existing infrastructure - Reduce reliance on "dirtier" peak power supplies
- · Contributes to national energy independence

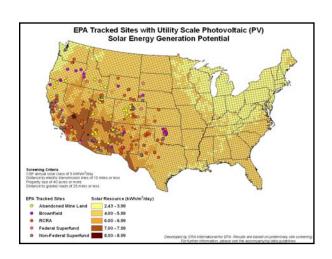


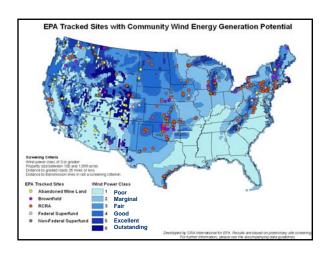


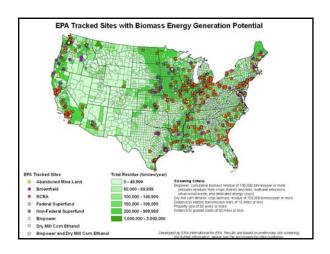




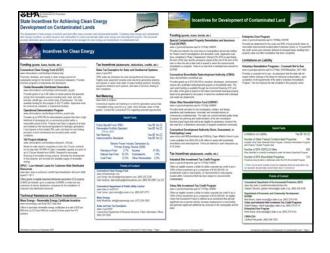


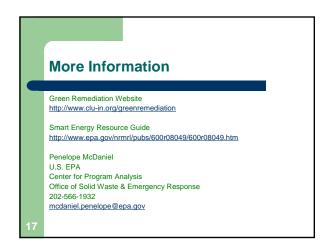






Renewable Energy Incentives State Incentives Grants and Loans Tax abatements, deductions, credits Net metering Other incentives: equipment loan programs for wind production Federal incentives Production tax credit for renewable energy: \$0.95/kWh to \$1.95/kWh for sales of electricity for the first 10 years of operation Federal grants and loans Database of State Incentives for renewable energy and energy efficiency www.dsireusa.org





Attachment 3
SURF 7 Reference Listing

SURF 7 Reference Listing

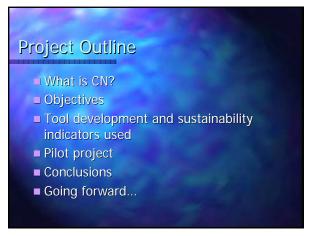
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Attachment 4
Development of a Sustainability Screening Tool for Site
Remediation Planning

Development of a Sustainability Screening Tool for Site Remediation Planning for CN SuRF Meeting - June 10, 2008 Robert Noël de Tilly, Golder Associates Karen Clark-Whistler, Golder Associates Hélène S. Richer, Golder Associates Phil Moddle, Golder Associates Pierre Beaudry, Golder Associates Stella Karnis, CN









Objectives To develop a semi-quantitative sustainability screening tool, using key indicators based on international standards and sustainability issues applicable to CN Easy to use and applicable in multiple scenarios Enable CN decision-makers to evaluate the short and long-term environment, social and economic impacts of remedial options in a systematic fashion.



Identification of Key Sustainability Issues

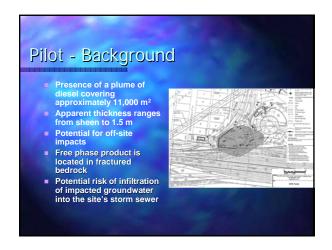
- Review of CN Corporate Documents
- Discussion with CN
- Review of external sources:
 - Office for Rail Regulation (ORR) in the UK and the Railway Association of Canada (RAC)
 - Third edition of the Global Reporting Initiative (GRI, 2006)
 - The International Federation of Consulting Engineers Project Sustainability Management Guidelines (FIDIC, 2004)

The Indicators - Social 10 Social Indicators Local resident safety and quality of life Worker safety Limited duration of work Benefits for CN and subcontractor staff Beneficial use for local community Employee skill development Local job creation and diversity Competitive advantage through innovation Response to social sensitivity Standards, laws and regulations

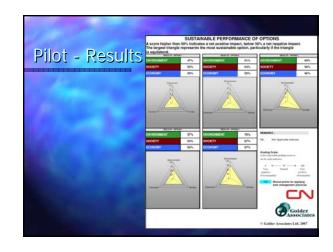
The Indicators - Ecomomic 11 Economic Indicators Initial capital cost moderation Low annual OMEM cost Prevention of potential litigation Potential grants or subsidies Environmental liabilities reduction Train service reliability and performance Donations to the community Economic advantages for the local community Reliability (moderate maintenance and repair) Economic advantage of more effective technology Technological uncertainty management

For each remedial option, the user selects a score for each relevant indicator from a set of possible scores from 0 to 100 (0 corresponds to a very negative effect and 100 to a positive effect). The quantitative indicators are also compared and ranked based on the estimates calculated. Weighting factors, ranging from 1 for low impact/risk to 3 for high impact/risk was included to adjust the overall influence of each indicator. Weighting is determined in consultation with stakeholders involved in the project to emphasize priorities without exceedingly skewing the overall assessment of each dimension of sustainability.

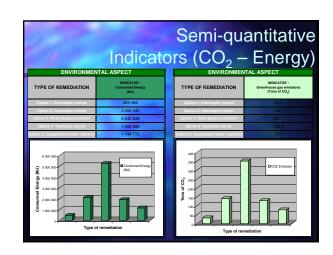












Pilot – Results Strengths of each Remedial Option

- Option 1 Interceptor sump with product recovery by vacuum truck
 - Ranked last in all aspects
 - Neutral impact on social aspects
 - Slightly positive impacts on economic aspects
 - Net negative impact on environmental aspects (minimal efficiency regarding product recovery and containment)
- Option 2- Interceptor trench with OWS and a filter bed for effluent treatment
 - Slightly positive impact on environmental, social and economic aspects (51%, 63% and 55% respectively)

Pilot – Results Strengths of each Remedial Option

- Option 3 MPE with OWS and a filter bed for effluent treatment
 - Ranked 1st on social aspects due to duration of work & employee skill development
 - Positive environmental and economic aspects (69% and 60% respectively).
 - High energy and water consumption (negative)
 - Important level of product recovery and containment (positive)
 - Economic shortcomings are high capital costs and OM&M costs (negative)
 - Option could be optimized through mitigation such as
 - Selection of appropriate equipment and facility design
 - Implementing renewable energy

Pilot – Results Strengths of each Remedial Option

- Option 4 Well based hydraulic barrier with OWS and a filter bed for effluent treatment
 - Ranked 2nd in economic aspect due to low capital and OM&M costs
 - Ranked 3rd in social and environmental aspects
 - Limited recovery and containment of product
 - Prolonged duration of work
 - Limited reduction in environmental liability

Pilot – Results Strengths of each Remedial Option

- Option 5 Injection of oxygenated water to foster in-situ bioremediation and containment
 - Ranked 1st for net economic impact due to low capital and OM&M costs however there is a degree of technological uncertainty.
 - Ranked 1st in environmental due to good recovery and containment and low energy consumption amenable to the use of renewable energy
 - Ranked 2nd in social aspects due to technical innovation
 - Technical uncertainty could be reduced by additional on-site assessment.

Pilot – Results of Sensitivity Analysis

- Based on Monte Carlo simulation.
- Performed to demonstrate the effect that varying indicator scores or weighting factors would have on the interpretation of a remedial option's sustainability.
- Conclusion: The results vary only slightly when parameters vary within the anticipated range of possible values.

Conclusions

- The tool allowed CN to evaluate the short and long-term environment, social and economic impacts of remedial options, including current situation (baseline).
- The tool allowed us to look for opportunities to optimize options.
- Sensitivity analysis showed that the results vary only slightly when parameters vary within the anticipated range of possible values.

Going Forward... Simplify sensitivity analysis by varying scores or weighting factors for high impact indicators through a series of evaluations. Determine site-specific performance indicators and endpoints, to ensure remedial technique and sustainability performance is monitored and to ensure the on-going optimization of the systems. Indicators will be environmental (e.g. MJ/L of hydrocarbons recovered), social (e.g. number of work related incidents affecting worker or resident safety per year of operation) and economic (e.g. OM&M costs per litre of hydrocarbons recovered) Test out at other sites



Attachment 5
The Social Dimension of Sustainable Remediation

"The Social Dimension of Sustainable Remediation" Some UK experiences

Paul NATHANAIL

Professor and Head of Land Quality Management, University of Nottingham;

Director, CABERNET

'Sustainable is not synonymous with green' (RESCUE 2005)

Sustainable brownfield regeneration has been defined as: "the management, rehabilitation and return to beneficial use of the brownfields in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context." (RESCUE, 2004)

contamination related risk in such a manner as to ensure the attainment and continued protection of human health and the environment Ifor present

unacceptable land

and future generations] in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context."

sustainable remediation could be defined as "the reduction of

www.rescue-europe.com

Social dimension – acceptability of:

Process

- Visual impact
- Aesthetics visual, odours, noise
- Congestion
- · Loss of access to land

Outcomes

- Risk reduction
- Risk removal
- Source reduction
- · Source removal

Case study 1

- If you don't ask you won't not find out you will get found out:
- If you don't ask you won't not find out you will get found out: Replacing an aging state secondary school with a new build boasting the latest equipment and state of the art facilities at no cost to the tax payer should have brought plaudits to the local authority championing the replacement.

 However factor in the new location being a former landfill, gasworks and council depot, the old site being redeveloped into a Walmartesque supermarket and the new school being run under a Private Finance Initiative (PFI) and throw in a virtually non existent public consultation/ engagement exercise and the seeds of problems can be heard germinating.

 Season with well organised campaigners and a regional media keen for regional news and watch the thorns grow and threaten to choke the emerging new school before the foundation stone had been laid. The cavalry charge that rescued the school and reassured parents
- The cavalry charge that rescued the school and reassured parents took the form of competent consultants doing a good job and an independent review on behalf of the Health Authorities reported at public meetings.
- The remediation was completed successfully even if a bit more conservatively than was strictly necessary and the school celebrated its official opening with a Royal visit.

Case study 2

· Formal processes of community engagement are not always the answer. A sequential knowledge raising, process agreeing and option selection exercise intended to arrive at an agreed remediation strategy backfired when at the end of the process local unelected representatives rejected the outcome and insisted on a total removal of contaminated materials from their community anyway.

5

Case study 3

Elsewhere a mixture of social and privately owned houses built on the site of a former quarry infilled with decades of municipal and local industrial waste had to be remediated under the Environmental Protection Act 1990. Contaminated soils in gardens were stripped and replaced – taking with them fences, ornamental features and plants that were in some cases the results of years of committed care and attention. A concerted process of active engagement with the residents before and during the protracted site investigation/ risk assessment and then remediation stages quashed rumours, reassured anxious parents and grandparents that there were no acute risks and ensured remediation went ahead smoothly with local cooperation and consent.

So how is social acceptability determined?

- The above experiences show that a community
 - that is not engaged with early in the process;
 - that is not informed about the technical aspects of what is happening to their homes
- · will not trust its civil servants and
- will rely increasingly on unaccountable parties or story-hungry media.
- Process seems to matter less than openness and trust must be built and then guarded.

7

Formal consultation

 Only then can formal consideration of alternative options consider social issues such as employment, traffic congestion, nuisance, loss of formal or informal amenity land and actual or perceived impact on health, property values, cultural heritage or local aesthetics.

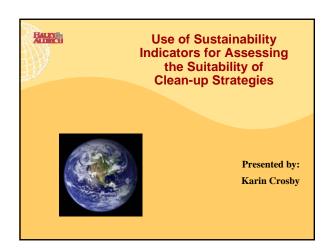
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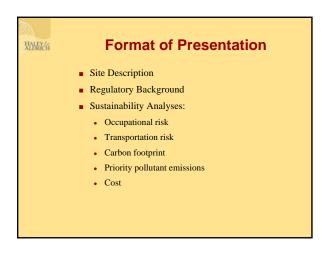
Conclusions

- T-alk with stakeholders in plain language
- R-aise realistic expectations
- U-nderstand local concerns & history
- S-pend *time* listening
- T-ake the action you promised to take

9

Attachment 6
Use of Sustainability Indicators to Assess the Suitability of Cleanup Strategies

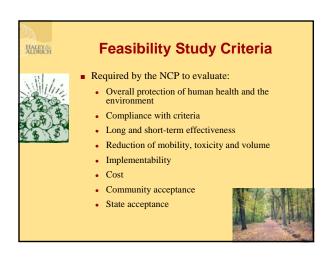




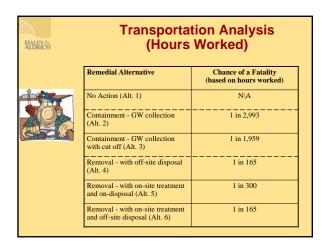


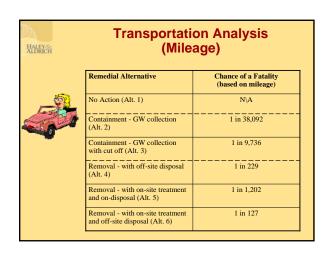


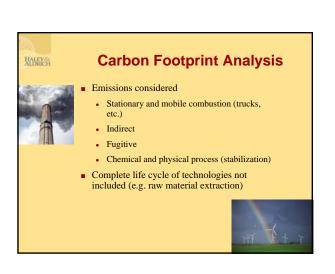
Alternatives ■ No action (Alt. 1) Containment • GW collection (Alt. 2) • GW collection with cut off (Alt. 3) Removal • With off-site disposal (Alt. 4) With on-site treatment and disposal With on-site treatment and off-site disposal (Alt. 6)

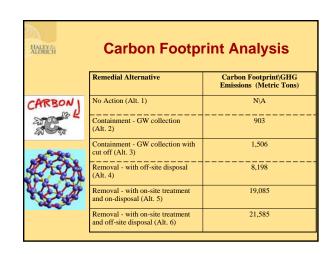


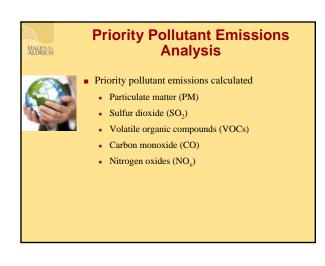
HALEY&- ALDRICH	Occupational Analysis (Hours Worked)		
	Remedial Alternative	Chance of a Fatality (based on hours worked)	
2.10 a .	No Action (Alt. 1)	N/A	
	Containment - GW collection (Alt. 2)	1 in 815	
	Containment - GW collection with cut off (Alt. 3)	1 in 767	
	Removal - with off-site disposal (Alt. 4)	1 in 85	
	Removal - with on-site treatment and on-disposal (Alt. 5)	1 in 107	
	Removal - with on-site treatment and off-site disposal (Alt. 6)	1 in 82	

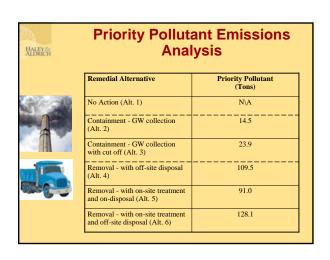


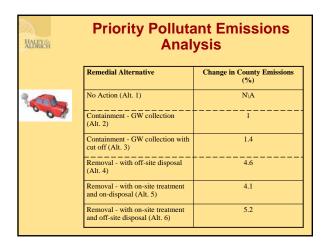


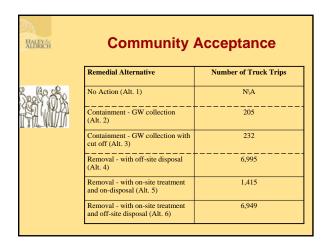


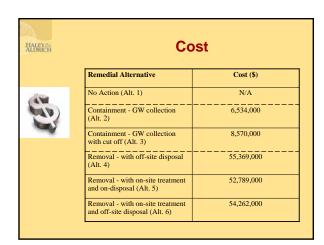


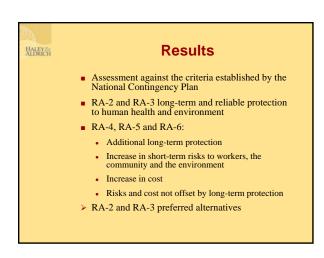














Attachment 7
Source Treatment Carbon Footprint

Source Treatment Carbon Footprint

Sustainable Remediation Forum - June 11, 2008

Dave Ellis, DuPont Corporate Remediation Group Michelle Thomson, DuPont Corporate Remediation Group P. Brandt Butler, URS Diamond





The miracles of science™

Overview

Site Background

Pre-Remediation Assessment

Post-Remediation Assessment

Lessons Learned



Site Background

DuPont Facility – Florence, SC | SWMU 3A

- Disposal of laboratory waste
- Gravel-filled french drain (7 feet long x 3 feet wide x 8 feet deep)
- Operated from 1960 to 1972
- Disposed approx. 45 gallons/year

Estimated soil volume – 670 cubic yards

- Chloroform, 1,1,2,2-tetrachloroethane, carbon tetrachloride
- 122 lb-total contaminant mass.



Candidate Technologies

Remedial Action Objectives

Soil - mitigate direct contact and soil impacts to groundwater

Technologies Meeting Threshold Criteria

- ZVI-Clay Soil Mixing (2.6 and 2.0%)
- Excavation and Disposal (670 cubic yards)
- Mobile Multi-Phase Extraction (MMPE)



Sustainability Assessments

Parameters		Excavation & Disposal	ZVI-Clay Soil Mixing	MMPE
Tons of CO₂ Equivalents		52	42	74
Adjusted Greenhouse Gas (ton - CO2 Eq)		52	37	70
Efficiency (lb-contaminant destroyed/lb CO ₂)		0.000	0.0015	0.0005
Energy Usage (kWh)		190,000	220,000	310,000
Occupational Risk	Exposure Hours	1,100	400	200
	Mileage	17,000	1,300	2,000
Resource Usage	Groundwater (gal)	0	0	28,000
	Soil (ton)	1,001	22	0
	Landfill (acre-ft))	0.41	0	0
Consumables	ZVI (ton)	0	26	0
	Bentonite (ton)	0	20	0
	Grid Energy (kWh)	0	0	716
	Propane (lbs)	0	0	4,200



Estimated and Actual Footprint

Parameters		Estimated ZVI-Clay	Actual ZVI-Clay	Factor
Tons of CO₂ Equivalents		42	104	2.7
Adjusted Greenhouse Gas (ton - CO2 Eq)		37	100	2.9
Efficiency (lb-contaminant destroyed/lb CO ₂)		0.0015	0.0006	0.38
Energy Usage (kWh)		220,000	490,000	2.4
Occupational Risk	Exposure Hours	400	1,200	3.3
	Mileage	1,300	3,800	2.9
Resource Usage	Groundwater (gal)	0	61,000	
	Cover Soil (ton)	22	100	4.5
Consumables	ZVI (ton)	26	43	1.7
	Bentonite (ton)	20	83	4.2



What Changed?

Remedial Element	Estimated ZVI-Clay	Actual ZVI-Clay	Quantity Factor	GWP Contribution, %
Soil Volume*, cubic yard	670	1,150	1.7	
Cover Soil, ton	22	100	4.5	
Gasoline, gal	92	840	9.2	8
Diesel, gal	490	3,000	6.0	41
On-site Equipment	2	9	4.5	
Truck Highway Distance, mi	860	3,800	4.4	
Commuting Distance, mi	400	3,700	9.3	
ZVI, ton	26	43	1.7	51
Labor, on-site staff	5	6	1.2	

^{*} Project team increased soil volume (scope) prior to field work to reduce residual mass.



Lessons Learned

Estimation tool sensitive to scope changes

Actual remediation will have different footprint than estimated

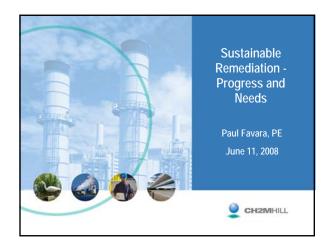
- Factors not able to estimate travel distance, delivery distance
- Factors able to estimate equipment, material quantities, labor
- Focus on elements making largest contribution to footprint

Remedial decision would not have changed

Revised excavation estimate – 114 ton – CO₂



Attachment 8
Sustainable Remediation—Progress and Needs



Overview EDA's C

- EPA's Green Remediation Primer
- How could this change remediation practice?
- What is missing from the discussion?
- Feasibility study sustainability analysis example

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EPA's Green Remediation Primer - April 2008

- Defines Sustainable or Green Remediation
- Core Elements of Green Remediation
 - · Reduced energy requirements (renewable energy push)
 - · Reduced air emissions
 - Minimize fresh water consumption/degradation
 - · Non-invasive remedies favors in situ methods
 - · Minimize waste and maximize recycling
 - Produce a net environmental benefit

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How Does This Change Remediation?

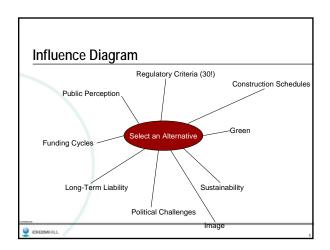
- Focus is on making existing systems more sustainable
 - · Optimization to reduce energy and waste
 - · More use of renewable energy sources
 - · Favors in situ, low-energy remedies for new sites
- Encourages incorporating sustainability impacts into remedial decision making for existing sites but provides no solid guidance on how to do this.
- Bottom Line: Make the existing system as "green" as possible.....but EPA does not appear ready to change a selected remedy due to sustainability issues

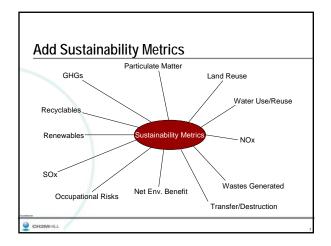
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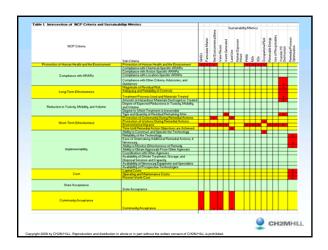
What Is Missing?

- Clear guidance on how to incorporate sustainability impacts such as greenhouse gas emissions into a CERCLA and RCRA remedy selection
- A method for replacing existing remedies with more sustainable solutions that have net positive environmental impacts
- A more comprehensive view of sustainability that considers collateral risks to workers and society on an equal par with cancer incidence risks

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Regulatory Dilemma

Should we continue to try to clean up a potential groundwater resource when the remedy:

- creates significant air pollution and GHG
- consumes non-renewable resources
- · creates new waste products
- creates collateral injury and death risks

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Pump and Treat Site Case Study - MMR

- Dilute TCE Plume
- 18 extraction wells pumping over 3000 gpm
- Treatment with GAC
- Reinjection of clean water into aquifer
- Protecting a sole-source aquifer

OH2MH

Feasibility Study Alternatives

- Additional extraction well is needed to halt off-site migration
- FS examines four alternatives
 - No action no off-base land use controls
 - · LTM with off-base land use controls
 - Status Quo Pumping (18 EWs /200+ MWs)
 - · Add Extraction Well and Injection Well

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Sustainability Impacts Evaluated

- Air Emissions (vehicle use for sampling/maintenance, power use, carbon reactivation)
- Collateral Risks (drilling, sampling, trucking carbon to/from site, tick and insect disease)
- Solid Waste Generation (sampling, lab, treatment plant)
- Non-renewable resource loss (fuel, power)
- Other resource impacts (habitat and groundwater)

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Life-Cycle Impacts

- 46 years of pumping that includes RPO
- 80 years of LTM
- Negative impacts of pumping alternatives:
 - 56,000 tons of GHG and 2 tons of VOCs to atmosphere (15,400 car-years)
 - Statistics estimate 1.9 injuries and 0.02 deaths from collateral risks
 - 73M kWhr used enough to power 6900 homes for a year
 - 7 Sivi Kwili useu ellougii to power o
- Positive impacts of pumping:
 - · Prevents over one billion gallons of new gw contamination
 - Reduce 10-6 cancer risk for surface water exposure



Summary

- Based on sustainability impacts our analysis recommended LTM w/Land Use Controls which has minimal GHG and collateral risks but eliminates cancer risk due to groundwater ingestion.
- Sustainability impacts can be incorporated into FS shortterm effectiveness and protection of human health and environment criteria and presented to regulators
- Goal is to start regulatory discussions on sustainability impacts and set the stage for future discussions on net environmental impacts of pumping

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Attachment 9
Guidance on Incorporating Sustainability into the Army Environmental Remedy Selection and Optimization Process





Guidance on Incorporation of Sustainability into the Army Environmental Remedy Selection and Optimization Processes

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Overview



- · Army Definition of Sustainability
- Why Sustainability
- Structure of Guidance
- Existing Army Sustainability Practices
- Examples of Decision Flow Chart
- Implementation Procedures
- · Schedule and Funding

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Definition - Sustainability (from Army Strategy for the **Environment 1-Oct-04)**



· A strategy that "simultaneously meets current as well as future mission requirements world-wide, safeguards human health, improves quality of life, and enhances the natural environment"





Army Sustainability - Why



- · Reduce costs
- Minimize impacts
- · Maintain good community relationships



Sustainability in Army **Environmental Remediation -**Why



- · Current Army sustainability structures limitations
 - > Primarily active facilities
 - > Primarily construction/deconstruction
 - > Within environmental remediation, limited to system optimization
 - Lack of off-site impacts in all existing structures



Guidance Approach



- · Use existing Army guidance where available and appropriate
- Provide a concise decision process
- Augment decision process with execution details

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Existing Army Sustainability -Sustainable Construction/Deconstruction



- 1999 Federal Executive Order 13123 "Greening the Government Through Efficient Energy Management" calls for optimization of life cycle costs for facility construction, operation and decommissioning
- Associated Army Guidance
 - > Army Engineering Technical Letter 1110-3-491 "Sustainable Design for Military Facilities", utilizes the Army SPiRiT and US Green Building Council LEED, self-assessment green remediation design matrix tools
 - "Deconstruction Guide for Military Installations", 2003

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Existing Army Sustainability -Sustainable Construction/Deconstruction



- · Associated Policy
 - >Army policy memorandum 5 Jan 2006 requires vertical building projects to achieve SPIRIT GOLD or LEED SILVER rating levels.
 - Army policy memorandum 6 Feb 2006 requires 50% minimum diversion of construction and demolition waste.

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Existing Army Sustainability -Environmental Management Systems



- EO 13148 Greening the Government Through Leadership in Environmental Management, 2000
- Required Environmental Management Systems (EMSs) for Federal facilities by 12/2005.
- Actions based on impact reduction and ease of reducing impacts. Aspects included are the environment, the mission, regulations, and the community.
- Tool ISO 14001 EMS Standard

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Existing Army Sustainability -Remedial System Evaluations



- Optimization of existing remedial systems Corps of Engineers 1998 to present.
- Foci: Remedial goals, exit strategy, protectiveness, cost savings, equipment maintenance
- Tools checklists for different remedial technologies, report with recommendations
- Compare to Remedial Process Optimization of the Air Force

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Existing Army Sustainability -Long-term Monitoring Optimization



- · Roadmap to Long-Term Monitoring Optimization, 2005, joint Corps and EPA guidance document
- Also available
 - ➤ Air Force (AFCEE) Long-Term Optimization Guide
 - > Naval Facilities Engineering Service Center Guide to **Optimal Groundwater Monitoring**

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Existing Army Sustainability Practices - Systematic Planning Process



- Army Guidance to be finalized Jan 2009. Incorporates:
 - >Stakeholder involvement, team building
 - Identification of project objectives/goals, planning up front through site closeout
 - Sampling design of sampling and data management
 - Design of remediation approach, performance objectives, and metrics

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Application of Existing Army Guidance/Policy to Environmental Remediation Sustainability Guidance



- EMS and RSE existing structures to incorporate sustainability in environmental remediation
- SPP planning process to incorporate sustainability into new sites.
- Strong Army support of sustainable practices

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Limitations to Existing Army Sustainability Guidance and Policy



- Resource metrics primarily apply to military construction/deconstruction.
- For environmental remediation, primary focus is on optimization of existing systems
- Within existing remediation systems, primary focus is on risk protectiveness and cost, i.e. no off-site impacts.

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Proposed Guidance Structure



- Basic structure decision flow chart(s), with detail in checklists and on-line resources.
- Will span the entire remedial process
- Will include a broad range of sustainability parameters that can vary from site to site
- Will apply across the types of sites in the Army environmental program

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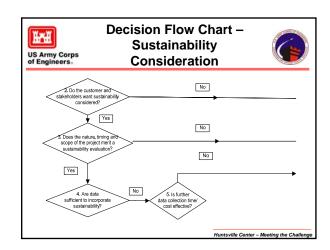


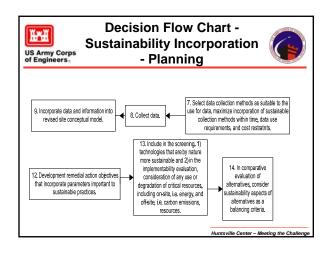
Decision Flow Chart (hard copy)

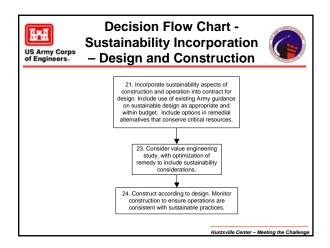


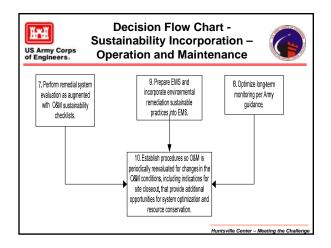
- Incorporation of sustainability contrasted with traditional approach
- More complicated, potentially larger data needs and more planning.

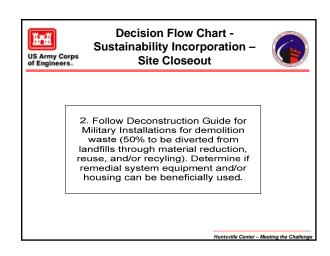
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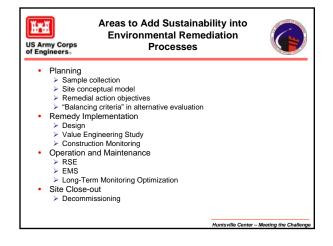


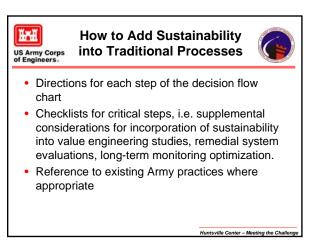














Implementation of Guidance to Add Sustainability into Traditional Processes



- Coordinating guidance development with implementation guides being developed by Seattle and Kansas City District Corps. Some possible options are:
 - > Training for Army facilities and Corps Districts
 - Inclusion in Project Management Plans, required for all environmental project in Corps
 - Incorporation into future and existing EMSs.
 - Addendum scopes of work attached to guidance for existing and future contracts for RI/FS, design, construction, and site closeout work.

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Schedule and Funding



- Draft guidance to be completed October 2008.
- Peer and Corps/Army Headquarters review, 2009; finalization of guidance October 2009.
- Funding from a combination of Army funds for Formerly Used Defense Sites (FUDS), Base Realignment Closure (BRAC) sites, and EPA sites (funding from EPA through the Army).

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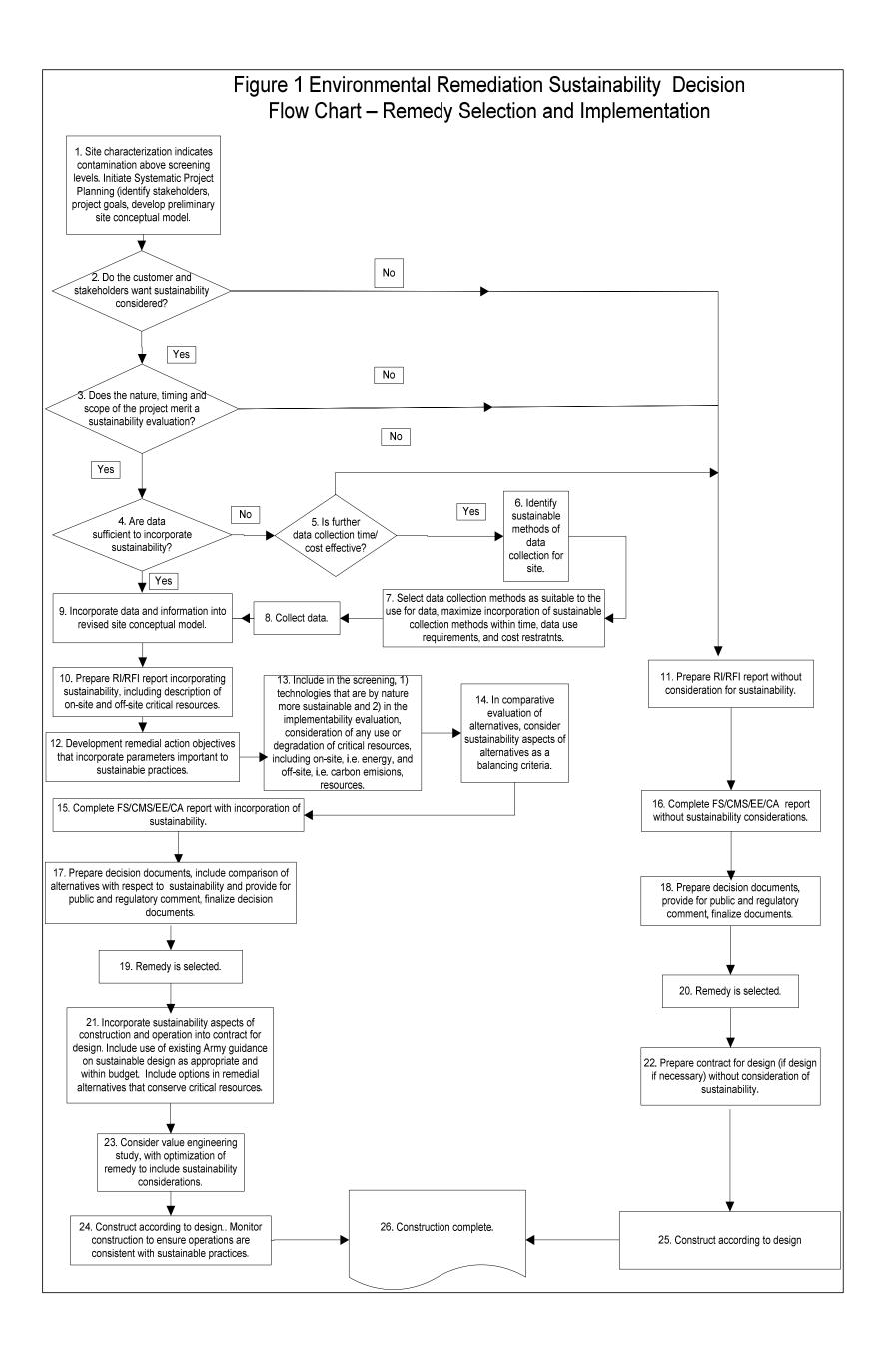


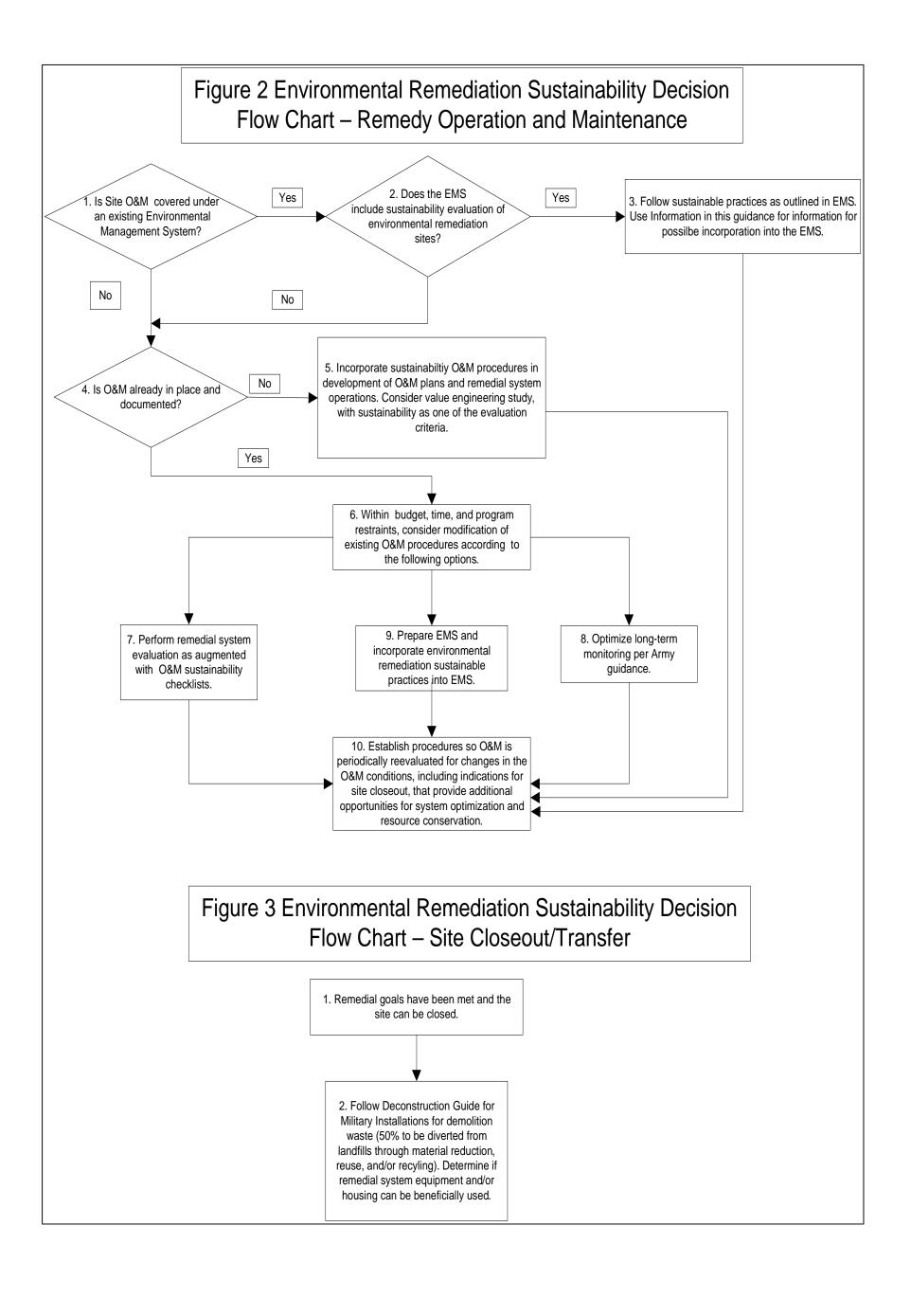
Questions



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Attachment 10
White Paper Chapter Facilitators and Volunteers

White Paper Chapter Facilitators and Volunteers

Chapter Title	Facilitator	Volunteers
Description and Current Status of Sustainability in Remediation	Dick Raymond, TerraSystems	Carol Dona, Corps of Engineers Elie Haddad, Locus Technologies Lowell Kessel, Good EarthKeeping Org. Phil McKalips, Environmental Standards Chuck Newell, GSI Environmental Ray Vaske, URS
Sustainability Concepts and Practices in Remediation	Stephanie Fiorenza, BP	Pierre Beaudry, Golder Associates Bob Boughton, California DTSC Dora Chiang, EarthTech Catalina Espino Guerrero, Chevron Stella Karnis, Canadian National Steve Koenigsberg, WSP Environmental Strategies George Leyva, California Region II Water Board Tom Peargin, Chevron Tiffany Swann, GSI Environmental Maggie Witt, USEPA Region IX Dave Woodward, EarthTech
A Vision for Sustainability	Paul Favara, CH2MHill	Brad Barquest, United Technologies Corporation Louis Bull, Waste Management Karin Crosby, Haley & Aldrich Elisabeth Hawley, Malcolm Pirnie Maryline Laugier, Malcolm Pirnie Gary Maier, EarthTech John Ryan, ENSR Maile Smith, Northgate Environmental Dan Watts, NJ Institute of Technology
The Impediments and Barriers	David Major, Geosyntec	Susan Block, SC Dept. of Health & Env. Control Julia Bussey, Geomatrix Consultants Jeff Caputi, Brown and Caldwell Robert Coffman, ENVIRON Dave Curnock, United Technologies Rich Dulcey, ERM John Englert, K&L Gates Ben Foster, LFR Mike Houlihan, Geosyntec Bill Hyatt, K&L Gates Charlie So, Shaw Environmental & Infrastructure Curt Stanley, Shell Global Solutions Elizabeth Wells, San Francisco Water Board Carol Winell, Good EarthKeeping Org.

White Paper Chapter Facilitators and Volunteers

Chapter Title	Facilitator	Volunteers
Vignettes of Success	Brandt Butler, URS	Erica Becvar, Air Force Ctr. for Eng. and the Env. Jeff Caputi, Brown and Caldwell Deni Chambers, Northgate Environmental Mngmt. Amanda Dellens, EarthTech Issis Rivadineyra, Naval Facilities Eng. Service Ctr. Jeanne Schulze, USEPA Region VI Maile Smith, Northgate Environmental

Attachment 11
White Paper Acronym Brainstorming

White Paper Acronym Brainstorming

- G Reduce Global Warming Emissions
- R Recycle and/or Reuse
- E Minimize or Eliminate Consumption of Natural Resources
- E Promote Destruction or Elimination of Contaminants
- N Mimic **N**atural Processes
- W Waste minimizing and Water wise
- A **A**ir emission minimizing
- V Verisimilitude and VIPs
- E Energy Efficiency
- S **S**ustainability
- C Concepts
- R Revitalizing or Remediating
- I Impacted
- P **P**roperties

for

- T Tomorrow
- R **R**esources (consumption)
- E **E**missions
- E **E**nergy
- L Local/Regional Issues
- S **S**afety
- S Sustainable
- P Practices
- I in
- E Environmental
- R Remediation

Attachment 12 SURF 8 Possible Agenda Items

SURF 8 Possible Agenda Items

Discuss institutional controls and their relation to risk protectiveness				
Discuss site-specific considerations				
Evaluate the pros and cons of emissions now vs. emissions later				
Identify a minimum number of metrics to consider				
Address methane releases from remediation				
Address hypothetical risk vs. actual				
Discuss implementation issues				
 Do you select a sustainable remedial technology, integrate sustainability into the selection process, or both? 				
 How do you address future changes within our framework? 				
 Does the complete analysis include operations and waste only or a full life-cycle analysis 				
Determine our scope: contaminated footprint vs. property boundary vs. globe				