SPEAKER ABSTRACTS AND BIO-SKETCHES
Technology Developments for accelerating revitalization

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Bio:
Dr. Kovalick manages an office chartered to act as champion for the introduction of more innovative site characterization and remediation technologies in the clean-up of abandoned waste sites under Superfund and corrective action under the Resource Conservation and Recovery Act. Formed in 1990, his office is providing policy leadership and technology information within EPA and enabling the broader use of innovative technologies through other Federal agencies, States, consulting engineers, technology vendors and by other countries.

He served from January 1993 until June 1994 (during the Clinton Administration transition period) as the Acting Deputy Assistant Administrator for the Office of Solid Waste and Emergency Response. This office is EPA's national program manager for all solid and hazardous waste regulatory programs, as well as site remediation, underground storage tank, chemical emergency preparedness, and innovative remediation technology issues.

Dr. Kovalick holds a Bachelor of Science in Industrial Engineering and Management Science from Northwestern University and a Masters in Business Administration from Harvard Business School. He holds a Ph.D. in Public Administration and Policy from Virginia Polytechnic Institute. He is a recipient of the President's Meritorious Executive Award and EPA Bronze and Silver Medals for Superior Service. In February 1990, he was named by Engineering News-Record magazine as one of their "1990 Marksmen." In 1996, he received the EPA Fitzhugh Green Award for Outstanding Contributions to International Environmental Protection over 20 years. He has served on subcommittees of the National Research Council and the Department of Energy to advise the Department on technology development issues. He is a member of the Dean’s Advisory Committee, College of Architecture and Urban Studies, at Virginia Tech, and on the Editorial Board of Environmental Engineering Science. He is a member of the American Society for Public Administration and the Academy of Management.
Remediation Markets: EBJ Overview

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Abstract:  
The remediation market has achieved maturity. It has flattened as a growth sector, and indeed, has contracted to some degree. Yet while remediation was always a market with an end game built in by definition, and while that end has been predicted for several years, the cleanup market has proven surprisingly resilient into the new decade. Insurance providers have returned to the market with innovative products, “brownfields” has overtaken “Superfund” as the word in remediation, and while brownfields isn’t necessarily the “swizzle stick” that stirs the remediation drink, the opportunity to participate in community revitalization by returning under-utilized properties to productive use remains tantalizing.

This overview by the Environmental Business Journal places the remediation market in the context of other environmental markets. EBJ finds that DOD and DOE projects constitute about half of the current cleanup market, and that those opportunities are continuing despite the potential to divert funds to war and homeland security—even while certain trends in contracting change the federal cleanup picture, especially for the larger players. Superfund reform is now piecemeal rather than comprehensive, and cleanup standards are more risk-based than oriented towards destruction. New technology is geared more towards more effective program management than more effective contaminant destruction. Overall, EBJ sees continued contraction in the market, and companies will have to target the right niches to sustain growth. In the short term, one such niche is building decontamination. In the long term, companies should assess how they can participate in the emerging “Restoration Economy.”

Bio:  
George Stubbs has a total of 18 years of experience in journalism, working primarily for the environmental and electronics industries. Mr. Stubbs joined Environmental Business International in October 2001 after serving for more than 10 years as editor of Golob’s Environmental Business Report (formerly Hazardous Materials Intelligence Report), published by World Information Systems (Cambridge, MA). Also while with WIS, Mr. Stubbs served as managing editor of the Massachusetts Environmental Ventures newsletter, a quarterly publication produced in cooperation with the University of Massachusetts-Boston’s Environmental Business and Technology Center. In addition, he wrote quarterly environmental newsletters on behalf of such companies as Zurich American and PricewaterhouseCoopers.

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Bio:  
Mr. Matviya has served the citizens of the Commonwealth in the Pennsylvania Department of Environmental Protection since 1973. He is currently the Regional Manager of the Environmental Cleanup Program for the Southwest Region, a position he has held since 1993. In this position he is
responsible for implementing the Land Recycling Program (“Act 2”); the Storage Tank Program; and the Hazardous Sites Cleanup Program, managing a staff of over 25 employees.

Mr. Matviya is the Department’s spokesman for its efforts to redevelop industrial sites (“brownfields”) in southwestern Pennsylvania. In May 2000, Mr. Matviya represented the Commonwealth at a brownfields workshop in Brno, Czech Republic and participated in the “Brownfields in our Neighborhoods” workshop in Ambridge, PA in November 2001. He served on the program subcommittee for the Industrial Sites Reuse Conference held in Pittsburgh, 1996-1998, and has made numerous presentations on the subject, including “Pennsylvania’s Ground-Breaking Land Recycling Program” presented at the Superfund XVIII Conference in Washington D.C., December, 1997, and co-authored the poster presentation, “An Overview of the Summerset at Frick Park Project” presented at Brownfields 2001 in Chicago. Mr. Matviya is also involved in the Department’s environmental futures planning process, serving as the team leader for the Kiski-Conemaugh Watershed Team. He is on the Board of Directors of the Loyalhanna Watershed Association. Prior to his current position Mr. Matviya worked in the Mining, Water Quality and State Parks programs. He holds treatment plant operator certifications in both wastewater and drinking water. Mr. Matviya is a 1973 graduate of Indiana University of Pennsylvania (B.S. Biology) and attended the University of Pittsburgh Graduate School of Public Health.

ACT I: PLENARY SESSION

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Bio:
Linda Garczynski has been an employee of the Federal government for over 26 years. She has extensive experience in the Superfund program working in a wide variety of the program’s areas since 1982 (e.g., removal, remedial, policy, contracts and State programs). She has authored several major policy documents including the OSWER Environmental Justice strategy, the Superfund Long-term Contracting Strategy, and the 1985 National Contingency Plan. Currently, she serves as Director of the OSWER Office of Brownfields Cleanup and Redevelopment. In 2000, EPA’s Brownfields Office was awarded the Harvard University, Kennedy School of Government Award for Innovations in Government. This was the first time the EPA had ever received this award. In 2002, Ms. Garczynski headed up the national effort to implement the new Small Business Liability and Revitalization Act signed by President Bush in January 2002. The reuse and redevelopment of contaminated property remain her primary goal. She is also responsible for leading the Federal Brownfields National Partnership, announced by the EPA Administrator in November of 2002. This partnership is comprised of 23 Federal agencies focusing on the revitalization of communities affected by brownfields.

Ms. Garczynski has also worked in EPA’s Pesticides and Public Affairs programs and for the Social Security Administration. She has served in the Federal government’s LEGIS fellows program as the environmental legislative assistant to a senator. She is a graduate of the Georgetown University School of Foreign Service.
Revitalizing Brownfield Clusters through the New Jersey Department of Environmental Protection (NJDEP) Brownfield Development Area (BDA) Program

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Abstract:
In most cases, brownfield properties do not exist in isolation. Brownfields are most prevalent in former industrial areas and are therefore often located in close proximity to other brownfields. The cumulative adverse impacts of multiple brownfields on affected communities can be devastating. It may be impossible to revitalize these communities if regulators are limited to addressing the brownfields one at a time, on a piecemeal basis. NJDEP’s BDA Program attacks this problem by allowing communities to bring clusters of closely spaced brownfields to the Department for designation as a BDA. Once designated, NJDEP, working in partnership with other state agencies, provides targeted resources and guidance to enable the community to develop and implement a comprehensive plan for the remediation and reuse of the targeted brownfield properties. The goal of the BDA Program is revitalized communities, not just individual redeveloped properties. Assistant Commissioner Van Hook will describe NJDEP’s BDA Program, provide a status report on current BDAs, and offer lessons learned for application elsewhere.

Bio:
Mr. Van Hook is the Assistant Commissioner for New Jersey’s Site Remediation, Solid and Hazardous Waste, Dredging and Emergency Response Programs. He is a graduate of the Yale Law School and an Adjunct Professor in Environmental Law at Columbia Law School. Prior to joining the Department in 2002, Mr. Van Hook was a partner in the environmental group at the law firm of Sidley, Austin, Brown & Wood.

Insured Fixed Price Cleanups as a Tool Towards Property Reuse

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Abstract:
Tale Of Two Sites: How Insured Fixed-Price Cleanups Expedite Protections, Reduce Costs, And Help The EPA, The SEC, And The Public
This article compares two waste oil Superfund Sites virtually identical in size and character but vastly different in policy approach and cleanup results. The first Site employed an Insured Fixed-Price Cleanup (“IFC”) and, as a result, was cleaned up in 19 months, at 40% below estimated costs and with no litigation. At the second, where an IFC has not been used, cleanup has been stalled for years, more has
already been spent on attorneys’ fees and other transaction costs than was required to clean up the IFC Site in its entirety, and estimates of future cleanup costs rise yearly as the Site contamination spreads. The IFC Site now is being used as public fields and open space; at the non-IFC Site, no beneficial use is foreseeable for years. At the IFC Site, the cleanup was funded solely by the Potentially Responsible Parties (“PRPs”) who sent the waste to the Site; at the non-IFC Site, the public has footed the lion’s share of the bill. Finally, at the IFC Site, the PRPs identified and set aside from the start funding for more than twice the estimated cleanup costs; at the non-IFC Site, the Securities & Exchange Commission (“SEC”) and public have virtually no assurance that the PRPs have even identified much less set aside even a fraction of the government-estimated cleanup costs.

This article urges policymakers in general -- at EPA, the SEC, and Congress -- to consider IFCs as a way past existing obstacles to Superfund cleanups. It urges policymakers to enact guidance, regulations, and/or statutes to encourage the use of IFCs as an environmental tool. It also outlines three specific regulatory suggestions: (1) the creation of a rebuttable presumption that an IFC will be used at Superfund Sites, much as EPA now uses rebuttable presumptions in other areas; (2) that EPA set a goal of 10 IFCs – one per Region – over the next 18 months, or by the end of 2004, just as EPA kick-started its Brownfield Program with numeric goals; and (3) that EPA enact guidance for the use IFCs to let the Regions and the public know when and how they can be used, just as EPA has done to implement virtually every other desired policy.

The opinions in this article are Mr. Hill’s alone and not necessarily those of Marsh USA, Inc.

Bio:
Michael Hill is Senior Vice President of Marsh USA, Inc. and National Practice Leader for Insured Fixed-Price Cleanups (“IFCs”). Based in Washington, D.C., Mr. Hill has over 15 years experience in the environmental field, both as an attorney and as a corporate officer. In May of this year, he published, “A Tale Of Two Sites: How Insured Fixed-Price Cleanups Expedite Protections, Reduce Costs, And Help The EPA, The SEC, And The Public,” 45 Chem. Waste Litig. Rptr. 907 (May 2003), which is the subject of his presentation here.

Mr. Hill served as an environmental Trial Attorney for the U.S. Department of Justice (1986-90); an Associate in the Washington law firm Covington & Burling (1990-95); as Partner and Environmental Litigation Practice Manager in the Washington law firm Collier Shannon Scott (1995-2000); and as Senior Vice President of TRC, a company that performs IFCs and for whom he originally served as outside counsel (2000-02). He attended Williams College (1980) and Yale Law School (1984).

Beyond Petroleum – Strategic Land Reuse at BP

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Abstract:
Strategic Land Reuse is about aligning responsible parties, developers, communities and governmental agencies and encouraging creative engagement. It’s about collectively applying skills to provide answers, not excuses. It’s about innovating and improving. It’s about making a start in making a difference.
Land reuse decisions must involve leadership from all key stakeholders to ensure that all relevant issues are considered. This necessarily begins with conversations at the community level. Inviting participation and promoting dialogue from different stakeholders builds trust and strengthens the credibility of reuse plans. By applying market analysis techniques, reuse plans become the center focus for consensus building and compromise. By listening, sharing ideas and expressing concerns, plans can be validated while obtaining the commitments needed to move sites forward. The result is setting realistic cleanup objectives and reasonable schedules based on the realities of the market served.

Bio:
Mr. Kalet is responsible for leading remediation activities for the Eastern portion of the BP US Refining remediation portfolio of operating and closed refineries. Mr. Kalet joined BP in 1990 and has worked exclusively on environmental assignments supporting the downstream portion of the business including regulatory rulemaking, solid waste compliance, air permitting, MSDS preparation, and site remediation. Prior to joining BP, he worked 14 years as a process and quality control engineer for Union Carbide Corporation. Mr. Kalet holds a Bachelors degree in Chemistry from the State University of New York and a MBA from Purdue University.

UNDERSTANDING SITE CONTAMINATION: AREA-WIDE APPROACHES TO SITE ASSESSMENT

Moderator: Daniel M. (Dan) Powell
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Bio:
Mr. Powell is with the U.S. EPA’s Technology Innovation Office (TIO). He leads TIO’s efforts to promote the use of innovative investigation and clean-up technologies at Brownfields redevelopment sites and manages the Brownfields Technology Support Center project. Mr. Powell also coordinates TIO team efforts to promote innovative characterization and monitoring processes and technologies throughout the waste programs. He has received Agency awards for his work in developing Brownfields support materials and his participation in the selection of pilots in the USTFields program. He has also been awarded for his previous efforts in establishing public-private partnerships between Federal agencies and corporate site owners to demonstrate and evaluate the use of innovative technologies.

Mr. Powell has worked to develop information resources to help all stakeholders understand technology options at Brownfields and land revitalization sites. Throughout his tenure in TIO, he has worked on a large number of outreach, technology demonstration, information dissemination, and training projects.

Mr. Powell has been with the Technology Innovation Office since 1990 and the EPA since 1988. He received his Masters of Public Administration from the Woodrow Wilson School of Government at the University of Virginia in 1988, and he graduated summa cum laude with his Bachelor of Arts degree in political science and urban studies as the valedictorian from Roanoke College (Salem, VA) in 1985.
Brownfield Development Area -- Area-Wide Approach to Redevelopment and Environmental Protection

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Area-Wide Environmental Site Assessment for Large-Scale Urban Redevelopment

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Abstract:
The City of Wichita, Kansas is undertaking an ambitious urban neighborhood revitalization project in its historic Delano Neighborhood. Implementation of the citizen-based Delano Neighborhood Revitalization Plan could not begin until environmental concerns were assessed. However, the size of the area (about 1.5 square miles), number of properties (over 500 commercial and industrial parcels), and over 120 years of development history made this task potentially prohibitive. The City and its consultant, Tetra Tech EM Inc., responded with an ambitious and innovative area-wide Phase I environmental site assessment (ESA) that included a preliminary survey of the entire redevelopment area and completion of an American Society for Testing and Materials (ASTM)-standard assessment of about 120 high-priority commercial properties.

This presentation will discuss the many complex issues that arose because of the urban location, mix of commercial, industrial, and residential land uses, and an aggressive schedule designed to put redevelopment planning on a fast track. It will discuss how the project assessed over 500 commercial and industrial properties in one assessment, at a fraction of the cost of performing individual ESAs, while complying with ASTM standards on an individual site-by-site basis. The technical approach will be presented, including background research, creation of a sophisticated geographic information systems (GIS) database, report preparation, quality control, and ASTM requirements. Equally important issues of community involvement, integration into future planning efforts, and public perception concerns will be discussed. The presentation will conclude with a synopsis of lessons learned and suggestions for improving the approach for future projects.

Bio for Jack A. Brown, RS, MPA:
Jack A. Brown has over 30 years of public health service and has been the Director of Wichita’s Environmental Health Department for the last thirteen years. He has been the City of Wichita’s Project
Manager for the investigation and remediation of two large pollution sites: the Gilbert & Mosley Site and the North Industrial Corridor (NIC) Site, since their inceptions in 1991 and 1994. He has coordinated the City of Wichita’s environmental programs such as the Local Environmental Protection Programs (LEPP), the Arkansas River Pollution Study, Project 33/50 Air Quality – Pollution Reduction Program of Sedgwick County, Kansas, and is Project Manager of the City of Wichita Brownfield Pilot Assessment Program. He received his Liberal Arts Degree in 1970 from Friends University, Wichita, Kansas; attended the Graduate School of Environmental Management at the University of Southern California in 1976; earned a Master of Public Administration from Wichita State University (WSU), Wichita, Kansas in 1977; and a Mini-MBA from WSU in 1997. He is a registered Sanitarian with the State of Kansas, Adjunct Faculty Member in the Master of Science in Environmental Studies program at Friends University, and Adjunct Faculty, in the Master of Public Health program for WSU.

Bio for Scott A. Schulte, CHMM:
Scott Schulte is an environmental scientist and urban planner with Tetra Tech EM Inc., an environmental consulting and engineering company, and is Tetra Tech’s project manager for the City of Wichita Brownfield Pilot Assessment Program. He earned a Bachelor of Arts in Political Science and a Master of Urban Planning from the University of Kansas, and is a Certified Hazardous Materials Manager. Mr. Schulte has 11 years of experience in the environmental field. His areas of expertise include extensive site assessment and Brownfields experience, waste management and regulatory compliance, watershed planning and water quality treatment, habitat restoration, and training. He has worked on Brownfields issues at the federal and local levels, including site assessments, policy development and review, and technology transfer. He has managed and conducted numerous site assessments, including three area-wide Brownfield assessments. Mr. Schulte co-authored several Brownfields references and web sites for the U.S. Environmental Protection Agency’s Technology Innovation Office. He has conducted field analysis and data quality control, assisted with innovative technology evaluations, and taught field analytical training courses throughout the U.S. Mr. Schulte also managed a hazardous waste facility for a Kansas municipality, and was a Nuclear, Biological, and Chemical Defense Specialist in the U.S. Marine Corps.

Use of Area Wide Assessments for Brownfield Redevelopment Locations

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UNDERSTANDING SITE CONTAMINATION: USING DECISION SUPPORT TOOLS TO IMPROVE ASSESSMENT AND CLEANUP

Site Characterization Utilizing the FIELDS Tools

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Abstract:
The mission of the FIELDS Team (U.S. EPA Region 5) is to characterize, analyze, and communicate contaminant problems that may pose a threat to human health and the environment. To achieve our mission, we have developed and applied innovative software tools, the FIELDS Tools, to characterize contamination in soils and sediment. The FIELDS Tools are a set of ArcView extensions: Sample Design, Database Query, Modeling (geospatial analysis), Human Health Risk Assessment, Ecological Risk Assessment, and Decision Analysis. The goal of the FIELDS software development team is to provide decision support tools usable to most technical staff at minimum cost. The FIELDS Tools extensions for ArcView are written in Avenue, C++, and Visual Basic. The Sample Design module allows a user to design statistically-based sample designs (random, stratified random, and gridded) and upload these designs to a GPS unit in order to navigate to sample locations. The parameters used to create the sample design (e.g., number of sample locations, sample area, false negative values) are exported as a table that can be included in a report. Once the samples are collected and analyzed, the FIELDS Tools’ Database Query module allows the user to import data from a STORET database, an EQuIS database, NOAA’s Query Manager database, or a FIELDS-defined data table. If a user has field names or types that do not match the FIELDS-defined data table format, an interactive GUI allows users to match their field names with the FIELDS-required names. The query options in the Database Query module include creating 3D datasets and 2D datasets. For the latter, a user may create maximum values per location or depth-weighted average datasets. The FIELDS Tools also include a cross validation routine that generates root mean square errors (RMSE) of estimation for permutations of IDW parameters number of neighbors and power. The contoured values can be used to estimate the mass of contaminant (e.g., pounds of PCB) and the volume of contaminated material (e.g., sediment > 10 ppm) using the Mass/Volume module. Finally, the FIELDS Tools include a Remediation module that allows users to determine areas to remediate in order to meet a clean-up goal by remediation unit (called block-based remediation) or for the entire site (i.e., to meet an average concentration value for an entire area). The FIELDS Tools also include a stand-alone alpha version of our 3D Viewer that includes point display and 3D IDW contouring and grid display as well as viewing modification functions.

The FIELDS Tools have been nationally recognized by the U.S. EPA for their ability to increase the efficiency and effectiveness of environmental cleanup efforts. In order for the Tools to become a U.S. EPA recommended software, the Tools are undergoing a two-phased peer review process. The FIELDS Tools have been used extensively in U.S. EPA Region 5 Superfund sites to create sample designs,
estimate contaminant values and contaminant mass and volume, and to generate remediation scenarios. Other users of the Tools include other U.S. EPA regions, State and Tribal environmental agencies, as well as their contractors.

The FIELDS extensions for ArcView (Spatial Analyst is required) are freely available from: http://www.tiem.utk.edu/~fields/

Bio:
Brian Cooper is an Environmental Scientist for the United States Environmental Protection Agency Region 5, Chicago, Illinois. He is also the manager of a technical support team Field Environmental Decision Support (FIELDS) who provide data analysis and interpretation for environmental decision-making. His team has developed a set of tools that integrate the power of geographical information systems (GIS), imaging software, global positioning systems (GPS), and in-field sampling and analysis technologies. Mr. Cooper has a bachelor’s degree in computer science, a master’s degree in environmental biology, and a master’s degree in science from the department of Agricultural and Biological Engineering at Purdue University.

LUST On-Line Calculator Introduction

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Abstract:
EPA has developed a suite of on-line calculators to assist in performing site assessment and modeling calculations for leaking underground storage tank sites (http://www.epa.gov/athens/onsite). The calculators are divided into four types: parameter estimation, models, scientific demos and unit conversions. Parameter estimation calculators are used to estimate gradients, chemical parameters, retardation factors, multiphase partitioning and effective solubilities. Simple models are included to perform transport analyses, which include transport of contaminants to receptors, diving of plumes due to recharge, and estimates of uncertainty in model outcomes. Scientific demos illustrate concepts concerning subsurface flow and transport, including for example the effects of borehole dilution on observed concentrations. Unit conversions for parameters unique to this field (hydraulic conductivity, Henry’s law constants, rate constants) are included as aids to correct site assessment and analysis. Since their beginning in 1999, the calculators have proven to be a useful tool as evidenced by steady increase in their usage. EPA is currently adapting the calculators to address a wider variety of problems by including parameter values for more chemicals and by developing a model for chlorinated solvent transport and transformation.

Bio:
James W. Weaver received Masters and Ph.D. degrees in Civil Engineering from The University of Texas at Austin, and a Bachelors degree from the State University of New York, College of Environmental Science and Forestry. Dr. Weaver has worked for the U.S. Environmental Protection Agency’s Office of Research and Development for 15 years; initially at the ground water research center in Ada, Oklahoma; and, since 1997, at the Ecosystems Research Division in Athens, Georgia. Dr. Weaver has worked on the development and testing of simulation models for fuel releases, evaluation of field behavior of
Practical Issues Associated with Effectively Using Real Time Measurements for Site Assessment and Cleanup

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Abstract:
Recent advances in environmental characterization technologies and in field deployable computational capacity has permitted large quantities of data to be collected quickly and managed electronically. Usually, the raw data sets are not immediately available in forms that easily allow for analysis and interpretation. In order for this information to be useful, techniques and tools must be available to allow rapid analysis of the data and manipulation into formats that are meaningful to the decisions being made at the site.

In addition, circumstance usually do not allow all key personnel being affected by the information being collected to be present on-site for extended periods of time. Therefore, Web friendly presentations of the analyses are often highly desirable in order to keep all key stakeholders informed of site progress and decision-making.

Further, there are many distractions such as equipment failure, health and safety issues, scheduling of contractors, etc. that cause the on-site decision-maker to lose focus on the analysis and interpretation of the incoming data.

Problems that frequently occur include:
- Lack of full utilization of the information collected
- Missed opportunities to fully characterize or remediate an area
- Bad data sets resulting from failure to detect problems while in the field
- Lack of consensus on the meaning of the information or decisions made based on the data.

Field experience has led to methods to anticipate and address such problems prior to and after mobilization. Key examples drawn from field situations are examined. These specific examples are used to construct general recommendations to be applied at Brownfield and other environmental sites. As experience with the Triad approach grows, methods for dealing with these types of practical problems will be developed and adopted as standard operating procedures. For now, it is important to communicate this information to other practitioners to help realize the full potential of using real-time measurement techniques.
Bio:
David S. Miller P.E., R.G., (Ph.D., The Johns Hopkins University, Whiting School of Engineering 1995) has 20 years of experience in civil, geological, and environmental engineering. He is currently the section manager of the Geosciences and Information Technology Section in the Environmental Assessment Division at Argonne National Laboratory and an environmental engineer providing environmental assessment and policy expertise to a wide range of sponsors including USEPA, USAF, USACE, DOE, the National Guard Bureau, and the Western Pennsylvania Conservancy. Recent projects include Remedial System Evaluations for TCE in groundwater at Camp Grayling, Michigan (glacial till) and Air Force Plant 6 in Marietta, Georgia (deep fractured bedrock) and implementation of a Triad-based characterization of PCE and TCE in groundwater using a membrane interface probe combined with conductivity logging at Colonie, New York (Pleistocene lake bed sediments). Current research interests focus on environmental assessments of watersheds and applying real-time decision-making to the detection and mobility of contaminants in soil and groundwater.

Using Freeware Spatial Analysis and Decision Assistance (SADA) Software to Integrate Sample Design, Geospatial Modeling, Risk Assessment, and Remedial Decision Frameworks

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Abstract:
Spatial Analysis and Decision Assistance (SADA) is free software that incorporates tools from environmental assessment fields into an effective problem-solving environment. These tools include integrated modules for visualization, geospatial analysis, statistical analysis, human health risk assessment, ecological risk assessment, cost/benefit analysis, sampling design, and decision analysis. The capabilities of SADA can be used independently or collectively to address site specific concerns when characterizing a contaminated site, assessing risk, determining the location of future samples, and when designing remedial action. A fully functional freeware version is available at www.tiem.utk.edu/~sada/.

SADA is a self contained, stand-alone package that provides a number of methods for quick and easy exploration of data from contaminated sites in two and three dimensions. In order to allow data visualization with respect to site characteristics, SADA can accept map layers from a Geographic Information System (GIS) saved in a Data eXchange Format (DXF). Beyond data exploration, are tools for performing a geospatial analysis. These tools allow the user to quantify the nature and distribution of contamination in space as well as the uncertainty about endpoint results such as the remedial design. These methods quantify the spatial extent and boundary of areas of concern and more accurately model exposure to contamination by considering the spatial distribution and range of contaminants. Particular tools include methods for measuring and modeling spatial correlation among data and mapping concentration, risk, probability of exceedance, model variance, and remedial design output.

SADA provides full risk assessment modules for both human health and ecological risk. The human health risk models follow the EPA's Risk Assessment Guidance for Superfund (RAGS) and can be customized to fit site specific exposure conditions. The ecological risk module allows users to perform benchmark screenings and calculate dose values for a number of terrestrial and aquatic receptors. While
the risk modules are well integrated with the geospatial functions, they may be used independently in a more traditional risk assessment.

The decision frameworks in SADA makes the connection among all these modules to produce at least three important decision outcomes: setting the cleanup criteria, determining where to remediate, and quantifying the cost and benefit of remediation. Should additional samples be required, SADA provides different strategies to determine future sample locations. These strategies place samples in large data gaps, in areas with a high degree of uncertainty about exceeding cleanup goals, in areas where models are having the most difficulty in estimation, and confirmatory samples in areas of concern.

Finally, all modeling results can be documented using the auto-documentation feature. For any given set of results, SADA will present the user with all models, parameters, and assumptions that were involved in producing the result. The specified information is produced in a report that can be read by a number of popular word processing and browser programs.

Bio:
Mr. Stewart is with The Institute for Environmental Modeling at the University of Tennessee, Knoxville. He has worked at with the university and nearby Oak Ridge National Laboratory for the last nine years, primarily involved in developing environmental software and information management systems. He has been the project manager for the SADA software since 1996 and has been involved in developing a number of other software applications for various agencies including DOE, NRC, EPA, and the Department of Agriculture. Mr. Stewart completed his B.S. in math and statistics in 1992 and a Masters in mathematics in 1995 from the University of Tennessee.

CLEANING UP CONTAMINATION:
INNOVATIVE OPTIONS FOR ASSESSMENT AND CLEANUP FOR MINING SITES

Twenty-Five Years of Mine Reclamation with Biosolids in Pennsylvania
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Abstract:
Pennsylvania has been a leader in the use of biosolids for reclamation of mine lands. In the 1970s, Federal mining laws established standards for reclamation, and marine protection legislation banned the practice of ocean disposal of biosolids. In a beneficial confluence of needs, biosolids from Philadelphia were made part of early developmental approaches in Pennsylvania for compliance with mine reclamation requirements.

This paper is a retrospective of lessons learned from the Pennsylvania program. Over a twenty-five year period, the field experience with biosolids use continues to demonstrate clear environmental benefits and negligible adverse effects. Re-inspection of sites, even two decades after completion, shows vigorous
ground cover, signs of active animal populations, minimal surface erosion, and clear flowing waters in nearby watercourses. But even against this positive feature has arrayed opposition in some communities and a loss of political support. These arose from early mistakes in public outreach, allegations of harm, odor nuisances and poor relations with legislators.

This paper makes recommendations to biosolids managers for creating a successful program of reclamation with biosolids.

- Biosolids producers need to build partnerships with other agencies and organizations, particularly regulators and conservation officials.
- Biosolids producers need to “sell” the beneficial results of biosolids use for reclamation, especially the wildlife and watershed benefits.
- Opportunities for involving school children and science teachers need to be developed.
- Demonstration sites are useful tools for showing and measuring the comparative results of biosolids against other technologies.
- Conducting operations in an open, accessible way helps build understanding and trust. Creating liaisons with other governmental and interest groups, particularly in the game and watershed community builds community support.
- Project managers need to continually look for improved practices to reduce risks of off-site nuisances, thereby building trust among neighbors.
- Odor is a key impact area in which scientific advances and new management practices will be needed to ensure compliance with stiff regulatory standards.
- Several new research areas include examining application rates, vegetative seed mixes, benefits of land treatment to control acid mine drainage, and new approaches to temporary storage.
- A key area is to develop new tools for building public relationships and creating biosolids re-use programs that respond to the concerns of the community.

Bio:
Mr. Toffey is the Biosolids Utilization Manager for the City of Philadelphia Water Department. His responsibility is to handle the disposition of 200,000 tons of material produced annually at the Biosolids Recycling Center, the centralized facility for handling the byproducts of a regional wastewater system serving 2.3 million people. He has been with the Water Department for fifteen years of the twenty-two years of Philadelphia's recycling, and in that time has overseen the recycling of well over 2 million tons of biosolids products for park improvements, agricultural fertilization, and land reclamation. He oversees the Water Department’s research initiatives in odor and pathogen control, and is coordinating its participation as a demonstration agency with the Environmental Management System for Biosolids of the National Biosolids Partnership.

Mr. Toffey received a Bachelors of Science in Agriculture, with a concentration in soils, from Cornell University, and received a Masters of Environmental Planning from the University of Pennsylvania. Before his assignment with the Water Department, he worked with regional and city planning agencies as an environmental expert.

Mr. Toffey has been active in several industry organizations. He serves as executive director of the Mid-Atlantic Biosolids Association. He has served for several years as co-chair of the Biosolids Committee of the Pennsylvania Water Environment Association, and is a member of both the WEF Residuals and Biosolids Committee and the AMSA Biosolids Committee. He also served as president of the Pennsylvania Composting Association.
Bioavailability of Pre- and Post-Treated Hard Rock Mine Waste Materials

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Abstract:
The USEPA has been evaluating the bioavailability of emerging and innovative cost-effective green engineering solutions, such as the U.S. Department of Agriculture (USDA) developed application of residuals such as biosolids, composts and wood ash to large area metals mining sites. One site in Leadville, Colorado was characterized by discrete 0.5-1.0 hectare parcels of fluvial mine tailings deposits along the embankment of the Upper Arkansas River. A second mining site in Kellogg, Idaho was historically a wetland converted to a tailings pond. The contaminants of concern in both of the mining sites; tailings were zinc, lead, cadmium, copper and manganese, with zinc concentrations ranging from 50,000 - 100,000 ppm. The third site was located in the “old lead belt” of Jasper, Missouri, and was comprised of extensive waste rock repositories. The zinc, lead and cadmium contaminated materials were generally not acid forming. The mining sites focused an evaluation of changes in soil physical, chemical, biological and toxicological characteristics, through metals analyses, agronomic assessment, assessment of soil microbial community structure and function, small mammal trapping and rye grass and earthworm toxicity testing. The results show that while successful innovative technologies have cost-effectiveness and public acceptance in their favor, they do not have any performance criteria. However, the measures implemented to address attractive nuisance issues reinforced support for their overall effectiveness.

Bio:
Harry R. Compton, has a BS in Biology from Stockton College and Masters degree in Regional Planning and Environmental Engineering from University of Pennsylvania. He has been with USEPA’s Environmental Response Team as an environmental engineer for 19 years providing technical assistance in the Superfund Program. His current focus includes implementing EPA priorities of revitalization of Superfund and Brownfields sites by employing scientifically sound, cost-effective, publicly acceptable technologies. An advocate of “green technologies” he has been implementing phytoremediation and mine site reclamation for the past seven years.

Innovative Approaches to Mineland Reclamation

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Abstract:
Dealing with mine-scared land cleanup and reuse in coal country can present interesting new opportunities for innovative partnerships. This presentation will focus on the 35-acre AMD&ART Park in Vintondale, PA, a site that attracted over 20 funders and that includes a large AMD treatment system, new wetlands and active recreation. With new AMD&ART-like projects now underway with OSM support in OH, VA and TN, the concept of multidisciplinary collaboration in transforming environmental liabilities into community assets is finding increased applicability.
Bio:
Within the last year, the EPA Office of Water, the National Watershed Forum, the Wildlife Habitat Council, the Alliance of Artist’s Communities and the Virginia state RC&D all singled out Allan Comp’s work as an innovator in approaches to reclamation and partnership building. He received a Bridge Residency at the Headlands Center for the Arts in 2000 for his work as an “artist/thinker bridging to other disciplines” and was part of a small team awarded the national EDRA/Places magazine Place Planning award the same year. He authored the first Brownfields Pilot Demonstration Project awarded to a coalfield watershed, followed that success with two more in TN and WV, started both the Office of Surface Mining Summer Watershed Internship Program and the OSM VISTA Initiative and wrote Hope and Hard Work, a booklet funded by EPA and published by the Canaan Valley Institute, celebrating the work of nearly two dozen coal-country watersheds. A Ph.D. in history of technology and economic history with a long commitment to cultural resources, community engagement and environmental recovery, Dr. Comp is currently employed by the Office of Surface Mining where he is focused on supporting the efforts of volunteer watershed groups working for the recovery of the Appalachian Coal Country from a century of pre-regulatory exploitation and neglect.

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CLEANING UP CONTAMINATION:
DEALING WITH NONAQUEOUS PHASE LIQUIDS – DRY CLEANING SITES

Dealing With Nonaqueous Phase Liquids – Dry Cleaning Sites

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Abstract:
It is estimated that between 75 and 90 percent of drycleaner sites are contaminated due to improper use and disposal of solvents. Since 1994, twelve states have passed legislation creating programs to investigate, remediate, and prevent contamination at these facilities. These programs are similar to insurance pools in that, dry cleaners pay fees that go into a fund that is used to remediate contaminated sites. Even though the programs are fairly new and most have very limited budgets, they have performed
at least 630 assessments, 197 remedial actions, and closed 83 drycleaning sites. These numbers are increasing rapidly as the state drycleaner programs in each state mature. A panel consisting of Bill Burns, Florida Department of Environmental Protection; Richard De Zeeuw, Oregon Department of Environmental Quality and Craig Dukes, South Carolina Department of Health and Environmental Control will present an overview of information and experiences gathered by the member states as they investigate and remediate contaminated drycleaner sites.

In June, 1998, the US Environmental Protection Agency, Technology Innovation Office brought the states together in the belief that technical issues and problems concerning solvent contamination at dry cleaner sites are not unique to one state and that free exchange of information would benefit all. The result of that effort is the State Coalition for Remediation of Drycleaners (SCRD), which is a forum for sharing technical and programmatic information regarding the remediation of drycleaner sites. Member states include Alabama, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas and Wisconsin. In addition, participation in SCRD as “Represented States” is open to states without drycleaner-specific programs but are actively remediating dry cleaner sites under other authorities. New York and California, currently participate as “Represented States”.

Specific information to be presented will include the following:
- SCRD projects and information including nearly 100 case studies available on the website
- Overview of site assessment technology and applications
- Overview of remedial action technologies and applications

Bio for Richard De Zeeuw:
Richard De Zeeuw is the program coordinator for the dry cleaner program for the Oregon Department of Environmental Quality. He is currently serving as Chair of the State Coalition for Remediation of Drycleaners, an association of 11 states that have programs specifically for funding remediation of contaminated dry cleaner sites.

He has been involved in the development and management of environmental programs for over 25 years. He began managing Oregon’s dry cleaner program since its inception in 1995. Prior to his current assignment, he worked in state agencies and as a private consultant in the development and promotion of renewable energy, water resources, and recycling. He has a BA in economics from Drake University and a Masters Degree in environmental economics from the University of Wisconsin – Green Bay.

Bio for William Burns:
William Burns is the Program Administrator of the Drycleaning Solvent Cleanup Program in the Florida Department of Environmental Protection. He has been with the department for 16 years in the Division of Waste Management, starting as a Project Manager in the Superfund and Hazardous Waste Cleanup Section. Prior to joining the State of Florida, he served several tours of duty as an officer in U.S. Coast Guard in the fields of Marine Environmental Protection, Law Enforcement and as an exchange officer to the National Oceanic and Atmospheric Administration. His academic background includes a Bachelor of Science in Environmental Management from the University of West Florida, graduate courses in Toxicology from Florida State University and Industrial Safety from the University of Houston.

Bio for Craig Dukes:
Craig Dukes is an Environmental Health Manager with the SCDHEC Bureau of Land and Waste Management. Since 1984, he has worked as an environmental chemist and a project manager for overseeing assessment and remediation of uncontrolled sites with both the Federal CERCLA program and the SC Superfund program. He developed the SC State Scoring System, used for prioritization of State Superfund sites and Drycleaning Fund sites. In 1995, he began development of the SC Drycleaning Restoration Trust Fund program and has been responsible for developing and implementing the policies and procedures to assess and remediate drycleaning facilities within the state.
Base Realignment and Closure (BRAC) Case Studies: Transfer from DoD Owned Properties to Private Sector Ownership and Use

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Abstract:
The DoD has decided to close numerous surplus military bases across the United States and transfer them to the private sector to continue operations or for use for other purposes. Many of these closures have taken place as part of the Base Realignment and Closure (BRAC) process. Case studies will be presented on seven DoD facilities that are undergoing closure and transfer under this program. Highlights will be presented regarding work at each of these facilities. These include fast-track property transfer, DoD and regulatory partnering initiatives, use of land use controls, and innovative investigation and remediation techniques to solve environmental issues. Investigative techniques will include membrane interface probe, field test kits, and others. In situ remediation techniques discussed will include permeable reactive walls to treat metals, bioremediation to treat volatile organic compounds, and fracturing/chemical oxidation for DNAPL destruction. It will be demonstrated from these case studies that the solutions to many property transfer and environmental issues can be applied to other DoD property transfers as well as industrial brownfields.

Bio:
Keith W. Henn is a senior hydrogeologist and remediation specialist for Tetra Tech NUS, Inc. in Pittsburgh, PA. He has earned his M.S. in Hydrogeology at Wright State University and a B.S. in Geology at the University of Pittsburgh at Johnstown. Mr. Henn is a registered professional geologist in Pennsylvania, South Carolina, Florida, and Illinois. He demonstrated more than 10 years of professional experience in the fields of hydrogeology, groundwater flow and contaminant transport, abiotic/biotic contaminant degradation, and engineering geology. As the Lead Program Hydrogeologist for the U.S. Navy Southern Division’s Comprehensive Long Term Environmental Action Navy III Program, Mr. Henn is responsible for maintaining technical standards and policy related to all aspects of hydrogeology, site investigation planning and practice, and remediation at more than 500 sites across 26 states. Mr. Henn has also demonstrated expertise for numerous other government and private sector clients across the United States and France. He specializes in developing and implementing innovative and cost-effective investigation, remediation and closure strategies utilizing a wide range of technologies including bimetallic nanoscale particles, hydraulic and pneumatic fracturing, bio-stimulation, barrier wall technologies, multi-phase extraction, and monitored natural attenuation.
Overcoming Impediments to Redeveloping Brownfields: Two Case Studies in Buffalo, New York

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Peter Cammarata
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Christopher Pawenski
Erie County Department of Environment and Planning

Kent McManus, P.E., DEE
Malcolm Pirnie, Inc.

Abstract:
Two of the most significant impediments to redevelopment of brownfield properties are the funding of investigative and remedial activities and the relatively slow pace at which remedial actions occur. The investigation and remediation of two properties located within the 1,400-acre South Buffalo Redevelopment Plan project area will be discussed relative to funding and pace concerns, respectively. The South Buffalo Redevelopment Plan was prepared in 1997 as a conceptual comprehensive master plan for land formerly occupied by heavy industry. This 1400-acre project is one of the largest brownfield redevelopment projects in New York State.

The 50-acre Truscon Site, formerly owned by the LTV Steel Company, is also located within the South Buffalo Redevelopment Plan project area. Buffalo Economic Renaissance Corporation (BERC) cooperated with a developer on a $22 million package to purchase the site and plan the construction of a hydroponics greenhouse facility for commercial tomato growing. However, a Phase I Environmental Site Assessment uncovered evidence of a major historical petroleum hydrocarbon spill on the site. Facing the prospect of implementing a remedial plan with undefined costs and a lengthy remedial schedule which would jeopardize the development package, BERC worked closely with Malcolm Pirnie, LTV Steel Company, and the New York State Department of Environmental Protection to craft a remedial strategy that would accomplish several key goals: simplify the remedial approach to reduce costs, expedite completion of the on-site remedial measures, prepare the site for redevelopment in the least time possible, and maximize cost-sharing with LTV Steel Company. Using a stream-lined method of soil excavation and fast-tracked bioremediation, the project was completed in 18 months rather than the 36 months as originally estimated. Because of this, BERC was able to close the $22 million deal with the developer. The hydroponic commercial tomato growing facility was built on schedule and represented the first major parcel developed in the South Buffalo Redevelopment Plan project area.

BERC, its subsidiary Development Downtown, Inc. (DDI), and the City of Buffalo used approximately $2.5 million of seed money (Community Development Block Grant funds, program income, and capital budget) and parleyed it into a $7.5 million dollar brownfield redevelopment investment. The seed money was used to initiate project planning, site investigations, and building demolition at the 114-acre municipally-owned Hanna Furnace Site, located within the 1,400-acre South Buffalo Redevelopment Plan project area. BERC, DDI, and the City of Buffalo were able to secure funding or services from no less than six other sources to facilitate the redevelopment of the Hanna Furnace Site. These sources include
the County of Erie - Capital Budget, Empire State Development Corporation (ESDC) - Rebuild Now-NY Program, New York State Department of Transportation – Intermodal Transportation Program, the New York State Environmental Quality Bond Act, Army Corps of Engineers - Planning Assistance to States or Local Communities, and the United States Environmental Protection Agency (USEPA).

Bio:
Daniel E. Riker, P.G. is employed as a Project Hydrogeologist at Malcolm Pirnie, Inc. Mr. Riker earned his Bachelor of Arts Degree in Geology at Colgate University in Hamilton, New York and his Master of Arts Degree in Hydrogeology from Duke University in Durham, North Carolina. Mr. Riker has 10 years of experience in contaminant characterization at hazardous and solid waste facilities, including the development of project scopes, on-site implementation of characterization efforts, data collection and interpretation, and report preparation. He has been involved with assorted projects including brownfields, preliminary site assessments, Phase I and II environmental site assessments, treatment technology assessments, and multiphase site and remedial investigations.

The Landfill/Brownfields Golf Equation

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Abstract:
The beneficial reuse of landfills and brownfields for the development of golf courses began perhaps fifty years ago. Such a mode of development has produced a wide variety of golf facilities. They range from driving ranges to excellent golf based multi-use developments, such as Industry Hills in California, and the Renaissance in Charlotte, NC. They also include a TPC Course at Eagle Trace, in Coral Springs, Florida, that hosted the Honda Classic PGA Tour event for many years. Industrial brownfields were redeveloped into 27 great holes at Harborside in Chicago, and a Superfund site produced the Anaconda Course, by Jack Nicklaus, in Montana. The list is impressive.

Most landfills start life on the outskirts of communities. Over the years growth envelopes them, to create great locations, such as Wildcat G.C. in Houston, Texas, where 36 holes are accessible within a fifteen minute drive of Downtown. The Meadowlands, in New Jersey, is in the process of a major landfill reuse project that will produce at least 54 holes of golf, together with 1700 residential units, 1.3 million square feet of office space, a Resort/Conference Hotel, and support commercial uses, all within a ten minute train ride of lower Manhattan, and a twenty minute drive from Newark International airport.

Today the major development control factors are aligned very positively. There has never been a great number of mature landfills and brownfields starting to idle, and there has never been a stronger demand for affordable golf. Financing costs are attractive, and incentives are available. Many landfill sites are large enough to host multiple use developments, with lands in excess of the areas devoted to trash cells. The possibility of converting an annual maintenance cost liability into a positive cash flow lease, or a productive public recreational or multi purpose use, is gaining favor among brownfield property managers. The forward thinking ones are even looking at the enhanced values that can be created on adjacent property that is presently considered blighted. Numerous interesting scenarios are out there.

My presentation will review the above situation, with some examples from actual projects.
Bio:
Roy Case is a British golf course designer who has been in practice in the United States since 1987.

Mr. Case is an Architect and Land Planner by training and experience, and a golf course designer by avocation. Over the last 15 years he has become renowned for his skillful handling of environmentally difficult sites, in both public and private golf sectors, and his projects have won many awards and commendations. His ability to handle sensitive sites led him into the field of designing and developing golf facilities on landfills and brownfields, to the extent that approximately half his practice in now devoted to this ultimate recycling process.

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CLEANUP/ASSESSMENT CASE STUDY SESSION:
SITE ASSESSMENT USING TRIAD APPROACH

Residential Waterfront Redevelopment: Expanding Baltimore's Inner Harbor

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Abstract:
Industrial use turned to residential – expanding Baltimore’s Inner Harbor (Bond Street Wharf, Jackson’s Wharf, European Flats on Thames Street, Bond Street Townhomes, London Coffee House) utilizing Maryland’s Voluntary Cleanup Program.

In April of 2000 a waterfront corridor, immediately adjacent to Baltimore’s Inner Harbor, consisting of eight separate vacant properties began redevelopment. Historical use of the properties dated back to the early 1800’s when the area was utilized by numerous wharfs and warehouses dealing with the shipping industry. Based on site reconnaissance and historical records, several recognized environmental conditions (REC) existed at the site and an investigation using USEPA’s Triad approach was initiated in May 2000. Based on the soil and groundwater sampling results, the 8-acres property entered into Maryland’s Voluntary Cleanup Program. However, shortly after entering the program, redevelopment and construction schedules mandated that the 8-acres be broken into eight separate parcels with each one entering the VCP independently. This strategy gave the project the flexibility to focus on the properties with the strictest redevelopment and construction schedules in order to meet the developer’s deadlines.

During the course of redevelopment, areas of contamination were discovered that were associated with the adjacent property owner – Allied Chromium Factory. This chromium factory at one time was the largest in the world and utilized the site as an area to dispose of their hazardous hexavalent chromium waste.

Due to the discovery of hazardous materials after submission of the final reports to the Maryland Department of the Environment (MDE) for each of the parcels, the developer needed to negotiate with MDE and all project stakeholders regarding moving forward with redevelopment. MDE allowed construction to continue, but rigorous oversight was necessary to properly dispose of hazardous materials
and protect worker health and safety. If work had stopped, the developer would have lost hundreds of thousands of dollars.

The site has received No Further Requirements Determinations (NFRD) for all eight parcels. To achieve these NFRDs, human health risk assessments, innovative mercury soil sampling techniques, soil vapor modeling, and focused remediation of impacted soils and groundwater were utilized. Future use of the site will be for the international headquarters for an architectural firm; waterfront condominiums; promenade; The wrapper, mixed user commercial and residential units around a parking garage; five luxury townhomes; and commercial residential units.

Bio:
Paul H. Hayden has a B.A. in Geology and B.A. in Environmental Studies from Binghamton University, a Master of Studies in Environmental Law from Vermont Law School, and a Master of Business Administration from the University of Phoenix. Mr. Hayden is the Brownfield Coordinator for Arc Environmental’s Baltimore, Maryland office focusing on the Mid-Atlantic Region. He has extensive experience with environmental regulations and economic incentives associated with state voluntary cleanup programs. Mr. Hayden has performed over 100 Phase II Environmental Site Assessments during his nine years as an environmental professional. Properties he has redeveloped were primarily waterfront, commercial and/or industrial in nature.

Redevelopment of Brownfields In and Around Port Area to Support Intermodal Freight Growth

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Abstract:
The three-year, federally funded study examined ways to transform fallow industrial properties -known as Brownfields - into productive, tax-paying facilities that will allow the region to reap maximum economic benefits from rapidly increasing international trade. At the same time, the study looked at ways to steer this flow of goods to nearby Brownfield sites to avert further congestion on the region's already heavily traveled transportation network.

One topic from the study that is relevant to redevelopment is the use of innovative site assessment techniques and applying the 'TRIAD' approach to the demonstration sites. Site characterization is a process whereby the horizontal and vertical extent of environmental contaminants is identified and the level of contamination for the entire site is estimated. Typically, site characterization methods may include obtaining and analyzing ground water and soil samples at a limited number of key locations. This process is slow and cumbersome, however, and not compatible with the speed of business and Brownfield redevelopment. An alternative approach to site characterization, called the Triad Approach, was evaluated as part of this study and found to be more useful. The Triad Approach is an innovative site characterization technique that includes three elements: Systematic Planning, Dynamic Work plans and Real Time Data Generation. Field analytical methods and mobile laboratories are used to analyze samples in the field, generating real time data that are used to select new sampling locations. These methods are effective for quickly and inexpensively delineating “hot spots” with a high degree of
accuracy, allowing soil remedial efforts to be focused on well-delineated areas and providing a much higher degree of certainty to the cost estimates.

The Triad Approach was used at a thirteen (13) acre site to develop real-time data in conjunction with field decision-making to map the boundaries of VOC and PCB “hot spots”. The purpose was to map contaminants with sufficient detail to allow the collection of “in place” post excavation samples, so as to develop accurate estimates of soil volumes needed to be removed and treated. Previous investigations had identified several locations on the site where VOCs and PCBs exceeded the site specific non-residential soil cleanup standard (1,000 ppm TVOCs and 50 ppm PCBs). However, these were single soil samples and the dimensions of these “hot spots” and the volume of soil needing remediation was unknown, presenting substantial uncertainty to prospective developers. Using a combination of modified standard methods performed in a mobile laboratory and field analytical methods (FAMs) (field portable GC and immunoassay PCB test kits), the boundaries of the impacted areas were quickly delineated. This was accomplished because field personnel were receiving information on analytical results daily and could select new sampling locations in the field (judgmental sampling). When used by experienced environmental professionals, this process is very powerful, saving time and money. The outcome was that much uncertainty was removed from the remediation work and soil excavation was performed quickly without costly delays. A finding from this study is that a streamlined approach, like the Triad Approach, is critical to Brownfield redevelopers, who must be able to accurately predict cleanup costs and comply with schedules in order to stay within the cost boundaries established by their pro forma and complete a profitable project.

Bio:
Bruce E. Mackie is an Associate with GeoTrans, Inc. He holds B.A in geology from Susquehanna University and is a registered professional in several states. He has worked at GeoTrans for the past three years and was formerly employed for 16 years by McLaren/Hart. Mr. Mackie possesses over 19 years of environmental experience providing hydrogeologic and technical management of field investigations/engineering studies at RCRA, CERCLA and NJ hazardous waste sites as well as managing environmental liability evaluations for facility divestitures and acquisitions. He has provided technical and strategic assistance to PRP groups during consent order and remedy negotiations with federal and state agencies. Mr. Mackie provides litigation support to private sector clients involved in insurance and environmental liability cases. He has published several articles on fractured rock characterization and is active in brownfield projects in New Jersey and Pennsylvania.

Using the USEPA's Triad Approach for Accelerated Characterization at the Assunpink Creek Brownfields Sites in Trenton, New Jersey

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Abstract:
A Site Characterization Program utilizing the USEPA’s Triad Approach was recently completed at two brownfields sites in Trenton, New Jersey. The Triad Approach combines Systematic Planning, Dynamic Workplan preparation and Real Time Analysis to achieve an accelerated and more precise characterization of environmental conditions at sites than traditional investigative approaches. The Triad Approach was utilized at the former Crescent Wire site and a former Freight Yard which are part of the
Assunpink Creek Greenways Project. The project is an initiative by the City of Trenton to redevelop abandoned brownfields properties along the Assunpink Creek into a recreational area and greenway.

The Systematic Planning process involved a careful review of existing environmental data for the site and several meetings with various stakeholders to identify project objectives and reach a consensus on an investigative approach. Sampling strategies focused on Areas of Concern (AOCs) identified during previous investigations, so that environmental impacts could be sufficiently characterized to support the selection of a remedial approach for the sites. Areas that were addressed using Triad included a PCB/Oil Impacted Area at the 2-acre Crescent Wire Site and site wide soil impacts as well as specific AOCs across the 15-acre Rail Area of the Freight Yard Site. The use of Field Analytical Methods (FAMs) was critical to support the expedited investigation process. An important step was obtaining approval from the New Jersey Department of Environmental Protection (NJDEP) for the use of the FAMs to provide a detailed site characterization. Specific FAMs were selected to achieve identified data quality objectives and to satisfy NJDEP requirements for Site and Remedial Investigations. The FAMs utilized during the project include: Immunoassay field test kits for Total Petroleum Hydrocarbons (TPH) and Polychlorinated Biphenyls (PCBs), X-Ray Fluorescence for metals and GC/MS for (PAHs). The stakeholders agreed that a limited number of fixed based samples would also be submitted to a NJDEP-certified laboratory for confirmation of the FAM results. These fixed based samples were also required to meet the NJDEP Technical Requirements for Site Remediation protocols. A Dynamic Workplan was generated to document the investigative approach agreed upon by stakeholders and clearly establish the guidelines and decision rules for the field investigation that was developed during the Systematic Planning phase.

The results of the investigation indicate that the Triad Approach enabled a more detailed characterization of site conditions in a significantly compressed timeframe. The approach identified a significant off-site impact to the Crescent Wire site that will result in eliminating the responsibility for on-site remediation of impacted soil and ground water by the City of Trenton. Complete characterization of the Freight Yard site was accomplished with greater confidence than would have been accomplished by a conventional sampling approach. This included eliminating the concern for impacts to ground water and the identification of a PCB ‘hot spot’ that likely would have been missed using a conventional sampling approach. Overall, the use of the Triad Approach at Brownfields sites reduces uncertainty and provides greater confidence regarding contaminant impacts which offers significant advantage over conventional investigation techniques to ensure project success.

Bio:

Katherine E. Linnell is a senior staff geologist with Langan Engineering and Environmental Services, Inc. in Doylestown, Pennsylvania. She has extensive site characterization experience that includes expedited delineation programs, soil investigations, groundwater investigations, fractured bedrock assessments, and the evaluation of site data to demonstrate the natural attenuation of contaminants. Ms. Linnell has a B.S. degree in Geology from Virginia Polytechnic Institute and State University (1997) and a M.S. degree in Geosciences (aqueous geochemistry specialization) from Pennsylvania State University (1999).
USE OF ENVIRONMENTAL INSURANCE FOR DISTRESSED PROPERTY TRANSACTIONS

Moderator: Michael Barbara, P.E.
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Bio:
Mr. Barbara is a Registered Professional Engineer in New York, New Jersey, Connecticut, and Pennsylvania. His project management experience ranges from on-site supervision of multi-million dollar remediation projects, wastewater treatment plant design and operation, solid waste management, and solid and hazardous waste permitting. He has managed the preparation of over 20 RCRA Part B permits for commercial TSDFs, federal facilities, and industrial sites. He has also provided training courses in hazardous waste management and CERCLA (Superfund) compliance, and is a frequent speaker on the topics of remedy modification and regulatory negotiation.

Since 1980, Mr. Barbara has had a specialized practice in CERCLA compliance and has worked on over 150 Superfund sites. He has served as technical consultant to many PRP Committees, with an emphasis on regulatory negotiations and expert representation. His regulatory agency experience encompasses USEPA Regions I, II, III, V, and VII, and has made many presentations to state agencies in New York, New Jersey, Connecticut, Ohio, Michigan, Delaware and Pennsylvania.

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Bio:
Michael Hill is Senior Vice President of Marsh USA, Inc. and National Practice Leader for Insured Fixed-Price Cleanups (“IFCs”). Based in Washington, D.C., he has over 15 years experience in the environmental field, both as an attorney and as a corporate officer. In May of this year, he published, “A Tale Of Two Sites: How Insured Fixed-Price Cleanups Expedite Protections, Reduce Costs, And Help The EPA, The SEC, And The Public,” 45 Chem. Waste Litig. Rptr. 907 (May 2003), which is the subject of his presentation here.

Mr. Hill served as an environmental Trial Attorney for the U.S. Department of Justice (1986-90); an Associate in the Washington law firm Covington & Burling (1990-95); as Partner and Environmental Litigation Practice Manager in the Washington law firm Collier Shannon Scott (1995-2000); and as Senior Vice President of TRC, a company that performs IFCs and for whom he originally served as outside counsel (2000-02). He attended Williams College (1980) and Yale Law School (1984).
Bio:
Peter A. Ceribelli is a Weston Solutions Vice President with 20 years of diversified experience in the Environmental Consulting and Remediation field in Project/Operations Management including three years as Manager of WESTON’s Remediation Division. His background includes extensive experience in development business structures and risk mitigation strategies to manage complex transactions involving environmentally impaired real estate with industry, municipal and federal clients. In his current capacity as Manager of WESTON’s Real Estate Solutions Business Line, Mr. Ceribelli oversees all of WESTON’s real estate development/investment and environmental liability transfer transactions. Mr. Ceribelli is a graduate of West Chester University with a degree in Business Administration.

Structuring the Real Estate Transaction:
How Environmental Insurance Tools Impact Negotiations

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Abstract:
Significant progress has been made in Brownfields redevelopment, but information about the actual real estate transactions or "done deals" is very limited. This session will provide a realistic view of how corporations and communities are structuring real estate transactions to divest environmentally-impaired sites. Through a review of actual case studies, attendees will learn about alternative deal structures that have been successfully utilized. New methods to manage environmental risks while optimizing returns will be discussed.

New property reuse techniques are now being utilized to negotiate with environmental regulators, overcome redevelopment hurdles and market impacted properties aimed at achieving targeted financial, economic, and community goals.

Understanding the marketing potential of a problem site and identifying reuse opportunities are key to a cost-controlled cleanup effort and maximizing financial recovery. This session will describe how applying new marketing strategies and tools can help in structuring the deal to:

- Manage risk by coordinating clean-up with site reuse activities,
- Minimize cleanup costs,
- Maintain community support,
- Negotiate with regulators, and
- Create optimum dollar return and economic development.
“Before” and “after” case studies will include a review of the planning, packaging, and marketing efforts for former chemical, heavy manufacturing, petroleum and utility sites. For example, a Pennsylvania utility company was burdened with a dormant, environmentally-impaired industrial facility in a depressed economic market. The building was planned and packaged for conversion from industrial uses into a hotel. As a result, the property was purchased by a major hotel chain and is now open to the public. This case study will include a review of how the property reuse program was presented to management, and the next steps that were undertaken to make the real estate transaction happen, with benefits to the company and community.

Bio:
David J. Daddario has more than 25 years of experience in the planning, packaging, and marketing of land and building assets, many involving environmental remediation programs. He has been at the forefront of Brownfield and Superfund revitalization initiatives, nationwide, and is a frequent speaker at business and economic development conferences. Since joining North American Realty Advisory Services more than 20 years ago, Mr. Daddario has supervised project teams in the adaptive-reuse of hundreds of industrial, retail, office, residential, and waterfront assets. Mr. Daddario was awarded both a B.S. and M.S. degrees in Civil Engineering from New York University. Mr. Daddario is a professional engineer and a specialist in strategic marketing.

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Bio:
Marcel Ricciardelli is Vice President, Industry Practice Leader for XL Environmental, Inc., a leading provider of integrated environmental risk management® solutions to business and industry worldwide through insurance, risk control and claims management. Prior to joining XL Environmental in 2003, he had been at AIG Environmental for over nine years in a variety of management and business production positions. His most recent position at AIG Environmental was as Vice President and Product Line Manager for AIG’s remediation stop loss program including pollution liability and blended finite risk insurance. Over the past 10 years, Mr. Ricciardelli has worked with all types of environmental insurance programs including pollution legal liability, remediation stop loss, professional liability, blended finite risk and casualty products for all size clients. His projects have included environmental issues surrounding portfolios of industrial and commercial real estate, corporate successor liability, environmental liability settlements and excess of loss coverage for known environmental issues including remediation, natural resource damages and litigation. Mr. Ricciardelli has pioneered coverage by developing creative insurance solutions for entities with known environmental issues and entities that assume and manage environmental liabilities. He has worked on extremely complex and challenging contaminated sites with multiple stakeholders including state and federal superfund sites, current and former Department of Defense sites, brownfield redevelopment and industrial sites including chemical, petroleum and mining sites.

Mr. Ricciardelli is a recognized expert and regular speaker for professional organizations and associations within the environmental, consulting, legal, property development, waste and insurance industries. He has a B.S. in Engineering from the University of Massachusetts.
Success in Private Sector Financing of Environmentally Challenged Properties

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Abstract:  
Financing an environmentally challenged site reuse project can be a costly and challenging effort. When contamination is real or perceived, the success in receiving the necessary funds becomes difficult and can often discourage progress. Reduced market value, cleanup costs and environmental liability are major concerns to both developers and lenders. In this context, it is critical that sustainable programs have timely access to funding sources that address both environmental and redevelopment activities.

Public-sector incentives and assistance help advance cleanup and reuse activities. However, experience shows that private sector financing is vitally important to a successful sustainable redevelopment program. This workshop has been organized as a forum where highly qualified experts can present topics that will help participants to better understand what is needed to achieve success in private sector financing.

The agenda will include presentations on the importance of actively engaging lending institutions, the development of a successful lending equation, lenders environmental concerns and existing and innovative risk management systems that have lead to successful transactions.
Bio for Dean Jeffery Telego:
Environmental Bankers Association (EBA) is a non-profit trade association that represents the financial services industry, including bank and non-bank financial institutions, insurers, asset management firms and those who provide services to them. Its members include lending institutions, property & casualty and life insurers, the environmental consulting and appraisal community, and attorneys. Mr. Telego currently represents the EBA as a Federal Advisory Committee member for the Negotiated Rulemaking Committee on All Appropriate Inquiry as dictated by the new Small Business Liability Relief and Brownfields Revitalization Act amending CERCLA.

The EBA was established in 1994 in response to heightened sensitivity to environmental risk issues, and the need for environmental risk management and due diligence policies and procedures in financial institutions. The EBA has provided the forum for financial institutions to address environmental issues for the past decade. One of the founding principles of the EBA is that a healthy environment is one key to a strong economy and that we will all benefit far more from a collectively strong economy than by individually cutting corners at the expense of the environment. Mr. Telego has been in the environmental risk management field since 1978.

Mr. Telego is also President of both Risk Management Technologies, Inc. (RTMI) and of RTM Communications, Inc. (RTMC). RTMI performs environmental risk management consulting and strategic market planning and association management. RTMC, the communications entity, creates and produces environmental risk management conferences and publications.

Bio for James A. Colella:
Mr. Colella is Group Manager of the Northeast Region of the National Lending Group of PNC Real Estate Finance. He provides construction, term and bridge financing for multi-family, office, retail and industrial projects. Additionally, he facilitates the permanent financing of construction loans through a network of institutional lenders and pension funds. His clients include large public and private real estate investment trusts and national and regional developers. He has over 20 years of banking experience.

In 2002, Mr. Colella closed on a construction loan for the initial phase of a 1,040-unit mid-rise multi-family project to be built on a RCRA facility, a former stone quarry turned municipal landfill. PNC Real Estate Finance is acting as agent on behalf of a six member bank group.

Mr. Colella received his undergraduate degree, a BS in mathematics and economics, in 1981 from Youngstown State University. He is also a licensed attorney and received his Juris Doctorate from Duquesne University in 1998. He was admitted to the PA Bar in 1998 and is a member of both the American Bar Association and the Allegheny County Bar Association.

Bio for William Muzychko:
William Muzychko is an Environmental Risk officer at PNC Bank, East Brunswick, New Jersey where he advises lending officers on understanding and mitigating environmental risks. He has over 20 years of banking experience and has been involved in developing and implementing environmental policies and procedures in the banking industry since 1992. In the past, he has also been involved in the environmental and engineering due diligence requirements for PNC’s capital market products.

Mr. Muzychko is Vice President of the Environmental Bankers Association and is on their Board of Governors. He also vice chairman of the BEST Advisory Board, a Trenton, New Jersey Brownfields Working Group, is a member of ASTM and the HUD Brownfields Financing Strategies Project Review Group and has participated as a member of the Delaware Brownfields Working Group.

Mr. Muzychko has spoken frequently on the topic of financing contaminated properties at conferences and seminars sponsored by: the Environmental Protection Agency; the New Jersey and Pennsylvania Departments of Environmental Protection; the Institute for Continuing Legal Education; Rutgers
Bio for Daniel Kaley:
Mr. Daniel Kaley has worked in the construction and environmental field since 1970. His banking career began in 1985 and he maintains credentials with multiple construction and environmental organizations. As a founding member of the Environmental Bankers Association and also an original participant in the ASTM E50 Environmental Assessment committee, he has been reviewing and evaluating environmental issues since the late 1980’s. He has developed and implemented the environmental policies and procedures for two (2) separate Banking institutions and written numerous position/procedure papers on a large number of specific environmental issues.

As Team Leader for the Real Estate Risk Services - Environmental and Construction Cost Division, Mr. Kaley is responsible for managing environmental risk and assisting the lending officers and borrowers through the process.

SITE – SPECIFIC APPROACHES AND REDEVELOPMENT TOOLS

Site-Specific Management Approaches and Redevelopment Tools (SMART)

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Abstract:  
In 2000, the United States Environmental Protection Agency (EPA) and the German Federal Ministry of Education and Research (BMBF) continued an ongoing partnership to gain a mutual understanding of approaches for the cleanup of chemical contamination in order to protect human health and the environment. The U.S.-German Bilateral Working Group has now begun its third phase with a new focus on providing a variety of tools, approaches, and technologies that could facilitate streamlined, cost-effective cleanup and redevelopment of contaminated sites. The Interstate Technology and Regulatory Council (ITRC), a state-led organization, is also a significant partner in Phase III activities.
The U.S.-German Bilateral Working Group began Phase III by identifying several environmental, social, and economical obstacles to redevelopment. The purpose of the partnership is to develop and share tools to help overcome the identified obstacles.

Site-specific Management Approaches and Redevelopment Tools (SMART) is a compilation of tools the partnership is developing. The compilation currently consists of the SMART Guidance (U.S. Version 1.0 CD available 09/30/03) and SMARTtech (draft CD available for review) which will both become part of an electronic, web-based, decision support tool called SMARTe (see schedule below). It is anticipated that additional “SMARTs” will be developed and incorporated into SMARTe.

Visually, SMARTe consists of three levels: the screening level, the resource level, and the decision support level.

<table>
<thead>
<tr>
<th>Screening</th>
<th>available 01/30/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource</td>
<td>available 01/30/04</td>
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<tr>
<td>Decision Support</td>
<td>available 09/30/06</td>
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</tbody>
</table>

Figure 1. SMARTe Visual Representation and Schedule

At the screening level, users will have a quick reference tool that will allow them to readily identify important aspects of redevelopment. At the resource level, the SMART Guidance provides ideas, best practices, and resources for overcoming obstacles to redevelopment. Links to additional information are also provided. At the decision support level, many tools will be joined together to allow users to assess market and non-market costs and benefits of redevelopment options, evaluate environmental and financial risks and opportunities, and visually communicate the vision of the redevelopment effort. One tool that will be incorporated into the decision support level of SMARTe is SMARTtech which is a searchable database containing information regarding characterization, monitoring, and remediation technologies. SMARTtech can be used to evaluate various options for managing environmental contamination.

By providing tools to overcome obstacles to redevelopment, the U.S.-German Bilateral Working Group anticipates that more sites with perceived or actual contamination will be redeveloped, thus preserving precious greenspace.

Bio for Ann Vega:
Ms. Vega has a BS degree in mathematics from Xavier University and an MS degree in environmental science from the University of Cincinnati. She has worked at the US Environmental Protection Agency (USEPA) in the Office of Research and Development (ORD) for almost 14 years. Ms. Vega is currently the National Risk Management Research Laboratory (NRMRL) Brownfields Research Program Manager and manages research projects related to brownfields redevelopment. Ms. Vega participates on the Interstate Technology Regulatory Council (ITRC) Brownfields Team, the ORD Brownfields Team, and the US-German Bilateral Working Group. Prior to becoming involved in Brownfields, Ms. Vega was the Quality Assurance Manager (QAM) for a division within NRMRL. In addition to reviewing QA project plans, performing quality audits, and reviewing division products, she participated on several Agency workgroups to enhance the quality of science within EPA.

Bio for Dr. Paul Black:
Dr. Black has more than 20 years of experience applying decision analysis concepts to a wide range of environmental problems. Most recently, as a principal and co-founder of Neptune and Company, he has promoted the use of decision theoretic concepts throughout his environmental work. Neptune and Company is an environmental consulting company that specializes in the technical disciplines of statistics, decision analysis, risk assessment, ecology, environmental modeling, QA and chemistry. Dr. Black manages Neptune's Decision Analysis, Modeling and Statistics Group. The main focus of the group is to provide consulting services in environmental decision analysis, covering disciplines such as
environmental modeling, cost-benefit (economic) analysis, options analysis, statistics, probability, elicitation, earth sciences, and human health and ecological risk assessment. His academic training includes a Ph.D. and M.S. in statistics from Carnegie Mellon University, and a B.S. from the University of Lancaster, U.K., also in statistics. Dr. Black manages Neptune's efforts supporting the EPA National Risk Management Research Laboratory Brownfields Research Program and participates on the Interstate Technology Regulatory Council Brownfields sub-team.

LUNCHEON SPEAKER

One Cleanup Program and Land Revitalization Initiative

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Abstract:
The One Cleanup Program (OCP) is EPA's vision for how different cleanup programs at all levels of government can work together to improve the coordination, speed and effectiveness of cleanups at the nation's contaminated sites. The OCP encourages improved collaboration among EPA cleanup programs with State, Tribal, local and other Federal agency programs and stakeholders.

EPA's Land Revitalization Initiative promotes the reuse of once-contaminated sites in order to revitalize America's communities. Because cleanup and reuse are mutually supportive goals, property reuse should be an integral part of the way EPA does business. EPA's Land Revitalization Agenda (LRA) provides a menu of policies and practices the Agency may employ to facilitate reuse.

For more information about the One Cleanup Program and the Land Revitalization Initiative, go to http://www.epa.gov/oswer/onecleanupprogram and http://www.epa.gov/oswer/landrevitalization.

Bio:
Steve Luftig joined the U.S. Environmental Protection Agency (EPA) in 1972. He has just assumed responsibilities as Senior Advisor to the Assistant Administrator for the Office of Solid Waste and Emergency Response, focusing on land reuse in EPA’s cleanup programs.

His experience with EPA includes assignments in the Washington, D.C. Headquarters Office, as well as in the EPA New York City Office (Region II). Just prior to his current position, he served as Director of the Office of Emergency and Remedial Response, which manages cleanup activities at Superfund hazardous waste sites. Before joining the Headquarters management team, he was the Director of EPA’s Region II Division in charge of the Superfund program, oil spill response, and chemical emergency planning and preparedness efforts for New York, New Jersey, Puerto Rico and the Virgin Islands. His experience also includes budget and policy development as chief of the Region II Planning and Evaluation Branch, and extensive experience implementing the Water Pollution Control Act related to waste water treatment plant operations and discharge permit development. He has also served as a consultant to the Philippine government under the auspices of the World Environment Center, the
government of Taiwan, and as a U.S. representative to the International Working Group on Contaminated Land.

Following graduation (Magna Cum Laude) from the City College of New York, with a Bachelor of Chemical Engineering Degree, he obtained a Masters Degree in Civil Engineering from New York University. He is a licensed professional engineer and member of Tau Beta Pi, the National Engineering Honor Society. He has received the President’s Meritorious and Distinguished Executive recognition, as well as awards from EPA for his work at the Love Canal hazardous waste site and for innovative management activities.

UNDERSTANDING SITE CONTAMINATION:

TRIAD APPROACH TO SAMPLING AND ANALYSIS – LOWERING COSTS, ACCELERATING CLEANUP, AND IMPROVING SITE DECISIONS

MATCHING TECHNOLOGY APPROACHES WITH SITE DECISIONS – SYSTEMATIC PLANNING FOR SITE SPECIFIC NEEDS

Triad Session

Introductory Session – Triad Approach to Sampling and Analysis – Lowering Costs, Accelerating Cleanup, and Improving Site Decisions

Panel Presentation – Matching Technology Approaches with Site Decisions – Systematic Planning for Site Specific Needs

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Abstract:
Approaches that maximize real time analysis, rapid sampling, and dynamic decision making lead to significant savings. Investment in a thorough, up-front systematic planning process ensures that site data
not only result in a standard consultant’s report, but also advance cleanup and land reuse goals with the necessary level of confidence in supporting decisions.

Unfortunately, many sampling and analysis efforts employ unnecessarily prescriptive analytical approaches. Decision makers may focus on the quality of individual measurements rather than on the ability of the overall data collection and analysis strategy to support more certain, site-specific decisions. Many assume that any data collected and analyzed using field techniques can only be used for screening purposes, while strict adherence to prescribed, off-site analysis automatically supports sound decision making. Often, managing analytical uncertainty takes precedence over managing elements that impact uncertainty in sampling. By ignoring the issue of sample representativeness, decision makers risk overlooking a primary source of decision error.

Several government agencies are supporting efforts emphasizing thorough systematic planning to allow site-specific approaches that maximize the use of field analytical and rapid sampling technologies to help control all sources of uncertainty. The approaches recognize the importance of matching data collected to the intended uses at the specific site and using these determinations to drive the selection of appropriate analytical and sampling tools. These strategies also encourage a dynamic decision making/ work planning approach to conduct fieldwork that allows field teams to quickly respond to the near real-time data generation capabilities. Such strategies allow technical teams to collect the data needed to support site decisions without the need (or minimizing the need) for costly, multiple field mobilizations. By managing both analytical and sampling uncertainty and allowing for greater sample representativeness, these strategies can significantly improve the confidence level of site decisions. This approach - integrating the use of systematic planning, dynamic work plan strategies, and real time, field measurement technologies - is referred to as the “Triad.”

The introductory session will provide participants with an overview of Triad mechanics and how Triad can be used as a work strategy framework to manage decision uncertainty. The technical panel will include presentation of case studies that utilized the Triad approach. The case studies illustrate how site reuse goals, economic, and practical constraints were considered during the systematic planning process.

Bio for Kira Lynch:
Kira Lynch is an environmental scientist for the Corps of Engineers Seattle District. Ms. Lynch serves as one of the Corps Innovative Technology Advocates (ITAs), and has sixteen years experience working with innovative field measurement technologies and dynamic sampling approaches. Ms. Lynch holds a Bachelor of Science in Environmental Toxicology from UC Davis and a Masters of Science in Environmental Management from University of San Francisco. She has a diverse background and has worked as a chemist for both fixed and field based laboratories. Ms. Lynch has worked for the US EPA Region 9 QAMS and as manager of the EPA Region 9 Field Analytical Support Program (FASP). Ms. Lynch has extensive experience planning and executing data collection efforts and remedial actions for Superfund and Brownfields, including preliminary assessments, site inspections, expanded site inspections, HRS Documentation Records, emergency response time critical and non time critical removal actions, remedial investigation feasibility studies, and remedial action construction projects. In addition, she has conducted hazardous waste site characterization and remediation under state cleanup programs in WA, OR, and CA. Ms. Lynch is currently the technical lead on Dept. of Defense and EPA projects that are utilizing dynamic approaches and field measurement technologies.

Bio for Deana M. Crumbling:
Ms. Deana Crumbling has worked in USEPA's Technology Innovation Office for the last 6 years to encourage incorporation of innovative site characterization technologies into routine practice. She has over 20 years of experience in analytical and biomedical chemistry that encompasses clinical, industrial, research, and environmental laboratories. She has worked in the hazardous waste site cleanup arena over the past 11 years in assorted capacities. In addition to her current position at EPA, she has worked in a state program for hazardous sites cleanup, in a consulting engineering firm, and as a technical advisor to a
private environmental law firm. She holds a B.S. in biochemistry, a B.A. in psychology, and an M.S. in environmental science.

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**Abstract:**  
As part of this Panel discussion concerning systematic planning and the development of project decision criteria, Robert Howe and Terry Goodwald with PADEP will present the results of an on-going effort for redevelopment at the Marino Brother Scrapyard. The site is contaminated with metals and PCBs and is being cleaned up to meet the needs of the Rochester Borough for reuse of the property as a museum and potentially a boat dock or other multiple reuse park. Practical and economic constraints have directed the planning process and the identification of key decision criteria. The site is about to undergo remediation in the next year.

In addition Mr. Howe will present the results of a Triad project conducted in EPA Region 1 at a former power plant facility. The city of Greenwich, Connecticut wishes to redevelop the site as a multiple use recreation facility that is to include wetlands and walking paths, and several playing fields. Field-based measurement technologies were used to expand site coverage and improve the certainty of project decisions. The results of the study suggest that redevelopment plans and action levels proposed might need to be revisited because low levels of contamination above the residential criteria may make remediation to these standards cost prohibitive.

**Bio for Robert Howe:**  
Mr. Howe has over 20 years experience in environmental chemistry and project management. As a laboratory chemist and supervisor during the first eight years of his career, he has a familiarity with the application of most field and laboratory based analytical equipment for the analysis of both inorganic and organic contaminants.

As a project manager and chemistry discipline lead, he has developed systematic plans for dynamic work plans applied successfully at over a hundred different sites across the U.S.

**Bio for Terry E. Goodwald:**  
Terry E. Goodwald has a B.S. in Environmental Resource Management from Penn State University with an emphasis in Freshwater Ecology. He has worked as an Environmental Protection Specialist for the Pennsylvania Department of Environmental Protection (DEP) for the past 18 years, both in the Bureau of Waste Management and the Environmental Cleanup Program.

Mr. Goodwald has worked as a project manager on sites ranging in costs from $250,000 to $15,000,000. He is responsible for managing projects involving site characterization, as well as remediation of abandoned hazardous waste sites utilizing monies from the Pennsylvania Hazardous Sites Cleanup Fund.
Mr. Goodwald works hand in hand with DEP's Emergency Response Program to complete final cleanups on large-scale emergency actions, such as the Washington Tire Fire and the Darnley Waste Oil Site. Currently, Mr. Goodwald is working on remediation of 30,000 cubic yards of contaminated carbon sweepings from the floodplain of Montour Creek in Allegheny County, PA. Additionally, he is working with EPA's Brownfields Technology Support Center and its consultant (Tetra Tech) in determining the most effective remediation for the Marino Scrap Yard in Rochester, PA.

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**CLEANING UP CONTAMINATION:**

**REGULATORY ACCEPTANCE OF NEW TECHNOLOGIES AND APPROACHES - THE INTERSTATE TECHNOLOGY AND REGULATORY COUNCIL**

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**ITRC – Shaping the Future of Regulatory Acceptance**

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**Abstract:**
The Interstate Technology & Regulatory Council is a bold initiative to reduce regulatory barriers to the use of new technologies for environmental remediation. This state-led coalition of regulators, industry experts, academia, stakeholders, and federal partners is bringing about a culture change in environmental decision making, replacing long-standing adversarial relationships with collaboration, consensus, and concurrence. The result is documented success in optimizing state resources and reducing compliance costs while protecting human health and the environment.

Engaging environmental experts and interested parties from public and private sectors in 40 states and the District of Columbia, ITRC is reinventing environmental regulation away from command and control, changing behavior to focus on solutions instead of problems. With broad participation from across the environmental community—and in response to jointly identified priorities—ITRC’s problem- and technology-based teams assemble technical information, performance data, and case studies of emerging technologies into decision-making tools and guidance documents. This expertise and wisdom are then captured and delivered in both classroom and Internet-based training courses. ITRC products and services help the environmental community understand emerging technologies, gain confidence in consensus-based guidance, and build consistent regulatory approaches for reviewing and approving specific technologies.

**An innovative approach**
What’s innovative about this program is that regulators and the regulated community are working not as adversaries but as colleagues, collaboratively identifying and resolving regulatory barriers to better environmental technology. State regulators on the ITRC technical team pledge 10% of their professional time to ITRC activities, enabling teams to develop first-rate products and giving the states a stake in their acceptability. The State Engagement Team, comprising environmental agency staff members from each
ITRC member state, works to gain concurrence from the highest levels of their state agencies to use specific ITRC technical/regulatory guidance in their decision-making. Multistate concurrence benefits both state regulators and vendors by streamlining the permitting process, with resultant savings in time and costs. ITRC provides free copies of its guidance documents, which can also be downloaded from its Web site (www.itrcweb.org). Perhaps the most innovative aspect of ITRC’s program is the teams’ development and delivery of free Internet-based training, enabling environmental professionals to learn about the latest technical solutions at their own desks, without the time and expense of travel.

Who benefits?
ITRC’s immediate beneficiaries are the state and industry professionals who use the program’s more than 40 guidance documents and take ITRC courses to learn to apply innovative technologies. ITRC’s innovative use of Internet training is of special benefit to busy regulators with limited time and funding. In just two hours and at their own desks, interested parties interact live with each other and national expert instructors. From this reliable, respected wealth of expertise, validated by multistate concurrence, technology users and regulators gain the knowledge and confidence to make and approve cost-effective and environmentally protective decisions. Secondarily, technology developers and vendors save the time and expense of conducting duplicative demonstrations and collecting performance data to satisfy requirements that differ state to state.

ITRC’s ultimate beneficiaries are truly the nation’s citizens and taxpayers. When better cleanup technologies are developed and commercialized more efficiently, further innovation is encouraged, so we all benefit from solutions that may otherwise never have been pursued and made viable and available. When these technologies are selected and approved with greater efficiency, environmental cleanup becomes more affordable or goes faster. The public benefits directly—through a safer, healthier environment—and economically as well, through redeveloped brownfields and a better return on tax dollars.

Pennsylvania’s Cooperative Multi-Site Agreement: A Model for Cooperation, Achievement and Success

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Abstract:
Basis for Success: In 1997, individuals from the Pennsylvania Department of Environmental Protection and the Department of Defense, who were involved with ITRC’s Policy Team, began some discussions concerning remediation initiatives in Pennsylvania at DOD facilities. Case studies were evaluated by the Policy Team to determine the effects of state voluntary cleanup programs and federal/state performance systems. The result was a series of discussions between the Department of Defense and PA DEP that resulted in a unique and innovative Cooperative Multi-Site Agreement between the Commonwealth of Pennsylvania and agencies within the Department of Defense.

Two initiatives in Pennsylvania set the stage for this precedent setting agreement. The first was Pennsylvania’s Land Recycling Program created under Act 2, the Land Recycling and Environmental Remediation Standards Act of 1995. This voluntary program sets uniform cleanup standards, standardized review procedures for cleanup plans, and releases developers from cleanup liability once
these standards are met. The second initiative was the multi-site agreement concept developed previously to address multiple site remediations on a statewide basis. In July 1998, the Pennsylvania Department of Environmental Protection (DEP) and the U.S. Departments of the Army, Navy, Air Force and the Defense Logistics Agency signed a Cooperative Multi-Site Agreement (CMSA) designed to prioritize, assess and remediate contaminated military and former military sites on a statewide basis. Currently, 1095 DOD sites have been placed in an inventory of sites by the various service components, including 205 Formerly Used Defense Sites.

Progress to Date: In 1998, there were 1079 sites identified on the Inventory of Sites list under the CMSA, including 52 Scheduled Sites (sites scheduled for remedial action) and 659 “Study Program” sites (no further action sites which required DEP concurrence). By 2000, 102 sites had been “resolved” under the terms of the agreement, 62 sites were scheduled for remedial actions and 541 Study Program sites remained to be evaluated by DEP. In 2001, the number of sites resolved under the CMSA jumped to 448, 55 were scheduled for further action and 193 sites needed further evaluation. As of February 2003, there were 1085 designated “sites” on the Inventory of Sites List of which 556 sites were resolved by DOD/DEP, 112 sites were scheduled for further remedial action and 15 sites remained to be evaluated by DEP.

Success Stories: Scranton Army Ammunition Depot, 911th Airlift Wing/171st Air Refueling Wing, Freemansburg Marine Corps Reserve Center, Tobyhanna Army Depot, Claysburg Air Force Station, Harrisburg Air National Guard base, 201st Red Horse Flight (Fort Indiantown Gap), Valley Forge General Hospital. (Examples of significant site accomplishments will be presented for each).

Presentation Objective: The CMSA has been instrumental in establishing a cooperative approach to the identification and remediation of DOD sites within the Commonwealth, including breaking down regulatory barriers to redevelopment of former DOD facilities and installations. Through the combined efforts of DEP and the Army, Navy, Air Force, Army Corps of Engineers and the Defense Logistics Agency, progress under the CMSA continues to forge ahead toward a goal of site remediation by the year 2010.

Bio: Gary W. Moulder has a B.A. in Political Science from Villanova University, an M.S. in Environmental Engineering from Columbia Southern University and is currently working toward a master’s degree in Occupational Safety and Health. Commander Moulder served with the US Navy on active and reserve duty for 22 years, the last five years of which he spent working with the Naval Facilities Engineering Command field activities on environmental restoration projects. He has been employed by the Commonwealth of Pennsylvania for over 23 years in the Departments of Transportation, Environmental Resources and Environmental Protection. He is a Certified Hazardous Materials Manager (CHMM) with the Institute of Hazardous Materials Management. Past experience has included: regulation of hazardous materials by highway; environmental member of the Toxic Waste Investigation and Prosecution Unit (TWIP); State Superfund Project Officer; and Contract Management Section Chief. He is the Program Manager for Pennsylvania’s Defense-State Memorandum of Agreement (DSMOA) as well as the principle point of contact for Pennsylvania’s innovative Cooperative Multi-Site Agreement (CMSA) with the Departments of the Army, Navy, Air Force and Defense Logistics Agency. He serves on DEP's Department-Wide Safety Committee, Technology Steering Committee, Quality Management Plan Review Team, Fire and safety Team Floor Leader and was appointed as Dean of the School of Recycling and Waste Management, a virtual learning center in DEP. Additionally, Mr. Moulder serves on the following national committees and work groups: Association of State and Territorial Solid Waste Management Officials Base Closure Focus Group; National DSMOA Steering Committee; ITRC Unexploded Ordinance (UXO) Work Group; National Defense Center for Environmental Excellence - Unexploded Ordinance Tasks 307 and 318. Mr. Moulder is currently serving as Chief of the Federal Facilities Section in the Division of Remediation Services, PA DEP.
CLEANING UP CONTAMINATION:
REUSING FEDERAL LANDS – NEW APPROACHES IN BASE CLOSURE AND FEDERAL FACILITY REUSE

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Bio:
Mr. Chamberlain works for the Department of Energy, Environmental Management, Office of Technology Development and Deployment as a program manager. He manages the technical assistance program to support closure of the DOE sites in Ohio. This program provides experts to the sites to develop solutions to problems that they cannot solve and expertise that can only be found in the National Laboratories. He has a degree in engineering and is a registered professional engineer. He has been working on the development of technologies for hazardous and radioactive subsurface contamination for the past 11 years. Prior to that he worked as a private consultant in the Washington, DC area on land development projects.

LUCIS: Navy’s Web and GIS-Based System for Land Use Controls at Base Closure Sites

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Abstract:
Risk-based cleanups of contaminated property are becoming increasingly common, with cleanup strategies and residual contaminant levels geared to the anticipated future use of the property. The protectiveness of these risk-based cleanups is based on the effectiveness of the institutional controls and engineering controls ("land use controls") that "run with the land" and are binding on current and future property owners and occupants. However, the effectiveness of these land use controls is directly related to the degree that they are known and understood, and can be related to a specific parcel of land on the face of the earth. Lack of knowledge of land use controls presents the greatest risk to the long-term protectiveness of risk-based cleanups, and increases with time.

The Department of Navy recognized this dilemma approximately four years ago at the peak of its Base Realignment and Closure (BRAC) Program. Congress authorized four BRAC rounds from 1988 to 1995,
and approved the closure 90 Navy and Marine Corps installations, which were ultimately split up into more than 600 individual disposal parcels. Many of these parcels were identified for commercial and industrial reuse and were remediated to industrial standards under risk-based cleanups. In all, approximately 30% of these disposal parcels are expected to have land use controls to protect these cleanup remedies and to limit the parcel's use. However, Navy will no longer own or control these parcels, and in many cases the original property recipients who agreed to these land use controls will reconvey them to other owners. Ensuring that all current and future owners, users, and regulators of these parcels understand these land use controls is of paramount concern.

Navy addressed this concern by tasking Booz-Allen, Hamilton to develop LUCIS - Navy's Web-based, GIS-based, real estate parcel-based land use control information system. LUCIS allows prospective buyers and tenants of former Navy BRAC sites, construction and utility companies, and planning, zoning, and permitting officials to access GIS-based map layers of these BRAC sites to determine what types of land use controls, if any, apply to them. In addition to these "LUC layers", users can access PDF versions of parcel deeds, surveys, and land use control summaries to provide more detailed real estate and land use control information. This free, Web-based system is available to anyone with Internet access. LUCIS is the first Web-based system created by a federal agency to provide comprehensive, GIS-based land use control information on its former properties. Navy encourages interested parties to use it and to provide feedback on its effectiveness.

Bio:
Richard Engel is the Head, Real Estate Base Closure Support Section, Naval Facilities Engineering Command (NAVFAC). His office oversees the execution of real estate disposal actions at Dept. of Navy base closure sites, development of real estate-based environmental land use controls, and conservation partnering programs. Prior to this, Mr. Engel directed the Headquarters Marine Corps Housing Section, managing family housing and bachelor housing programs. Before that, he served as real estate director for NAVFAC's Chesapeake Division, managing land acquisition, leasing, and natural resources programs in the Washington, DC and Chesapeake Bay regions. Mr. Engel began his Federal career managing base closure actions for NAVFAC's Northern Division in Philadelphia in 1974. He has also managed real estate programs for the Defense Information Systems Agency and the Dept. of Energy. Mr. Engel has served on community planning, conservation, and revitalization committees in Arlington, VA, where he resides with his family. He holds a BS in Regional Science from the University of Pennsylvania, a Masters in Public Administration from American University, and a certificate from the National Development Council as a Housing Development Finance Professional.

Accelerating Cleanup at a Former DOE Nuclear Weapons Production Facility
Utilizing Innovative Technologies

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Abstract:
The Young – Rainey Science, Technology and Research (STAR) Center is a former U.S. Department of Energy (DOE) facility in Largo, Florida, where nuclear weapon components were manufactured. In 1995, DOE sold the property to Pinellas County. DOE production operations ended in 1997, and Pinellas County converted the facility into a high-tech manufacturing and research center. Because of historic
waste disposal practices, ground water at parts of the facility and at a privately owned parcel of land adjacent to the facility that was formerly owned by DOE remains contaminated with organic solvents and metals used during DOE production operations. DOE is responsible for completion of ongoing remediation activities at these sites.

In keeping with DOE’s desire to contribute to sustaining economic development in the Tampa Bay region where the STAR Center is located, DOE has implemented an aggressive remediation strategy at the facility. This strategy is designed to complete cleanup activities as expeditiously as possible while maximizing utilization by the landowner of site property during cleanup activities. Accordingly, innovative technologies, such as air sparging with horizontal wells, biosparging with horizontal wells, in situ anaerobic bioremediation, steam-enhanced extraction, and electrical resistive heating, are being employed to support successful site cleanup.

Remediation activities at the facility are conducted pursuant to the requirements of a Hazardous and Solid Waste Amendment (HSWA) permit issued by the State of Florida. In addition, an adjacent off-site parcel of property formerly owned by DOE, is being remediated under a Remediation Agreement between DOE and the State of Florida.

Bio:
David S. Ingle has B.S in Education form Berry College and is a graduate of the US Army Safety and Health Management Intern Program. He currently manages overall project administrative and technical services relative to ongoing environmental restoration activities at the Young-Rainey STAR Center in Largo, Florida. He has a broad background of environmental, safety and health (ES&H) management responsibilities at various Department of Defense (DOD) and Department of Energy facilities since 1972. He has directed ES&H activities at two DOE nuclear weapons production facilities as well as directed ES&H activities at regional command offices for the DOD both in the United States and Europe. Management responsibilities have included such diverse ES&H area as occupational health and safety, emergency operations, waste management, environmental restoration, radiation protection, regulatory compliance, nuclear criticality, medical services, and industrial hygiene as well as the production, storage, testing and transportation of explosives and nuclear weapons components.

CLEANUP/ASSESSMENT CASE STUDY SESSION:
UNDERGROUND STORAGE TANKS

Cleanup and Redevelopment for Commercial Use of a Typewriter Manufacturing and Ink Coating Facility
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Abstract:
Project Overview
The Olivetti Facility in Harrisburg, PA was operated by multiple parties as a typewriter manufacturing, ink coating, and solvents degreasing facility from 1968 through 1989. Manufacturing operations at the main building resulted in soil and groundwater contaminated with a variety of non-chlorinated and
chlorinated solvents. A commercial development corporation purchased the property, including the main building area, from Olivetti in 1986. Subdivision and land development activities proceeded while investigations and remediation of the site were ongoing. Various soil and groundwater cleanup and site facilities closure activities were completed under various regulatory programs. The main manufacturing building is currently utilized as commercial office space, with the remainder of the property developed into other commercial use.

**Summary of Site Remediation Activities**

Six soil areas contaminated with chlorinated and non-chlorinated solvents, ethylene glycol, and petroleum hydrocarbons were remediated using a combination of bioremediation, soil vapor extraction, and excavation and off-site disposal. Soil treatment ceased upon attainment of risk based soil cleanup levels. One on-site and one off-site groundwater plume containing similar constituents as in the soils were remediated using pump and treat, monitored natural attenuation, and enhanced in-situ bioremediation. Groundwater treatment began in 1995, and ceased in 1998 when it was shown that an asymptotic rate of VOC removal occurred, and that cessation of pumping would not adversely affect human health and environment. Other site closure activities included closure and removal of chemical underground storage tanks (USTs), closure of a hazardous waste storage facility, removal of pyranol containing transformers, closure of a subfloor sludge storage pit, and demolition of a solvents coating building.

**Regulatory Framework**

Environmental work began in 1985 and proceeded until 1995 under a Notice of Violation (NOV). A consent order signed in 1995 required cleanup of soil and groundwater to background levels, or to other applicable state requirements. Implementation of Pennsylvania’s Land Recycling and Environmental Remediation Standards Act (ACT 2) in 1995 supported remediation of groundwater to Act 2 human and environmental health protection standards. Subsequent revisions of the Act 2 Standards supported cleanup of soil to meet groundwater protection standards. A risk assessment, including fate-and-transport modeling, and mass balance modeling with respect to impacts to surface water, was performed to establish on-site and point of compliance groundwater concentrations that would represent no adverse environmental or human health impacts.

**Current Development**

Site development began following soil remediation, but coincident with active groundwater treatment. This required redesign and reconstruction of the groundwater extraction and monitoring well fields, and of the groundwater treatment system housed in the occupied office building, and coordination with site environmental and site development activities. Technical support to the developer was provided in support of potential site occupants’ due diligence review of technical documentation of the properties under remediation. This site is currently subdivided, with development including a 14 screen movie theatre, restaurant, proposed development of a shopping plaza and bank, and use of the previous manufacturing building as commercial office space. Present negotiation between the responsible parties and the current owner developer of groundwater deed restriction as part of final closure. Final environmental closure and release of environmental liability is pending final negotiation of deed restrictions which will prohibit future use of site groundwater within groundwater impact areas.

**Bio:**

Dr. Cronce has over 25 years of experience as an environmental professional, with technical focus in the areas of soil and plant science, agricultural management, geology/hydrogeology, soil and groundwater protection and remediation, and waste management. He has held professional positions in government, academia, and industry. His experience includes 2 years of field soil survey and mapping, 10 years of university research and teaching, and 17 years of commercial consulting.

Dr. Cronce is a member of the National Academies, where he serves as a member of the U.S. National Committee of Soil Science. He is a licensed soil scientist and a nationally certified crop advisor. Dr. Cronce was named the R.E. Wright Associates, Inc., Technical Employee of the Year in 1991; received
Delineation of a VOC Release Using the Soil Conductivity/Membrane Interface Probe

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Abstract:
The delineation of the thickness, areal extent, and chemistry of a volatile chemical release into the subsurface environment was undertaken using the Geoprobe System® Soil Conductivity Membrane Interface Probe/Sorbent Trap/GC System (SC/MIP). This system allows for detection of volatile chemicals and the measurement of the soil electrical conductivity in the subsurface environment at increments of 0.05 feet as well as the speciation of the volatile chemicals collected with the membrane interface probe. The SC/MIP system has proved to be a very cost-effective screening tool at many VOC release sites. The SC/MIP data collected from this tool provides a general indication of the subsurface hydrogeologic properties, a qualitative indication of the VOC concentrations, and a very good definition of the horizontal and vertical extent and migration pathways of the VOC release. This information can then be used as a cost-effective guide to design remediation programs, and the proper placement of soil borings and/or monitor/remediation wells. For this investigation a photoionization detector was used with the membrane interface probe to provide information on the relative concentration of volatile chemicals with depth. The investigation included the advancement of 20 SC/MIP soundings to depths ranging from 7.5 to 39.25 feet, and the collection of roughly 10,000 PID and soil electrical conductivity measurements.

To enable a thorough analysis of this data set, PM-Diamond® software, developed by Principia Mathematica, Inc., was used to analyze historic hydrogeologic, groundwater and soil sample chemical data, together with the SC/MIP data set. The analysis of the investigation data set was used in an effort to provide reliable estimates of the feasibility and costs for a corrective action of the chemical release. The results of the analysis have been presented graphically to help inform and educate insurance companies, clients, and other stakeholders of the technical details of the investigation results and associated cost considerations. Analysis performed for the investigation included: spatial interpretations of the SC/MIP data set in some cases at 0.05 foot increments, development of SC/MIP data cross-sections, estimation of the mass of the chemical release, and development of estimates of the mass of the chemical release between the adsorbed and dissolved phases.
Additionally, graphical analysis of SC/MIP data sets collected at two different sites are provided as an example of the varying plume geometry that VOC releases can assume under varying hydrogeologic conditions.

**Bio:**
Roger E. Lamb has a B.S. in Geology from the University of Missouri at Kansas City and a M.S. in Urban Environmental Geology from the University of Missouri at Kansas City. He has worked in the environmental consulting sector for 19 years. He has worked on a wide range of projects including remediation of chemical impacted soil, sediments, and groundwater, siting of hazardous waste and sanitary landfills, and pilot testing of innovative investigation and remediation techniques. He is currently a Senior Hydrogeologist with Maxim Technologies in the Kansas City, Kansas office.

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**Brownfield Case Study for a New Jersey Petroleum Terminal**

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**Abstract:**
The site is a former refined petroleum and specialty chemical bulk storage and distribution facility located in a residential and industrial area along the Delaware River. Located in southern New Jersey, within the Philadelphia metropolitan area, the site encompasses 130 acres. The terminal operated from the late 1920’s until it was closed in 1996. Environmental assessment and remediation efforts commenced in 1981; to date, over 500 soil borings and 200 monitoring wells have been installed to assess subsurface conditions. A groundwater pumping and treatment system, with six active recovery wells, has operated since 1991 and currently treats approximately 350 gpm in an effort to contain groundwater migration. A soil vapor extraction and treatment system, with 42 active wells, has operated at a flow of 4,000 cfm since its installation in 2001. Regulatory activities are being performed under Remediation Agreement with the NJDEP as part of ISRA requirements.

BP’s challenge has been to manage the environmental liabilities in a cost-effective manner while maintaining a positive relationship with the community and maximizing the value of its property. BP has developed a viable plan for redevelopment of the terminal and adjoining 60 acres of industrial property. Forming a public-private partnership with the municipality, BP has made a social and economic investment to promote a sustainable redevelopment while meeting its environmental responsibilities. Highest and best use studies were completed to identify market data, develop site plans and concepts, and incorporate the factors related to environmental remediation. The plan envisioned calls for redevelopment of a combination port terminal and industrial/commercial park.

The first step in the plan has been implemented by the construction of the largest solar field on the East Coast. Completed in November 2002, and commissioned on Earth Day, April 2003, the facility, built with technology provided by BP Solar, consists of 5,880 thin-film panels constructed on a former industrial landfill. The field produces an estimated 350,000 kWh per year, or approximately 30 percent of the electricity needed to power the environmental remediation equipment for the terminal.
Bio:
Mr. Pause is a Senior Environmental Manager with BP Oil’s Group Environmental Management Company. He has over 20 years of experience performing environmental corrective action projects. Presently, Mr. Pause manages remediation projects and reuse opportunities at a number of closed and abandoned BP properties throughout the U.S. He has a B.S in Public Health and an M.S. in Environmental Engineering, both from the University of Massachusetts, and is a registered engineer in five states as well as a Licensed Site Professional in Massachusetts.

CLEANUP/ASSESSMENT CASE STUDY SESSION:
GUARANTEED FIXED PRICE CONTRACTING

Early Transfer, Remediation and Redevelopment of a Former Naval Shipyard: Mare Island Naval Shipyard, CA

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Abstract:
Type of Development
Early Transfer, remediation and redevelopment of a former Naval Shipyard.

Highlights
• This project sets the standard for Early Transfer of BRAC facilities. Due to the complex transactions, multi-party interest, and liability transfers issues, it is a model for success at other BRAC and Brownfield sites.

• Performing both developer and remediation contractor roles for western parcel of Mare Island involving over 3,000 acres.

• Developing 350 acres of former dredge ponds for Regional Dredged Material Disposal Facility through a Public Private Partnership.

• Assuming $54 million worth of cleanup and closure obligations from the Navy. Fixed price remediation of the site includes OE, low-level radiation, and chemical contaminants.

• Structured and negotiated comprehensive Risk Management, Insurance and Financial Assurance programs to manage remediation costs and environmental liability in perpetuity.

• Partnering with the City of Vallejo to facilitate negotiations for the early transfer of the western parcel of Mare Island.

Background
Mare Island is a former Navy industrial base located north of San Francisco near Vallejo, CA, which began operations in 1860 and was closed in 1996 as a result of the 1993 Base Realignment and Closure
(BRAC) process. The Navy, through the Southwest Division (SWDIV) of the Naval Facilities Engineering Command (NAVFAC), is in the process of turning the base over to the City of Vallejo. The City, acting through its authority as the local redevelopment authority (LRA), has contracted with WESTON to assume certain environmental liabilities and redevelop the existing dredge ponds for acceptance of various types of dredged material from sites in the greater San Francisco Bay area.

The Mare Island Dredge Ponds, covering 350 acres and capable of handling up to 10 million yd3 of dredge material, were used by the U.S. Navy to store dredged material sediments that were dredged from berthing areas on the Mare Island Strait. Upon closure of the Shipyard, the dredge ponds were placed in inactive status and have been maintained subsequently to control vegetation and drainage for future use.

WESTON, on behalf of the City of Vallejo, devised a plan to use the dredge ponds for the permanent storage of dredged material from the greater San Francisco Bay area. The site will play a vital role in the San Francisco Bay area’s Long-Term Management Strategy (LTMS) for upland placement of dredged material. WESTON has prepared the Business and Marketing Plans to support the development investment.

Surrounding the dredge pond location are numerous contaminated parcels that will require cleanup by the California regulators in order for WESTON to access the dredge ponds. These areas include a 240-acre landfill and other parcels containing ordnance and explosives low-level radiological items, and chemical contaminants. WESTON prepared and negotiated all of the required transfer and environmental agreements and developed the insurance and financial assurance mechanisms necessary to satisfy Federal, State and Local requirements to complete the transfer.

Bio:
Peter A. Ceribelli is a Weston Solutions Vice President with 20 years of diversified experience in the Environmental Consulting and Remediation field in Project/Operations Management including three years as Manager of WESTON’s Remediation Division. His background includes extensive experience in development business structures and risk mitigation strategies to manage complex transactions involving environmentally impaired real estate with industry, municipal and federal clients. In his current capacity as Manager of WESTON’s Real Estate Solutions Business Line, Mr. Ceribelli oversees all of WESTON’s real estate development/investment and environmental liability transfer transactions. Mr. Ceribelli is a graduate of West Chester University with a degree in Business Administration.

Eliminating/Managing Environment Risk for Brownfields Development: The Crosstown Center Case Study

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Abstract:
The Crosstown Center Development Site located in Boston, MA occupies six acres and historically consisted of several lead manufacturing companies, including paint pigment manufacturers and plumbing equipment suppliers, as well as several gasoline stations. Site investigations uncovered widespread subsurface contamination primarily from lead, polynuclear aromatic hydrocarbons (PAH’s) and petroleum hydrocarbons.
When complete, Crosstown Center will be a premier office, retail, and hotel project. Phase I development plans include a 175 room hotel, 21,500 square feet of retail, and a 650 space parking garage. Phase II includes a 280,000 square foot office building, 30,000 square feet of retail, and 600 additional garage parking spaces. Employment estimates for the development are approximately 1,000 permanent jobs and between 200-250 construction jobs. Crosstown Center is located in one of the largest Empowerment Zones in America.

Within one month after submitting the comprehensive site assessment report, TerraSure submitted a guaranteed fixed price for remediating the site and bringing it to regulatory closure under the Massachusetts Contingency Plan.

TerraSure has completed the remediation at the Crosstown Center site. Although there were several changes that occurred after the fixed price was negotiated, no change orders were submitted to the client. The changes encountered included finding contamination under a portion of the building that could not be tested prior to submitting a fixed price, taking the treated soil to a landfill instead of a recycling facility due to the high lead concentration even after treatment, and DEP comments that had an impact on the scope of remediation.

In comparison to the conventional approach, TerraSure’s remediation strategy resulted in site closure in one-third the time, at a significantly lower cost, and provided both protection from cost overruns and insurance against long-term environmental liabilities. Prior to the closing for the Phase I development, the bond buyers were concerned about the impact any cost overruns would have on their return on investment. TerraSure’s guaranteed fixed price contract provided them a solid assurance that a potentially significant cost variable on the project was being capped facilitating the closing of the deal.

**Bio:**

Mr. Rayo Bhumgara has a bachelor and master’s degree from the University of Bombay, India. He also has a master's degree in Environmental Pollution Control from The Pennsylvania State University and is a Certified Hazardous Materials Manager. He was one of the key individuals involved in creating TerraSure and currently serves as its Managing Director. TerraSure was formed by Gannett Fleming, a national engineering and consulting firm, to perform guaranteed fixed price remediation of Brownfields and other contaminated sites. TerraSure currently has 5 ongoing projects in Massachusetts, California, Pennsylvania, New York, and Florida. Mr. Bhumgara also manages Gannett Fleming’s New England environmental business and has been with the firm for 15 years. He has extensive experience in managing and executing environmental restoration projects. He has worked with numerous public and private sector clients performing environmental site assessments, multimedia compliance audits, permitting, remedial system design and installation, construction management, regulatory negotiations, and program management. The project he is presenting at the RevTech Conference received the Brownfield Project of the Year and Environmental Justice Project of the Year Award from the New England Environmental Business Council.
Performance Based Approaches For Accelerated Remediation and Property Redevelopment

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Abstract:
Although almost 30 years have passed since promulgation of RCRA in 1976, the environmental consulting and remediation contracting industry has not, for the most part, drawn upon all of the lessons learned and experience gained over this period to improve upon the value it provides to either commercial or government clients. Specifically the old paradigm of billing hours while marching down the lengthy and heavily papered path of “information development” still remains as the default mode for providing such services.

RPs and / or PRPs certainly cannot be blamed for this lack of innovation as for the last half of this 30 year period they have consistently tried to motivate their consultants and contractors to find ways to redirect information gathering efforts into actions that would bring their environmental issues to closure as quickly, judiciously and cost effectively as possible. For those that have listened to these pleas comes the concept of performance based remediation where firms focus on and are rewarded for bringing environmental liabilities to closure ASAP. Here comes the controversial part, underscoring the ability to achieve closure in a timely fashion by offering performance guarantees to do so. Not for the squeamish or faint of heart.

So what does “guaranteeing performance” mean? Quite simply it is a contractually binding commitment to achieve a certain endpoint for a fixed price and in doing so assume the risks of 1) regulatory uncertainty, 2) less than fully characterized site conditions, 3) remediation technology performance, 4) addressing concerns of other stakeholders, and more. This can be expanded to include time certainty in selected situations; such as property redevelopment opportunities where time uncertainty can stop a deal before it starts. Now it is important to recognize that not every site is a good candidate for such assurances and risk assumption and the characteristics (knowns andunknowns) of certain sites will be better suited for some service providers over others.

The primary difference between providing a guaranteed, fixed price remediation (GFPR) offering and a more “traditional” fixed price offering is that the latter is typically offered for a clear scope of work – a listing of precisely defined tasks if you will. Conversely, a GFPR offering is for project performance toward a prescribed endpoint such as obtaining a letter of No Further Action or reducing VOC concentrations in groundwater to MCLs. Whereas the typical fixed price offering focuses on a statement of work (SOW) the GFPR approach focuses on a statement of objectives (SOO).

Establishing price certainty to achieve the regulatory closure of environmental issues makes the GFPR approach a powerful tool for facilitating the transaction of environmentally impaired real estate, settling disputes and claims over the actual cost of remediating a divested property or a property impacted by co-mingling plumes of groundwater contamination from different off site sources (RPs), confidently establishing contingent environmental liability reserves, accelerating the adjustment (hopefully lower) of existing environmental reserves, developing alternatives to bonding for financial assurances required in support of remediation / reclamation plans, etc.
**Bio:**
Erhardt Werth holds a Bachelors Degree in Geology and a Masters Degree in Engineering. He has worked as a consulting engineer for Geraghty & Miller / ARCADIS for the past 26 years. He is currently the Executive Vice President within ARCADIS responsible for directing the firms Guaranteed Business Solutions Programs. Mr. Werth has directed all levels of consulting operations as well as having served as an effective strategist, advocate and trial expert for the firm's Fortune 500 clients. His current focus is on the continued development of innovative offerings to support the improvement of underperforming assets in the commercial marketplace.
POSTER ABSTRACTS
Brownfield Clean Up nValley Technology Center

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Abstract:

- **Before** – This 116,000 sq. ft. building was constructed and utilized for over 40 years by the Alexander Smith Carpet Company. In the late fifties, the building was sold to the Purdue Fredrick Pharmaceutical Corporation. Purdue occupied the building until the mid 90’s as a research laboratory. The building was abandoned in 1996 and was donated to the Yonkers Industrial Development Agency in 2000. The entire building has been gutted, all asbestos and in ground tanks removed. The YIDA is spending approximately $10 million on redeveloping the facility.

- **After** – The facility will become home to an incubator, various government agency offices, law and accounting firms and high technology/biotechnology companies.

- Completed in 2003

- $10 Million Project

- 200 New Jobs

- Incentives – Yonkers Industrial Development Agency Funding, Federal HUD 108 Loan, HUD Grant, SBA Loan and New York Empire Zone Tax Credits

- Property Taxes - $ 232,686

*Acknowledgement – Special thanks to Commissioner Erin Crotty of NYDEC and Larry D’Andrea of USEPA for their assistance in the development of this site.*
Revegetation of Exceptionally Steep Steelmaking Slag Slopes at the
Nine Mile Run Slag Dump, Pittsburgh, PA

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Abstract:
CEC is playing a key role in the development of a 100-acre greenway extension of Frick Park through the Nine Mile Run brownfield site to the Monongahela River. CEC is presently working on design-build ecological restoration efforts in the Nine Mile Run stream corridor. The effort includes 15 acres of revegetation of steep slag slopes (1.4:1 vertical:horizontal) without using soil, 42 acres of invasive plant management, and over 110 acres of assessment of invasive and native plant communities in and around the greenway using Global Positioning System (GPS) survey equipment. This work is being done for the City of Pittsburgh, Planning Department under a Pennsylvania “Growing Greener” grant.

This work follows up on U.S. EPA-sponsored studies led by the Pittsburgh Planning Department and executed by CEC and the Carnegie Mellon University STUDIO for Creative Inquiry. The greenway is a 100-acre public access portion of the 240-acre Nine Mile Run slag dump site. Following analysis and design by Biohabitats, The City of Pittsburgh and U.S. Army Corps of Engineers will be rehabilitating the Nine Mile Run stream channel and will be modifying the watershed stormwater system over the next few years to moderate extremes in stream flow due to extensive urban development, and to restore aquatic life to this tributary of the Monongahela River. The 140-acre balance of the site is being developed by the Urban Redevelopment Authority of Pittsburgh and the Summerset Land Development Corporation into a neo-traditional neighborhood, “Summerset at Frick Park.”

CEC performed an invasive plant management survey using high resolution GPS and developed a Geographic Information System (GIS) to track invasive plant infestations in support of the development of a 100-acre greenway extension of Frick Park through the Nine Mile Run brownfield site to the Monongahela River. This GIS database is being used to incorporate additional survey data and prioritize invasive plant management in the lower Nine Mile Run watershed and other areas of Frick Park.

Mulch vs. No Mulch: Effects on Surface Temperature
**In-Situ Remediation Technology Application Case History**

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**Abstract:**
A successful application of an in-situ soil and groundwater remediation technology was performed at a former gasoline station facility in Pensacola, Florida. The Florida Department of Transportation was expanding a roadway and needed to rapidly and permanently remediate the BTEX and MTBE contaminated groundwater beneath the roadway expansion continued without delay and further remediation of the site was not a typical gasoline station facility encompassing ¼ to ½ acre. Depth to affected zone consists of permeable sand. Prior to the chemical oxidation reagent application, the site had been cleared and graded in preparation for construction of a roadway expansion. Contaminant mass was calculated for the affected area prior to and after the final application. An overall contaminant mass reduction of 95 to 100% was achieved as a result of the single 10-day CleanOX® Process application.

**Using Numerical Groundwater Models in the Selection of Remedial Alternatives For Site Restoration**

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**Abstract:**
The transfer of property with groundwater contamination has often been a major obstacle to the land redevelopment process because of the uncertainty in assessing clean up times, costs and downgradient impacts. Groundwater models can be used to bridge these obstacles because reasonable cleanup timetables and remedial scenarios can be simulated with the computer. With the incorporation of graphical accessories to numerical models, complex site conditions can be simulated in an environment that can provide clarity of complex technical concepts to stakeholders with varying degrees of environmental expertise. Concerns that models can help explain include: duration of cleanup time, volumes of wastes generated from the process, off-site contaminant migration, dimensions of the remedial system that will be needed to address the problem, and the interaction of various site features (rivers, impermeable layers, etc.) on the operation and effectiveness of the system. Models can be used to simulate the effectiveness of numerous remedial technologies including: monitored natural attenuation, pump and treat, reactive barrier walls, sheet pile and slurry walls, French drains, landfill caps, and AS/SVE systems. Models remain the most effective tool in demonstrating complex interactions in groundwater because no other
A technical tool is as effective in showing the relationships between site features. Well designed and calibrated models can withstand substantial criticism by showing how the body of site information is well represented in the numerical model. Obviously no tool can replace the complexity of nature, but models designed by reviewing the entire spectrum of site-specific hydrogeological and geochemical data show that a scientist has reconciled well studied areas of a site with the less studied areas. This process is often useful in identifying data needs required prior to the transfer of property, system design or system installation.

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**Environmental Considerations in Land Use Management:**
**Future Use Assessment and Evaluation of a 2,200-Acre Industrial Property**

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**Abstract:**
At a 2,200-acre industrial site, the owner wished to offer portions of the property for sale and redevelopment. At issue with the sale of the property were concerns over potential future environmental impacts to or from the existing operation and future industrial facilities. Much of the property had been purchased as a buffer zone between the plant and surrounding residential, agricultural and industrial areas.

MFG evaluated the site with regard to past and present uses, current zoning, the environmental setting and potential future uses in order to determine which portions of the property could be offered for redevelopment. Consideration was given to maintaining an adequate buffer zone around the existing operation, and mitigating potential future contamination to the existing operation from future industrial users. MFG categorized the current buffer zone areas into three groups based on their potential for environmental risks to or from the existing operation. The groups were also divided into subgroups with suggested future use scenarios that would meet the objectives of the current property owner. The recommended future use scenarios included residential, commercial and industrial uses in different areas of the property based on current zoning, planned future growth, proximity to the existing operation, aesthetic issues, groundwater flow direction and surface drainage.

The project required integrating a number of disciplines including geology/hydrogeology, chemistry, risk assessment and geographic information systems (GIS) to evaluate the site and present the findings. The results of the evaluation were presented graphically in GIS overlays on both aerial photographs and USGS topographic maps. As a result of the project, one portion of the property has been selected for redevelopment as an industrial facility, three parcels will likely be returned to agricultural use and the community is evaluating one area for potential recreational use.
Economic and Environmental Assessment on Baltimore Park Heights Brownfields and GIS System Development

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Abstract:
This paper presents the results of economic assessment on the Park Heights community in Baltimore City and environmental assessment on two Brownfield sites in the community. The community has proposed these two Brownfields as the sites to develop a children’s playground and a miniature golf course. The purpose of these development projects is to stimulate the community’s economy and attract more business, as well as increase population retention or recovery. We have conducted investigations into the historical use of the properties, dated back to over 30 years ago and drew conclusions based on the preliminary soil analyses and the additional information obtained from a number of socio-economic surveys. The economic assessment of the neighborhood can provide a baseline study for the future Brownfield redevelopment projects. The results of the assessment indicate that both the economy (business) and the population are declining significantly in Park Heights Community of Baltimore City. This decline is likely to continue and even become worse for the next few years unless redevelopment is implemented. It is therefore important for the community, governmental agencies and other stake shareholders to develop a strategic plan of attracting business and population back to the community. This will involve economic development to include improved utilization of idle lands under the Brownfield redevelopment program. Statistical analysis is also used in the assessment and ArcGIS 8 is being used to create a GIS map of the community.
Effective Strategies for Identifying and Confronting Brownfield Complications

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Abstract:
Typical brownfield redevelopment projects are ripe with challenges and complications relating to flow-of-ownership, financial and environmental liabilities, regulatory requirements and funding. These obstacles can prevent important projects from being advanced, retard the progress of such projects, consume excessive resources, and/or ultimately result in project failure. Consequently, the identification of critical issues and development of strategies to overcome potential obstacles is an essential step in the process of advancing a successful brownfield redevelopment project.

The use of an initial project feasibility analysis and strategic planning process can help to define the critical path and focus resources appropriately, thereby optimizing project efficiency and increasing the likelihood of project success. This approach was employed for a brownfield project at the site of a former locomotive manufacturing facility and steel mill in the City of Dunkirk, New York. This project presented a number of challenges including:

- Tax, utility and emergency cleanup liens/debts amounting to nearly two (2) million dollars,
- Inability to confirm the current owner due to an unrecorded deed,
- Liabilities associated with documented on-site contamination, the magnitude and extent of which was unknown, and
- Investigation and cleanup funding shortfalls.

These and other potential obstacles to site restoration and redevelopment were identified and evaluated during the preliminary feasibility analysis, and strategies and responsibilities for resolving each of these issues were devised and successfully implemented to enable advancement of the project. These strategies ranged from a coordinated program of close communication with local government, state and federal regulatory officials to insurance asset recovery.

The approach utilized to identify and systematically resolve critical issues within the context of this project can be applied by other communities to effectively define and confront complications encountered on their brownfield projects. This case study will be utilized to present the process employed and the methods selected to overcome some of the obstacles common to many brownfield projects.
Remediation/Redevelopment of Former Wood Treating Site Using Cement-Based Solidification/Stabilization

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Abstract:
When commercial properties in prime locations are left vacant due to environmental impacts to the soil and groundwater caused by past industrial practices, there is significant incentive to return these Brownfield sites to use. One such site is located in Port Newark, New Jersey, which is one of the largest shipping ports in the New York/New Jersey area. The site was previously operated as a wood treating facility from 1940 until operations ceased in 1991, and remained vacant until remediation commenced under the jurisdiction of the New Jersey Department of Environmental Protection (NJDEP). Cement-based solidification/stabilization was used to address arsenic- and creosote-impacted soils at the site. Prior investigations at the site found free phase creosote in deep soils (2-12 feet), and arsenic-impacted surface soils (0-2 feet). Remediation of the site involved the in-situ solidification/stabilization of “deep” creosote-impacted soils, ex-situ solidification/stabilization of arsenic-impacted soils, and use of the treated soils as base materials for construction of an asphalt surface cover system designed for use as a container storage facility. Approximately 25,000 cubic yards of material was treated in-situ using an excavator mounted mixing tool, and approximately 27,000 cubic yards of material was excavated, treated through a pug mill, and re-used at the site as soil-cement base for the asphaltic concrete pavement. The use of soil-cement as an asphalt base course material reduced construction costs by obviating the need to import additional fill. As a result of the treatment, creosote and arsenic in the soil were successfully immobilized and contained at the site, and the property was returned to productive use by the Port Authority of New York and New Jersey.

Desorption of Polychlorinated Biphenyls (PCBs) from Sediments in the Presence of Hydroxypropyl-b-Cyclodextrin

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Abstract:
The removal of PCBs in soils and sediments is challenging because of the affinity of PCBs towards these matrices. When sorbed onto soil particles PCBs render themselves unavailable for the treatment process through sorption/desorption processes. The objective of this work was to investigate the usefulness of cyclodextrins as a remediation and solubility enhancer to leach out PCBs from contaminated soil and sediment. Sorption/desorption
experiments and gas chromatography – electron capture detector (GC-ECD) were conducted to study the effect of hydroxypropy-b-cyclodextrin (HPBCD) on sorption/desorption properties of PCBs in suspended oil particles. The results indicated that PCBs were included with HPBCD and that the physico-chemical properties of both HPBCD and PCBs changed appreciably. In the absence of HPBCD, the soil matrix completely depleted the PCBs from the surrounding medium (water) indicating the strong affinity towards the soil particles. When added to the same soil, HPBCD prevented PCBs from diffusing to the soil particles demonstrating that the PCB-HPBCD complex prefers the water medium in place of the soil matrix. The HPBCD caused the sorbed PCBs to diffuse out to the surrounding medium. Both experiments indicated that PCBs have affinity to bind with HPBCD under experimental conditions. A molecular mechanism was proposed to explain the inclusion of PCBs with HPBCD whereby the PCB molecule attaches itself to the HPBCD molecule without loosing chemical structure. The mechanism proposed was verified by a set of experimental tests using a chemical reagent known to break any bond between PCBs and matrix without impacting the PCB chemical structure. The result is considered breakthrough evidence that the inclusion occurred.

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**Lead Base Paint Conversion Technology**

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**Stan Cook**  
Fort Ord Reuse Authority

**Abstract:**  
New chemical coatings technology that converts lead based paint (LBP) coated building materials into Non-RCRA hazardous materials proven successful and cost effective at the former Fort Ord Army Base in California.

Lead Based Paint (LBP) was used throughout the United States and North America until the late 1970’s. Historically, there have been few economical and environmentally compliant choices for managing LBP building materials. Previously, either the LBP had to be removed, a costly step resulting in the generation of a hazardous waste, or building materials were managed and disposed of at a high cost as a regulated, hazardous waste.

At the former Fort Ord, EcoBond™ reduced the complexity and costs of handling and processing LBP coated materials resulting from building demolition or renovation. This new technology works through application of a paint–like coating, onto surfaces with LBP prior to demolition. The

**Problem:** LBP coated building materials handling/processing is expensive and often results in the generation of hazardous waste.

**Remedy:** In-place conversion of LBP into non-hazardous materials prior to demolition

**Advantages:**
- Avoids the generation of hazardous waste
- Applied in-place, and remains on surface during demolition
- Reduced lead particulate dispersion during demolition
- Easy application/Saves money
coating reacts with the lead in the existing paint, converting the lead into a non-hazardous material. Another benefit of this technology is that lead particulate dispersion during demolition is reduced or eliminated providing additional protection of workers. With on site air monitoring, lead hazard protective measures for workers may be reduced according to appropriate local industrial and occupational health standards. As compared to other LBP removal methods or with generating and disposing of a hazardous waste, this new technology’s costs are approximately the same as for a typical paint coating and can thus provide a 50% to 70% cost savings over traditional methods.

Conclusion:
At the former Fort Ord, all of the materials coated with EcoBond LBP™ were found to be less than 5 mg/kg and therefore determined not to be a RCRA hazardous waste. These results were verified with the Fort Ord Reuse Authority, and State regulatory agencies, and the U.S. Army Corp of Engineers. The successful application of EcoBond LPB™ eliminated the spread of lead contamination and allowed the building debris to be disposed of as a non-RCRA hazardous waste providing a $500,000 savings.

The City of York's Gateway Corridor

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Abstract:
The Boundary Avenue Corridor, which is a commercial/light industrial area adjacent to residential neighborhoods, located downtown in the City of York, Pennsylvania. Downtown York has been experiencing a flight of residents to its suburbs similar to larger cities across the country, which has subsequently created urban sprawl. In an effort to combat this problem city officials have begun a systematic redevelopment (i.e. smart growth) of key properties in an effort to reinvent downtown York and ebb the residential flight from the city. The Boundary Corridor is one of these key locations since it acts as a gateway corridor between recent new growth areas and depressed underutilized properties.

The site consists of seven separate parcels comprising approximately 10 acres. The Boundary Corridor was classified as a Special Industrial Area pursuant to Pennsylvania’s Act 2 Land Recycling Program (Act 2) for closure purposes. A scope of work was negotiated that encompassed all areas of concern, but reduced costs associated with previously proposed scopes. Work conducted on the site consisted of removal of nine underground storage tanks (UST); remediation of impacted soils; installation of monitoring wells; soil and groundwater sampling; fate and transport modeling; lead-based paint and asbestos surveys; and a human health evaluation. Pennsylvania’s Department of Community and Economic Development Industrial Site Reuse Program grant money was utilized to offset some of the environmental costs associated with the site redevelopment.

The project received closure from the Pennsylvania Department of the Environment in February 2001. In April 2001 the newly constructed Loretta Claiborne Building (dedicated to a local Special Olympic gold medal winner)
was opened. The building is 40,000 square feet and has leased 100 percent of its space. A parking lot was placed over the former UST site. A former automobile dealership (Himes Motor Company) was converted into Junior Achievement’s Exchange City as well as commercial office space. One other building is also planned for redevelopment. A former cigar factory (Dallmeyer Building) will be renovated to house the Secretary of the Interior's Standards for Historical Rehabilitation. It will be wired for fiber optic cable and also have wireless Internet available (tech-ready). It is currently being registered with LEED to become a certified "Green Building" providing 20 percent greater energy efficiency than ASHRAE standards and will be eco-friendly.

Imaging Your Way to a Better Brownfield Site

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Abstract:  
Recent advances in geophysical data collection and processing have propelled geophysical imaging to the forefront of technologies used to initially characterize a brownfield property. Drilling is of course the first choice; however, having a more complete understanding of the subsurface will save money and may avoid drilling hazards. Coupling electromagnetic terrain conductivity mapping (EM) techniques with an advanced global positioning collection system provides a quick and effective method for site evaluation.

The closure of a 25-acre landfill in the Boston, Massachusetts area proved to be a challenge since it was reported to contain buried drums. A 2-day data collection event produced approximately 100,000 records and identified the location of the buried drums, the depth of waste, areas where degrading was generating landfill gas and the location of a possible leachate plume. Drums were found in the location identified by the EM survey and the project manager recovered the drums. The landfill is currently undergoing capping and closure and will be converted to a golf course and park.
FAA National Airway Beacons Program

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Abstract:
The Federal Aviation Administration (FAA), like many government agencies and commercial enterprises alike, has installed generations of infrastructure, ranging from buildings to navigational aids. At any given time, agency policy dictates whether an older generation of such infrastructure will be abandoned or decommissioned, and whether the unused capital equipment will be removed. Historically, the economics generally favored leaving the existing equipment in place, and environmental regulations and policies have only recently begun to apply. As a result, the FAA has abandoned certain classes of navigational aids; among them the early airway lighted beacons, radio ranges, and fan markers (collectively referred to as beacons). Lighted airway beacons were used as navigational aids during the period from approximately 1926 to 1949. The number of airway light beacons being utilized reached a maximum of 2,274 in 1941 and then slowly declined until the last light beacon was decommissioned in 1974. The FAA’s concern in all cases was that these abandoned beacons not impose a threat to human health or to the environment. This poster presentation describes the program implemented by FAA’s Environmental, Energy and Safety Division (AFZ-800) to manage the environmental risks associated with this abandoned generation of infrastructure. This work is ongoing, and results to date will be discussed.

National Airway Beacons Program Implementation
On behalf of the FAA’s AFZ-800 organization, the Volpe National Transportation Systems Center and Booz Allen Hamilton planned and designed, and are currently implementing and managing a due diligence process to assess and mitigate any environmental risks associated with the beacons. A pilot project evaluating the use of satellite imagery and aerial photography was conducted as part of this program, but a combination of Geographic Information Systems (GIS) mapping and field reconnaissance efforts proved to be a more cost effective approach.

GIS mapping solutions are currently employed to guide the reconnaissance teams to the beacon sites and record their progress. To help the field teams make effective use of digitized vintage Airway Sectional Maps combined with modern street maps, special tools have been developed for use in the field. Backpack Global Positioning System (GPS) units are coupled with pentop computers containing both a GIS mapping application and a database to track reconnaissance findings. This set of tools is also combined with an inductive/conductive magnetometer to sweep the site for underground metals [i.e., underground storage tanks (USTs)]. Careful attention to the safety procedures and training of the reconnaissance teams and continuous communications with program stakeholders, including regulators and various FAA organizations, have been keys to the program’s success.
Results
As of June 6, 2003 the National Airway Beacons Program has investigated 1,715 sites across the United States and has located 51 USTs. Information for each of the UST sites located has been passed on to FAA regional managers, who are coordinating with regulators, removing tanks, and addressing site contamination, if necessary.

St. Louis Fusrap Remediation is a Mental Game Within a Strategy for Success

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Abstract:
This presentation will focus on the progress and achievements in removal action efficiencies of the FUSRAP St. Louis Airport Site team.

Over the life of the project with Shaw Environmental, Inc., the SLAPS removal action has experienced an annual increase in material excavated, transported, and disposed for a constant fiscal year budget. The SLAPS team has improved and streamlined site communications as well as optimizing labor and resources through a process of continuous improvement. These improvements have saved time and effort which equates to cost savings. The savings have been reinvested into the site and allowed more work to be accomplished than originally planned. Success at SLAPS is defined as exceeding the original plan and performing more work safely, on time, and within budget.

In addition, the SLAPS project is about safety. Safety is not something that we just fit into the work if it’s convenient. Safety at SLAPS is a basic fundamental human value that we execute and pattern tasks after. With our values being focused on zero injuries, we engineer tasks in a way that minimizes the risks to our employees. In other words, our paradigm has shifted from one of cost and schedule management, to a culture of safety management. Zero injuries; zero excuses. The benefits to the project are numerous. We have heightened the safety of each worker as a value. Our client is in 100% support of our safety program and the benefits it provides. With continual training and educating to work safe, the cost and schedule management falls into place.

Success at SLAPS is defined as exceeding the original plan and performing more work safely, on time, and within budget. The heightened safety culture at SLAPS remains the key value in the ultimate continuous improvement goal.
Bioterrorist Anthrax Remediation of a Large Postal Facility

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Abstract:
Bioterrorist Incident
In October 2001, an unprecedented bioterrorist incident led to the deaths of two postal employees by inhalation anthrax and the quarantine of the main postal processing facility that serviced the federal government in Washington, D.C. During routine mail sorting, less than 1 gram of Bacillus anthracis spores discharged through the paper envelopes containing the Daschel and Leahy letters. This release caused extensive contamination inside the 14-million cubic foot building plus cross-contamination of hundreds of postal vehicles and dozens of satellite postal facilities. It temporarily crippled the postal system in our nation’s capital and further amplified America’s collective anxiety of terrorism post 911.

Shaw Environmental & Infrastructure, Inc. led the contractor team that met this unique challenge for full environmental restoration of a weaponized biological agent released into a non-military setting. This poster offers a technical overview of how the largest civilian biodecontamination effort was developed and field executed.

Incident Response
Shaw was tasked to assist the USPS Incident Commander with returning the Washington, D.C. facility to normal mail processing operations, in a demonstrably appropriate condition for human exposure, and in the shortest time possible. Shaw immediately provided emergency response to the USPS starting October 21, 2001, the day the facility was closed and quarantined. Shaw took control of the site, sealed the building envelope, operated and maintained building utility and HVAC systems, provided all health and safety, collected over 20,000 samples and provided PCR and culture analyses. Shaw performed the technical research, development, regulatory requirements, engineering design, planning, fabrication, construction, training and drilling, and operation that culminated in the successful chlorine dioxide fumigation of the building in mid-December 2001 and the subsequent 3-month sampling and analysis effort demonstrating the building was suitable for re-occupancy.

Engineering and Construction
Common environmental remediation techniques, equipment, instrumentation, and standards were generally not adequate to perform the chlorine dioxide fumigation and many associated activities. Chlorine dioxide fumigation had only been previously attempted at the Hart Senate Office Building concurrent with this USPS effort, and for various reasons, little technically useful information was available. Shaw performed extensive bench, pilot, and full-scale testing to support engineering design efforts and address safety concerns. New sampling and analytical methods were developed in conjunction with multiple regulatory agencies. Shaw designed and constructed three chemical plants and a 4,000 gpm system with over five miles of piping and hose to perform the fumigation. A remote camera system with multiplexer was installed to monitor the building interior and equipment during fumigation. Shaw designed and built an extensive human-machine interface (HMI) system allowing operators to monitor and control all key system hardware from a central location. Building HVAC system controls were re-routed and upgraded for remote operation outside the building. Computational fluid dynamic (CFD) modeling and three separate whole building SF6 tracer gas studies were designed and performed by Shaw to assure effective performance of the gas mixing and fan-duct transfer system. Additional whole building tests were performed to
assure adequate temperature, humidity, and negative draft conditions for fumigation. A extensive ambient air monitoring system was designed, built, instrumented, and operated by Shaw including mobile units.

Building Fumigation
Chlorine dioxide fumigation of the entire building was performed December 15-17, 2001. All 50 monitoring locations inside the building and 6,400 biological indicator strips far exceeded the contact time dose requirements for 6-log sterilization. No ambient air monitoring excursions occurred and the 100-plus person team and equipment all performed flawlessly. None of the post-fumigation 4,428 wipe or 601 aggressive air samples were positive for B. anthracis. Finally, on February 26, 2003 the building was re-entered without protection by USPS, CDC, OSHA, and others.

Rapid Adaptive Site Characterization Techniques for Cost-Effective Brownfield Redevelopment of Two Urban Properties with Different Outcomes: A Case Study

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Abstract:
Rapid Adaptive Site Characterization (RASC) techniques were employed at two contaminated urban properties near Boston, Massachusetts in the city of Lynn. One property had been a former tannery since 1887, and the other property had been a former industrial laundry facility since the early 1900’s. These two properties were among the first to receive funding from the Environmental Protection Agency’s (EPA) Brownfields Redevelopment Initiative. Since such funding was limited during the initial screening of these two sites, creative and innovative site characterization techniques were essential. The RASC techniques allowed for the majority of the field data to be analyzed in the field immediately following collection, which not only reduced standard site characterization costs, but also enabled rapid decisions regarding the future development potential of the properties.

The RASC techniques at both properties included drive point profiling, soil vapor and soil screening with a photoionization detector, and field laboratory analysis with gas chromatography of volatile organic compounds in soil, soil vapor, and groundwater. The specific profiling method, developed at the University of Waterloo in Ontario Canada, allows the collection of subsurface permeability data, inorganic chemical parameters, and hydraulic head measurements at any desired depth while advancing to a specific sampling point. Therefore, data equivalent to ten to twenty-five permanent conventional monitoring wells can be collected and analyzed in one day. As the field characterization progressed, analytical results were summarized, mapped, interpreted, and discussed with all interested project team members. The ongoing interpretations guided the subsequent adaptive decisions concerning sample locations and necessary analyses, and rapidly focused the characterization on the most contaminated areas of concern.
The contamination present is considered representative of the urban industrial settings commonly available for Brownfields redevelopment; the contaminants of concern include lead, several other metals, PCBs, petroleum hydrocarbons, asbestos, and chlorinated solvents. The primary site-specific considerations for investigation approaches and remediation alternatives were reviewed for each of the above contaminants of concern relative to the intended site use as residential housing.

The former tannery property was quickly determined to be suitable only for industrial use, but the former laundry facility proceeded through state requirements with additional site investigations, risk assessments, and remediation actions that were completed in 2001 with assistance from the EPA Brownfields Revolving Loan Fund. The RASC techniques were essential in quickly focusing the limited available resources on this property which had the highest development potential. A permanent solution was achieved for the former laundry property at the end of 2001, and final reporting requirements were filed with the Massachusetts Department of Environmental Protection in February 2002. The construction of five residential homes was completed on this property in 2003 by the city's housing department. The redevelopment of the former laundry property is being hailed as a national model for the EPA’s Brownfields Redevelopment Initiative. The project is considered unique because the industrial property is being used for a residential housing development.

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**In Situ** Biogeochemical Stabilization of Creosote/Pentachlorophenol NAPLS Using Permanganate

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**Abstract:**

At wood-treating sites, coal-tar creosote and related hydrocarbons may be present in the subsurface as non-aqueous phase liquids (NAPLs). These NAPLs tend to be a long-term source of dissolved-phase organic plumes in groundwater. NAPLs that are present in the subsurface at concentrations significantly above their residual saturation can be removed by enhanced recovery technologies; however, NAPLs that are at or below their residual saturations are trapped in the formation and are generally not recoverable as free-flowing liquids. Nevertheless, a growing number of NAPL removal technologies have been promoted commercially over the past few years including: thermal-enhanced recovery, surfactant flooding, steam- and temperature-enhanced extraction, and others. Although some technologies may be capable of recovering a small percentage of the residual NAPLs, it remains technically impracticable to recover a significant percentage of the remaining NAPLs.

An alternative approach to residual NAPL recovery is *in situ* NAPL management. As defined herein, *in situ* biogeochemical oxidation for source-area stabilization entails the use of a permanganate chemical oxidizer that is flushed through an aquifer zone containing residual NAPLs. The oxidant is not meant to remove NAPL mass entirely. Rather, as the oxidant migrates through the targeted source area, (bio)geochemical reactions between the organic constituents of interest (COIs) and the oxidant cause the destruction and stabilization of NAPL via a two
The biochemical oxidation processes destroy COIs present in the dissolved phase, thereby increasing the dissolution of COIs from the NAPL into the groundwater. The more water-soluble, lower-molecular-weight NAPL constituents are released and chemically oxidized at a proportionally higher rate, thus leading to a “hardening” or chemical “weathering” of the residual NAPL mass. The selective removal of the more labile constituents causes a net increase in the viscosity of the NAPL, yielding a more stable NAPL source that is less susceptible to dissolution processes. In addition, the precipitation of manganese dioxide (MnO₂) as a result of the oxidation reaction results in the formation of a chemical “shell” further isolating the “weathered” NAPLs. As such, the flux of COIs into the dissolved phase is decreased, allowing natural-attenuation processes to more effectively manage the COI plumes.

A series of controlled laboratory-, pilot- and full-scale field studies was undertaken to demonstrate that ISCO technology could reduce the flux of chemicals emanating from creosote/penta NAPL sources. This paper will report the results of a full-scale field application of ISCO at an operating wood-treating site in Colorado where an estimated 180,000 gallons of residual creosote/penta NAPL is present in the shallow alluvial aquifer. The majority of the NAPL is contained on site through the use of a groundwater barrier wall system; however, approximately 6,300 gallons of residual NAPL is present downgradient of the barrier wall and is a potential source to the off-site dissolved-phase plume. The ISCO technology was implemented in this downgradient area to stabilize/manage subsurface NAPLs. Phase 1 of the ISCO implementation was performed in September 2002 and involved the injection of 24,000 gallons of 3-percent potassium permanganate solution in an area containing approximately 1,200 gallons of residual NAPL. Routine monitoring of NAPL thickness and groundwater quality was performed prior to, during, and post-ISCO implementation. Preliminary NAPL monitoring results indicate a reduction in NAPL thickness and mobility. The collection of soil/NAPL cores, NAPL mobility, field parameters, and natural attenuation data to demonstrate technology effectiveness will be completed by spring 2003.

**Anatomy of Streamlined Site Investigation and Cleanup in a Reuse Setting**

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**Abstract:**  
Technology, a wealth of information on site investigation and remediation, and agency and industry experience and desire, have created a favorable atmosphere for rapid site investigation and cleanup. We have in our grasp the ability to eliminate site investigations conducted on “geologic” time.
CDM has had great success with the following streamlined process for investigation and cleanup:

1) Regulator involvement. Regulators are often brought in at the end of a process, i.e., after a work plan is developed. Site owners may fear that regulator involvement will slow the process or result in additional activities or expense. However, endless volleys of comments and response to comments may ultimately delay the schedule, and often regulator needs still have to be implemented in the field. CDM has found that up-front regulator involvement, including over-the-shoulder reviews and frequent updates as work products are developed, may greatly reduce the amount of time and cost from work plan formulation to actual field work to acceptable investigative and analytical reports.

2) Realistic assessment of potential site reuse. Regulator and community input regarding site reuse increases the acceptance and success of a cleanup plan. Careful land use planning and regulator buy-in can also reduce the level of cleanup necessary to protect human health and the environment.

3) Health-based remediation goals. Data collected during site investigations are compared to site-specific HBRGs developed based on site reuse scenarios. Use of HBRGs allows for rapid decisions regarding the need for additional investigation or cleanup, while still taking into account site conditions.

4) Use of presumptive characterization technologies and remedies. USEPA has developed guidance for some contaminants, such as Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds (USEPA 1993) and Users Guide to the VOCs in Soils Presumptive Remedy (USEPA 1996). Use of these guidance documents may reduce the time and expense of site characterization and remediation.

Six-Phase Heating™ Enables Rapid Redevelopment of Sites in Illinois

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Abstract:
Skokie, IL – Now a Movie Theater Six-Phase Heating™ (SPH™) was successfully applied at a large DNAPL site in Skokie, Illinois formerly owned by Bell Laboratories and operated by Lucent Technologies. The owners had slated the property for redevelopment. The site was contaminated with TCE and TCA in a soil volume of 23,100 yd³. Within 60 days, temperatures throughout the entire treatment volume had reached the boiling point of water. Subsurface regions displaying higher electrical conductivities were preferentially heated. These regions included clay-rich soil lenses and zones of elevated chloride ion concentrations. At this site, as DNAPLs migrated downward they were trapped in silt rich stringers or on top of the clay aquitard. Over time, pockets of elevated chloride ions were created from the biological dehalogenation of the chlorinated solvents. By preferentially heating these regions, SPH™ was able to specifically target those subsurface locations holding the majority of the remaining DNAPL mass. With another 70 days of heating, separate phase DNAPL had been removed and TCE/TCA groundwater concentrations reduced to below the Illinois RBCA Tier III standards which had been set as the site cleanup goals. In fact, most of the area had been cleaned to the more stringent Tier I standards. CEST™
received a No Further Remediation (NFR) letter for the site in 2000. The site has undergone redevelopment and is currently a movie theater and parking lot.

Waukeegan, IL – Enables Quick Redevelopment with Institutional Controls. Current Environmental Solutions (CES™) deployed Six-Phase Heating™ (SPH™) at the Avery Dennison Co. in Waukeegan, under the Illinois Environmental Protection Agency (IL-EPA) Site Remediation Program. The property consisted of approximately 2 acres, and contained a one-story slab-on-grade corrugated metal structure of approximately 42,000 ft2. The facility was situated within the Waukegan-Gurnee Industrial Park. The soil was extensively contaminated with methylene chloride with concentrations in excess of 40,000 mg/kg, and an average concentration of 1,389 mg/kg. The Illinois EPA site-specific soil remediation objective for methylene chloride was 24 mg/kg in unsaturated soil, and 2,000 mg/kg in saturated soil. Extensive investigations of the property determined the extent of the contamination, and identified the location of three source areas to be remediated. The project was successfully completed in less than one year to below the soil remediation objective, and the average concentration of methylene chloride remaining after treatment with SPH™ was 2.5 mg/kg. The Illinois EPA issued a “no further remediation” letter for this property, with certain institutional controls embedded in the deed. The property has successfully been redeveloped and is currently being used for other industrial purposes.

M1: Advanced Technology for Onsite Treatment and Reuse of Soils

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Abstract:
USR Ltd. has developed an advanced soil treatment technology to remediate a wide range of contaminants. This technology, the "M1," uses conductive heat--not flame or combustion--to thermally treat complex contaminants. This technology is energy efficient, mobile, easily scaleable, and has no moving parts. Thus, it is ideal for on-site remediation projects, thus allowing the onsite reuse of the native soil after it has been cleaned.

Due to its design, the M1 has very low air emissions, and no particulate emissions. Depending on the types of contaminants to be treated and the applicable regulatory standards, the M1 may not need any additional air pollution controls (other than what is incorporated into the M1 technology itself). If, however, additional controls are necessary for a project, they can be tailored specifically to the M1 to ensure compliance with all applicable requirements.

The M1 currently is being used commercially to remediate petroleum contaminated soils and has recently completed successful trials of difficult coal tar soils from MGP sites (with high concentrations of PAH compounds), oil exploration drill cuttings, and chlorinated solvent soils. A pesticide soil trial will be conducted in the next few weeks. A PCB trial is being planned.
The Role of Ecological Enhancements and Habitat Creation in Site Restoration Projects (CERCLA/RCRA Brownfields)

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Abstract:
The Wildlife Habitat Council (WHC) is a non-profit, non-lobbying group of corporations, conservation organizations and individuals dedicated to protecting and enhancing wildlife habitat. Using natural resource based approaches in remediation/reuse/redevelopment projects can often achieve substantial cost-savings and improve the social, economic and environmental values of sites. While numerous and varied opportunities to exist ecological approaches exist today, there remains a substantial need to foster implementation of this approach at site clean-ups.

WHC has entered into a cooperative agreement with the United States Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) and Office of Underground Storage Tanks (OUST). Under the agreement, WHC will present the latest technologies for applying ecological enhancements to site remediation. WHC’s goal is to demonstrate how federal, state, and local governments, industry and community groups can use ecological enhancements to facilitate the restoration of both private and public (state, tribal, local) lands for a variety of reuses that include wildlife habitat.

Environmental Benefits, Energy Savings, and Pollution Prevention at a Landfill Cap Construction Project For Reuse as a Wildlife Management Area at the Barksdale Air Force Base, Bossier City, Louisiana

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Abstract:
The subject site is a former construction and demolition debris (C&D) landfill that operated from the mid-to-late 1940s until 1978 at the Barksdale Air Force Base (BAFB) in northwestern Louisiana. The primary objective of the remedial action was to install a permanent low permeability soil cap over the former disposal areas to inhibit the infiltration of rainwater in order to protect groundwater quality. The secondary objective during the execution of the project was to maximize green construction materials/methods, pollution prevention, and conservation for reuse of the land as a wildlife management area. Significant conservation efforts and pollution prevention practices were employed during environmental restoration projects including green construction...
materials/methods, use of recycled materials, preserving riparian ecosystems, and the use of native wildflower species for vegetative cover.

A natural levee was allowed to remain in order to maintain a habitat corridor around the Landfill #3 site and minimize disturbance to the adjoining riparian ecosystem. Recycled concrete from demolition projects at the Base was incorporated as rip-rap and aggregate materials for stormwater runoff management and used to construct access roads to groundwater monitoring wells. Trees and shrubs were selectively removed from the immediate work areas and recycled for placement onto hiking trails in conservation areas. The drainage design and construction for the site was developed to recreate the natural drainage pattern to both the adjacent wetland area and the Flat River. All disturbed areas were covered with degradable straw-based erosion control matting. Native species of drought resistant wildflowers are being used for long-term vegetative cover protection. The selection of wildflowers for the permanent cover at the site has resulted in the protection against erosion and off-site transport of sediment as well as direct economic and energy savings. The wildflowers necessitate only two maintenance events per year as opposed to a minimum of eight events for traditional turf grasses. This has resulted in economic savings of an estimated $11,250 per year and energy savings associated with minimizing manpower, fuel, irrigation, soil aeration, transportation, etc.

The area is now utilized as a wildlife management area in a variety of ways by several different species of animals. The landfill is covered with native species of flowers and grasses such as Mexican Hat, Black Eyed Susans, Purple Vetch, Rye, Wheat, and Fescue that is bordered by the Flat River and a wetland area. This habitat scenario provides not only protein rich food and water for the deer, songbirds, wild turkeys, quail and water foul, but also provides protective cover and bedding areas from the local predators such as Hawks, owls, foxes and coyotes. In addition, the base personnel who manage this habitat, enforce strict bag limits that reduce the number of older populations of game animals thereby giving the younger animals the opportunity to mature to full body mass potential. This approach allows the Base to successfully manage local wildlife to their full potential without negatively impacting this area’s natural vegetation.

Arsenic in Soil and CCA Treated Wood by Field Portable X-Ray Fluorescence (FP-XRF)

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Abstract:
X-ray Fluorescence (XRF) has been a widely accepted means of analyzing the preservative content of wood by treatment plants for many years. Chromated copper arsenate (CCA) is the most widely used wood preservative for decks, playgrounds and exterior housing structures and its analysis in wood is straightforward by XRF.

In recent years, however, issues surrounding the use of CCA preservative chemical have increased. There are concerns of possible As leaching into soil both during the woods in-use life and when the wood is disposed of in un-lined landfills. This leaching could cause an increase of arsenic in topsoil that would be a major concern to the health of children and adults. This possible hazard has led wood treatment manufacturers to voluntarily stop producing CCA as of the end of 2003 and begin using alternative wood preservatives.
XRF, and more specifically field-portable XRF (FPXRF), has the ability to analyze low levels (ppm) of arsenic in soil. Therefore FPXRF provides the complete package for CCA measurement: It can be used to monitor proper treatment of wood, sort treated and untreated wood at a construction and demolition landfill, and screen for arsenic leaching in soil.

Ozone, Oxygen, and Hydrogen Peroxide Injection for Aggressive In-Situ Chemical Oxidation of MTBE and TBA

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Abstract:
There are many limitations with providing cost-effective remedial solutions for sites impacted with MTBE and TBA. Groundwater & Environmental Services, Inc. and Applied Process Technology, Inc. have developed an aggressive in-situ chemical oxidation system to remediate MTBE and TBA impact at costs below conventional methods. At our pilot site in Delaware, the chemical oxidation system was utilized at a site where a large dissolved-phase BTEX, MTBE, TAME, and TBA plume (approximately 800 feet in length) impacted numerous residential supply wells and properties. Following pilot testing activities and a detailed life-cycle cost analysis of potential remediation technologies, the chemical oxidation process was selected since it was determined to be the most cost effective solution and indicated the shortest remedial life cycle duration. The life-cycle cost analysis involved the evaluation of eight remedial technologies. The chemical oxidation system involves oxygen, ozone, compressed air, and hydrogen peroxide injection (via subsurface piping) to ten injection locations along two property boundaries. The presentation will evaluate the life cycle cost analysis which was utilized, detail the system design specifications and operational features, and evaluate the results of the technology at the Delaware site, where most of the dissolved-phase plume was remediated in the first three months of system operation.
Development of a Refinery GIS – A Collaborative Process Case Study

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Abstract:
Site investigation and remediation at the former BP/Amoco Refinery in Casper Wyoming, was facilitated by the use of a GIS-based Decision Support Tool (DST) for data analysis, decision making, and stakeholder communication. Requirements of the DST were defined by technical work groups using a collaborative design process, with representation from each of the major stakeholders: the regulatory agency, the property owner, the owner’s consultant, and the community.

DST functions were developed to evaluate data usability, assess data adequacy, formulate sampling work plans and investigate remedial alternatives based on risk-based action levels. The DST was used in public information meetings to convey the scope and goals of the project, display the data, and demonstrate data adequacy and uncertainty. By collaboratively designing the DST, data analysis methods were more readily accepted by all of the stakeholders throughout the accelerated schedule site investigation and remedy negotiations.

Waterstone conceptualized, designed and developed the DST using ArcView coupled to a Microsoft Access database. The complex interface was coded using ArcView’s programming language Avenue, Visual Basic, and Access’s programming language VBA. The system was linked to a replication of the master environmental database at individual deployment sites in Wyoming, Colorado and Washington. The foundation of the GIS/database interface provides simple, site-specific dialogues (pull down menus) to build consistent queries of the environmental database, and to display the results either as map layers in the GIS or data reports, graphs, histograms or charts in Access. All data can be compared to site- and compound-specific risk based remediation goals.

At the direction of the client, a scientifically rigorous method for interpolating constituent concentration data from soil samples was developed that maintained a component of simplicity for the end user of the GIS interface and allowed for real time use during meetings. Waterstone created an interface between the ArcView GIS and the FORTRAN kriging program KT3D (from the geostatistical library GSLIB) which was written in Visual Basic. This interface included site- and compound-specific default values pre-programmed for users without training in geostatistics, yet retained the ability for experts to easily modify any of these parameters. The resulting kriging tool has been, and continues to be, relied heavily upon for analysis of soil contaminant data by both the client and BP’s environmental consultants.

The Casper Refinery DST and the collaborative design approach used for construction and implementation of the DST had a profound effect on the style and pace of the RFI/CMS. The ability to visualize data sets in real time facilitated all levels of stakeholder communication, and greatly decreased the time required for regulatory review. The DST was instrumental in reducing the timeframe of the RFI/CMS from an industry average of 8 to 10 years, to 2.5 years, with significant cost savings to the regulators and the property owner.
Abstract:
Quantitative decision analysis and probabilistic modeling are powerful techniques for mapping a strategic plan, identifying optimum decisions, and shedding light on the risks associated with complex redevelopment projects. For a confidential assignment in New Jersey, decision / risk modeling formed the basis of a strategic plan and optimized the estimation of remediation and restoration costs. These results are being used to support an appraisal of the property designed to establish just compensation as part of anticipated condemnation proceedings. The site in question is nearly 100 acres in size and was historically used for primary metal processing and refining operations. Current redevelopment plans call for the construction of an entertainment complex, office buildings, commercial retail building and light industrial buildings. The presentation will describe a unique decision-framing process used to gather data from various project stakeholders and help ensure a representative model of site conditions and liabilities. We will also present the model structure and results in the form of probability distributions, descriptive statistics, and sensitivity analyses. Conceptual redevelopment plans will also be presented. There is a potential that the condemnation proceedings may enter into litigation; therefore, the location and name of the site will not be provided.
Anaerobic Biodegradation and Biotransformation Using Emulsified Edible Oils

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Abstract:
Chlorinated solvents originating from clothing and textile dry cleaning operations, metal parts cleaning activities, and paint solvents can quickly degrade an aquifer. Nitrate, perchlorate and dissolved metals in groundwater also pose serious water quality threats. Options for cleanup of these contaminants vary, but many have high capital costs that need long-term maintenance, continuing attention and are not appropriate for lightly contaminated areas or where the source area is poorly defined. EOS Remediation, Inc. is licensed under U.S. Patent #6,398,960 to provide an innovative, patented remediation technology that generally requires a one-time application, no aboveground equipment, and no maintenance. The introduction of this low cost emulsified edible oil substrate (EOS™) to the aquifer has been shown to accelerate anaerobic biodegradation in aquifers impacted with chlorinated solvents, perchlorate, nitrate and to promote biotransformations of chromium, radionuclides (U, Tc), and acid mine drainage to less toxic forms.

EOS™ technology has shown superior product handling and subsurface distribution characteristics compared to other in situ products. Supplied as a microemulsion concentrate, EOS® is mixed in the field and pumped into the aquifer, affording immediate impact to greater areas of concern beneath the site. Data have confirmed the establishment of anaerobic conditions within two to three months after application. Field results at three Air Force bases and several industrial sites to date have shown the ability to successfully distribute EOS™ into contaminated aquifers up to 25 feet from the injection point, depending on site-specific hydrogeological conditions.

Emulsified edible oils have been shown to be very effective as a long-lasting, natural time-release, organic substrate. Project data confirm its longevity in aquifers for over three years without re-application as well as its ability to stimulate the desired biological activity and transformations. In this presentation, EOS Remediation will show how the technology is implemented, share project data and illustrate the advantages of this powerful new remediation approach.

________________________________________________________________________
Reductive Dechlorination of TCE During a Brownfield Redevelopment Using HRC®

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Abstract:
Reductive dechlorination using Hydrogen Release Compound (HRC®) as a carbon source to degrade trichloroethene (TCE) and dichloroethene (DCE) was conducted at a site undergoing renovation under a Missouri State-funded Brownfield redevelopment program. The goal of the program was to remediate contaminants to State acceptable levels for a development with minimal disruption to the building while allowing for the complete renovation of the site within a highly restrictive time frame. In the areas where HRC was applied, trichloroethene (TCE) degraded by over 95% (1.8 mg/L to less than 0.05 mg/L) within three months in one critical well and decreased by over 70% in a second well. A third well did not show TCE degradation after 90-days. In the same areas, 1,1,1-trichloroethane (1,1,1 TCA) degraded a minimum of almost 50% and decreased to below detection limits in two of three critical wells. Additional HRC applications are underway to treat newly discovered areas of the site.

In-situ Bioremediation of Pesticide Impacted Soil at the THAN Superfund Site, Montgomery, Alabama

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Abstract:
Further to the results of a pilot-scale demonstration completed in May 2001, the USEPA selected Adventus Remediation Technologies’ patented DARAMENDÔ bioremediation for full-scale treatment of pesticide-impacted soils at the T. H. Agriculture and Nutrition (THAN) Superfund Site (Site) in Montgomery, Alabama. To our knowledge, this represents the first ever, full-scale, in-situ, solid-phase application of bioremediation to pesticide-impacted soils. In particular, Site soils were impacted with Toxaphene, DDT, DDD, and DDE. To date treatment results correspond closely to those seen during the pilot-scale demonstration, during which DDT and Toxaphene concentrations (the only compounds that exceeded the Performance Standard) were reduced from 317 mg/kg and 168 mg/kg to 24 mg/kg and 26 mg/kg respectively, during 168 days of active treatment. To date, after approximately 75 days of active full-scale treatment, Toxaphene, DDT, DDD, and DDE concentrations have been reduced by 63%, 70%, 27%, and 32%, respectively. Relatively high initial DDT concentrations resulted in the transient accumulation of DDD in some sampling zones. Reductions in DDD concentrations in these sampling zones are now expected to accelerate, due to the sharp reduction in DDT concentrations. This pattern is consistent
with that observed during bench- and pilot-scale studies conducted on this and other pesticide-impacted sites. It is anticipated that all Performance Standards for the Site will be reached following 50 to 75 days of further treatment (i.e., May or June, 2003). Results from the completed project will be presented.

Engineering Controls Proposed to Eliminate Human Exposure and Remediate Residual Sources of Petroleum Hydrocarbon Contamination at a Site Planned for Redevelopment into a Residential Apartment Building

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Abstract:
The redevelopment of a property in Downtown Manhattan, New York contaminated with petroleum hydrocarbons requires the implementation of feasible engineering controls to mitigate potential human exposure to contamination, as well as remediate existing source areas and provide hydraulic containment of contaminants in groundwater. The property is currently being developed into a residential apartment building which will cover the entire extent of the site. The State regulatory agency is currently reviewing a proposal submitted by the responsible party which consists, among other items, of the installation of a passive protective vapor barrier beneath the future building. An additional proposed mitigation measure to prevent human exposure to petroleum vapors consists of a contingency sub-slab vapor extraction system to be operated following building construction if a potential exposure risk is determined to exist. Active on-site remediation has been required by the State regulatory agency. Installation of traditional remedial equipment (soil vapor extraction system, groundwater pump and treat, etc.) within the residential apartment building is being avoided due to possible liabilities associated with the risk of increasing potential human exposure to contaminants by penetrating the vapor barrier liner to allow for remedial piping to enter the building; and potential indoor contaminant releases from operation and maintenance of remedial equipment inside the building. Furthermore, space constraints and access limitations prevent the operation of remedial equipment from an off-site location. The proposed remedial strategy consists of the implementation of a dual phase surfactant enhanced high vacuum extraction program. An aqueous surfactant solution will be periodically delivered to the contaminated areas of the subsurface (located beneath the future building) by a network of injection wells through pipes accessible from outside of the building footprint. Following a time period sufficient to allow the surfactant solution to de-sorb petroleum hydrocarbons from contaminated soils, the groundwater-surfactant-contaminant solution will be extracted from the subsurface along with soil vapor through the same injection points used to deliver the solution into the subsurface. A pilot study was conducted at the site to evaluate the feasibility of employing the program and gauge the effectiveness of the technology at remediating the site. The results of the pilot study were favorable. The proposed program will allow the unobstructed development of the entire property as intended by the developer while meeting the remediation requirements of the regulatory agency in a cost-effective manner.
Full-Scale ISTD Treatment at Former Wood Treatment Facility, Alhambra, California

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Rosemead, CA

Abstract:
Southern California Edison (SCE) operated a wood treatment facility for utility poles in Alhambra, CA from 1921 to 1957. The former wood treatment area (AOC-2) occupies 2 acres of a 33-acre parcel, which is now primarily used for equipment storage and maintenance. Subsurface soils at the former wood treatment area are contaminated with organic compounds, including polycyclic aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), dioxins and furans as a result of releases from the wood treatment process. Delineation efforts identified approximately 11,000 m³ (14,500 cubic yards) of predominantly silty soil requiring treatment, to an average depth of 6 m (20 ft) and a maximum depth of 27 m (90 ft). The CA Department of Toxic Substances Control (DTSC), which is overseeing the project under its Expedited Remedial Action Program, established soil treatment standards of 0.065 mg/kg benzo(a)pyrene Toxic Equivalents (TEQ) and 1.0 µg/kg dioxin, expressed as 2,3,7,8-tetrachlorodibenzodioxin TEQ. A feasibility study led to the selection of TerraTherm’s patented In-Situ Thermal Destruction (ISTD) technology for remediation of the site. TerraTherm’s ISTD technology utilizes simultaneous application of thermal conduction heating and vacuum to treat contaminated soil without excavation. The applied heat volatilizes both water and organic contaminants within the soil, enabling them to be carried in the vapor stream toward vacuum extraction wells. Because of the high inter-well temperatures (e.g., 300-600°C) and the fact that the vacuum extraction wells are also heater wells operating at 700-800°C, a significant percentage of the contaminant mass present in the subsurface will be destroyed in situ, as evidenced by 7 completed ISTD projects. Contaminants not destroyed in situ are removed with the vapor stream and treated in an aboveground vapor treatment system. Based on treatability and design work, it is anticipated that >99% of the contaminant mass present will be destroyed in the heated soil, and that the remainder will be destroyed in the Air Quality Control (AQC) unit.

TerraTherm has installed a total of 917 thermal wells, including 785 heater-only and 130 heater-vacuum wells, in a hexagonal pattern at 7.0-foot spacing and to varying depths depending on the depth of contamination. TerraTherm will carry out the heating in two phases, the first phase of operations was begun in early March 2003. Each phase will last approximately 90 days, at which time inter-well temperatures are expected to have exceeded 325°C (635°F). Subsurface monitoring will track the progress of heating. The off-gas will be treated in an AQC unit consisting of a cyclone separator; regenerative thermal oxidizer with demonstrated capability of achieving 99% Destruction and Removal Efficiency (DRE); high-efficiency air-to-air heat exchanger; and granular activated carbon. A process blower will maintain the entire system under vacuum, while a continuous emission monitoring system will measure stack emissions. In accordance with DTSC requirements, TerraTherm will also conduct several rounds of source testing. The project is expected to be completed by spring of 2004.
EXHIBIT ABSTRACTS
U.S. Environmental Protection Agency, Technology Innovation Office

Description:
The mission of the Technology Innovation Office (TIO) is to increase applications of innovative treatment technology by government and industry to contaminated waste sites, soils and groundwater. Increased usage will be accomplished through the removal of regulatory and institutional impediments and the provision of richer technology and market information to target audiences of Federal Agencies, States, consulting engineering firms, responsible parties, technology developers, and the investment community. The scope of the mission extends to Superfund sites, corrective actions sites under the Resource Conservation and Recovery Act (RCRA), and underground storage tank clean up. By contrast, TIO is not a focus for EPA interest in treatment technologies for industrial or municipal waste streams, for recycling, or for waste minimization. Other offices address these special interests.

TIO will optimize the use of electronic bulletin boards, newsletters, monographs, technical briefs, brochures, trade journal articles, and conference presentations. It recognizes the importance of up-to-date and comprehensive mailing lists within EPA and for its clients in other Agencies, States, and for private stakeholders. Additionally, TIO demonstrates electronic databases, Internet Homepage resources, and solicits subscribers to our free-of-charge “TechDirect” technology information list server.

TIO is not a grant-making organization. Other organizations have that mandate for innovative technology development, technology transfer, and training. TIO will seek to enable outside groups to form partnerships and networks and seek to develop client relationships to increase the level of innovative technology use.

ICMA (International City/County Management Association)

Description:
ICMA is the professional and educational organization for chief appointed managers, administrators, and assistants in cities, towns, counties, and regional entities throughout the world. Since 1914, ICMA has provided technical and management assistance, training, and information resources to its members and the local government community. The management decisions made by ICMA's nearly 8,000 members affect more than 100 million individuals in thousands of communities--from small towns with populations of a few hundred to metropolitan areas serving several million.

ICMA's Mission
ICMA's mission is to create excellence in local government by developing and fostering professional local government management worldwide.

Association Activities
ICMA offers a wide range of services to its members and the local government community. The Association is an internationally recognized publisher of information resources ranging from textbooks and survey data to topic-specific newsletters and e-publications. ICMA provides technical assistance to local governments in emerging democracies, helping them to develop professional practices and ethical, transparent governments. ICMA assists local governments in the United States through programs such as the Center for Performance Measurement, the
ICMA’s Brownfields Program
ICMA’s Brownfields Program aims to help local government address their brownfields issues to promote community and economic revitalization, social equity, public health, and environmental quality. The mission of ICMA’s Brownfields Program is to conduct research, provide technical assistance, and facilitate information sharing to enhance the capability of local governments and communities to address brownfields redevelopment.

ICMA’s brownfields program provides comprehensive grant-funded research and technical assistance to local government officials through:
- Conducting peer matching;
- Facilitating research forums;
- Developing polices that benefit local governments and community stakeholders;
- Producing reports, case studies, videos;
- Developing and hosting a brownfields web site; and
- Presenting information at regional and national conferences.

U.S. Environmental Protection Agency Environmental Technology Verification Program

US EPA Environmental Technology Verification (ETV) Program
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Phone: 513-569-7884; Email: hillabby@epa.gov

Description:
EPA’s Environmental Technology Verification Program – or ETV – was instituted to verify the performance of innovative technical solutions to problems that threaten human health or the environment. ETV was created to substantially accelerate the entrance of new environmental technologies into the domestic and international workplace.

State Coalition for Remediation of Drycleaners (SCRD)
The State Coalition for Remediation of Drycleaners (SCRD) was established in 1998. It is comprised of representatives of state governments with formal programs directed at cleaning up soil and groundwater at active and inactive drycleaner sites. These state programs cover about a third of the estimated 30,000 drycleaner sites in the United States. SCRD offers its member states a forum for sharing programmatic, technical, and environmental information to improve the remediation of drycleaner sites.
SCRD members’ drycleaner programs help keep drycleaners from becoming brownfields sites; provide information about cost-effective innovative technology applications; and provide models for contract administration and oversight in brownfields cleanups.

Currently, SCRD’s member states are Alabama, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, and Wisconsin. Associate members, currently Louisiana, are states considering drycleaner-specific programs. In addition, participation in SCRD as “Represented States” is open to states without drycleaner-specific programs but active in the remediation of drycleaner sites under other authorities. Currently, California, New York, and Texas participate as “Represented States.”

SCRD activities are supported by the U.S. EPA Technology Innovation Office and the National Ground Water Association.
TECHNOLOGY FAIR VENDOR ABSTRACTS
**Description:**
O2Tube has created the worlds first *in situ* dissolved oxygen generation and vertical re-circulation system for groundwater in gravels, sands, silts and clays!

The O2Tube patent-pending system can provide the exact concentration of dissolved oxygen required for biological degradation of contaminants in groundwater without elaborate treatment systems, chemicals and their astronomical costs. Every O2Tube system is easy to operate, simple to maintain and costs pennies a day to operate.

The O2Tube system works in all types of soils and can be classified as an institutional or engineered barrier in Florida. The O2Tube system can be used to polish any currently installed groundwater treatment system by stimulating bacteria to release the product presently absorbed to the soil.

The main advantage to using a O2Tube oxygen generation and vertical re-circulation system is that it works in low flow sites (< 10-3 cm/s) where oxygen release compounds and diffusion rarely meet expectations.
Description:
As part of the national effort to clean up contaminated properties for reuse and revitalization, it is imperative that efficient, cost effective, and technically sound methods for adequately characterizing sites be utilized. When properly implemented, characterization strategies such as those outlined in the Triad Approach as recently introduced by US EPA, or Expedited Site Characterization (ESC) as previously developed by US DOE (ASTM Standard Practice D6235-98), represent such methods.

The basic concept behind both Triad and ESC is that by incorporating good systematic planning together with the implementation of a dynamic field investigation work plan, the resulting in-field decision-making will direct characterization efforts in the most efficient manner until all program objectives have been met as part of a single or limited field mobilization. In this way, a much more comprehensive and thorough characterization effort can be accomplished in a fraction of the time and at significantly lower overall program costs than conventional characterization approaches.

At the heart of the dynamic field effort which is key to both Triad and ESC, is the use of creative, focused, and technically appropriate rapid sample collection strategies used in concert with applicable field analytical methods. Equally important to the use of such strategies and methods, is the presence of an experienced Field Team Leader to direct all field activities. In general, analytical results from initial sampling points are used to determine the need for, and optimal placement of, subsequent sampling locations. Patterns observed from graphical representations of large data sets help provide confidence in the accuracy and completeness of the characterization effort.

The end result of conducting streamlined site characterization activities with the use of Triad or ESC is obtaining a thorough and complete understanding of environmental quality conditions sufficient to make required decisions in a timely manner. Such decisions can include whether or not to move forward with a planned revitalization program, or the ability to design and implement an effective remedial strategy. The ability to make these types of decisions quickly and effectively is essential with respect to the successful implementation of reuse initiatives for contaminated properties.
Current Environmental Solutions “First in Electric Resistive Heating”

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Description:  
Six Phase Heating™ (SPH) was developed at the Battelle Memorial Institute (BMI) by William Heath, now the Chief Operating Officer of CES™. Research and development of the technology began in the early 1990’s under the auspices of the United States Department of Energy (DOE), and the technology was commercialized by CES™ in 1997.

SPH works by taking conventional 3-phase electric power, splitting it into 6-phases, and then imparting this power into the subsurface soils and groundwater though a series of strategically designed electrodes. The resistance of the subsurface formation causes it to heat-up, and if sufficient power is input, the interstitial pore water in the soils as well as the groundwater are heated to 100°C. At these temperatures, the contaminants are volatized and the viscosity of non-aqueous phase liquids (NAPL) is dramatically reduced which allows for effective recovery via in-situ soil vacuum extraction (SVE). Rapid in-situ biodegradation is also a beneficial result of this technology.

SPH is advantageous in terms of effectiveness, cost and speed. In fact, it is the only known in-situ remediation technology that has proven to achieve drinking water maximum contaminant limits (MCLs) at a DNAPL site, and this was achieved in less than one year of operations. In this respect, SPH is extremely fast. At typical sites where remediation often requires upwards of 10 years or more of treatment, SPH can accomplish even more stringent treatment requirements in a matter of months. From a cost perspective, SPH is very competitive, and even with electrical costs included, the cost per volume of media treated is very competitive with more conventional methods of subsurface remediation.

Using SPH, CES has successfully achieved closure of at least four Brownfields sites in the USA which have been redeveloped. In addition, CES licensed the SPH technology to a Dutch development company which uses the technology for their own purposes. As “time = money” for real estate development, SPH has enabled this company to purchase low cost Brownfields properties, implement rapid remediation, and prepare the properties for redevelopment within months. In this regard, the company is able to beat their competition in the development field by several years while saving substantial sums of money.

ARS Technologies Inc.  
Zero Valent Iron and Chemical Oxidant Injection for Brownfield Source Treatment

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USR Ltd.
The M1: Advanced Technology for Onsite Soil Remediation and Reuse

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Description:
USR Ltd. has developed an advanced soil treatment technology to remediate a wide range of contaminants. This technology, the "M1," uses conductive heat--not flame or combustion--to thermally treat complex contaminants. This technology is energy efficient, mobile, easily scaleable, and has no moving parts. Thus, it is ideal for on-site remediation projects, thus allowing the onsite reuse of the native soil after it has been cleaned.
Due to its design, the M1 has very low air emissions, and no particulate emissions. Depending on the types of contaminants to be treated and the applicable regulatory standards, the M1 may not need any additional air pollution controls (other than what is incorporated into the M1 technology itself). If, however, additional controls are necessary for a project, they can be tailored specifically to the M1 to ensure compliance with all applicable requirements.

The M1 currently is being used commercially to remediate petroleum contaminated soils and has recently completed successful trials of difficult coal tar soils from MGP sites (with high concentrations of PAH compounds), oil exploration drill cuttings, and chlorinated solvent soils. A pesticide soil trial has also been conducted. A PCB trial is being planned. Results of these trials are available on request.

Technology Overview
The M1 is an advanced soil remediation technology. This technology utilizes infrared heating elements to heat contaminated soil. Electricity is applied to the infrared heating elements inside the element housings. These elements heat up to 1400 to 1600 degrees F. As the soil temperature rises, contaminants and water volatilize and create high pressure. This pressure forces the steam and volatilized contaminants into the low-pressure element housings. The upper and lower element housings are perforated with the center being solid. The steam and contaminants are driven by steam pressure into the upper and lower element housings where they are routed into the center housing, which is not perforated. The steam and contaminants are forced to travel along the 1400 to 1600 degree element (center housing) where the vapors are destroyed prior to exhaust.

Heat is transferred from the elements to the soil by conduction and the soil is heated to temperatures between 500 and 1600 degrees F. Typically the processing time is 48 hours or less, depending on the characteristics of the soil and the types and concentrations of the contaminants.

This technology is different from typical thermal treatment technologies because of the following characteristics:

- No moving parts.
- No sound.
- Thermal efficiency greater than 80% (thermal desorption units are typically around 33% efficient).
- No combustion—therefore no combustion by-products and no products of incomplete combustion.
- Lower volume of off-gases.
- Off-gas treatment is built in to the heating element / desorption chamber design.
- Low maintenance.
- Soil screening may not be necessary.
- Ideal for sites with limited working space.
- Scaleable—ideal for sites with small quantities of soil to be remediated as well as sites with large quantities. This technology solution is completely scaleable from one M1-12 unit on site to as many M1-12 units as needed on site to meet the required thru-put production needs of the customer.
Mobile—the M1-12 units are easily and inexpensively mobilized. They can be shipped fully assembled or disassembled for easy reassembly on site. They can be trucked (5 assembled units fit on a single flatbed) or for remote sites they can be flown in.

Immediate reuse of the contaminated soil.

For additional information, please visit our booth at the Technology Fair or call John Bova at 503-228-5587.

Geo Oxidation Services, Inc.
Chlorinated Solvent Plume Remediated Using a Fenton’s Reagent Based 
*In-situ* Chemical Remediation Technology

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**Description:**
In cooperation with the New York State Department of Environmental Conservation (NYSDEC) within the Voluntary Cleanup Program, Geo Oxidation Services, Inc. remediated a chlorinated solvent-contaminated groundwater plume at a former chemical manufacturing plant site in Port Jervis, New York. Geo Oxidation employed a two-step physical/chemical process to reduce concentrations of chlorinated solvents in the groundwater to levels that met NYSDEC mandated remedial goals.

The process consisted of the following steps: 1) a physical method, hydraulic fracturing, to enhance the disbursement of chemical reagents into the contaminated area, and 2) a chemical method, in-situ chemical oxidation using a Fenton’s reagent based process, involving the injection of an oxidation mixture to degrade target contaminants.

Preliminary to the fieldwork Geo Oxidation delineated the extent of contaminated groundwater at the site. The contaminated groundwater plume identified on the property in excess of NYSDEC Groundwater Quality Standards (GQS) was approximately 4.43 acres in size, with an area of about 0.8 acres that had a concentration of total volatile organic compounds (VOCs) >500 mg/L requiring treatment to comply with NYSDEC remedial goals. Concentrations of total VOC in the plume were as high as 8200 mg/L with a significant area above 5,000 mg/L. Principal contaminants with the highest concentrations in the plume included 1,1,1 trichloroethane (TCA), trichloroethylene (TCE) and cis-1, 2-dichloroethylene (DCE).

Hydraulic fracturing of the soils was completed in December 2001. This step involved the installation of four injection points and resulted in enhancement of the radius of influence in the silty sand conditions at the site to about 60 ft. Injection of the oxidation mixture began during mid-February 2002. Three injection rounds were completed over an eight-week period. Post-remediation sampling results indicated total VOC concentrations were reduced by an average of 92 percent in the treatment area. In November 2002 NYSDEC issued a letter of Satisfactory Completion of Remediation for the Port Jervis site and in June 2003 issued a “No Further Action” letter for the site.
The chemistry of oxidation using Fenton’s reagent will be displayed. Economic advantages of this process will also be covered (Costs under $20/cu. ft. treated). Range of applicability, rapid nature of the treatment method and the universal nature of Fenton’s reagent, as an oxidant, will be covered as well.

COLUMBIA Technologies
Subsurface Imaging with SmartData Solutions™:
An Integrated Approach for the Collection, Processing and Delivery of Field and Sensor Data

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Description:
With the emergence of a range of rapid field analytical and direct sensing methods, data management, processing and real-time delivery of the results has become critical for the full and timely utilization of these data sets. Gone are the days when only a few data points were collected on a site and the long wait for lab results. Field measurements are replacing lab results for characterization and monitoring and some direct sensing tools collect hundreds and even thousands of data points per day. The new challenge is how to handle so much data? How to review it, incorporate it into the body of site knowledge and present it in a timely manner to all the parties responsible for accepting and utilizing it for on site decision-making.

To benefit from the greater sample density afforded by these emerging technologies, and to use it for real time decision-making requires better tools for the collection, review, processing and delivery of the resulting information to all parties. One way to manage digital, high-density data is a process called SmartData SolutionsTM. This patent pending process enables any high collection rate technology to have its output rapidly reviewed, krigged into high definition 3D imagery and delivered to appropriate parties on a daily basis. This program allows for interactive webcasts to be held where the results are simultaneously critiqued by all participants and optimized to better communicate salient points. By having the results available to all of the knowledgeable site experts on a daily basis, conceptual site models can be vetted, questions can be addressed and better decisions will be made prior to the site assessment teams leaving the field.

This process allows anyone who collects high density data to make maximum and timely use of their data for rapid site assessment and remedial decisions. It has been used for directing fieldwork, selecting optimal locations for sampling, setting wells and targeting remedial efforts. It has also been used for performance monitoring of in situ chemical treatment. Rapid data processing is key to the successful implementation of Dynamic Work Plans such as is called for in the Triad Approach, a method recommended by EPA for performing better site assessments. A dynamic work plan can only work effectively if there is a method to ensure that the data collected are reliable and available for timely decision making.

Rapid processing systems like SmartData SolutionsTM also help to accelerate the acceptance of field and sensor data. It automates quality control procedures and facilitates integration of supporting data sets. The high definition imagery that results dramatically increases the ability to communicate to all parties, a more detailed and more accurate picture of the subsurface, because it is based on many more data points than current models. As a result all parties become more comfortable with the data quality that is being generated. Better decisions and
faster acceptance result in shorter project life cycles and lower project costs. More focused remediation results in
less need for monitoring and quicker closures. These goals have been achieved by integrating emerging sensor
and field measurement technologies with the power of rapid processing and the speed of data delivery.

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Tri-Corders Environmental, Inc.
Characterization of Two Department of Defense Sites Using EPA Method 8265 and the Triad Approach

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Description:
Managing the uncertainty associated with environmental investigations is perhaps the environmental
professional’s most difficult task. This has recently come to include managing the largest component of
uncertainty, sample representativeness (Crumbling et al). Previous interpretations of the term data quality have
focused almost exclusively on sample analysis. Uncertainty associated with sampling is assumed to be introduced
primarily during sample handling, labeling and storage. However, heterogeneous contaminant distributions are
commonly encountered during most site assessments and often account for the majority of the observed total
uncertainty.

The objective of data collection during site characterization is to provide decision makers with data of sufficient
quality to allow definitive decisions on future site actions. The Triad approach (systematic planning, use of
dynamic work plans and real-time field analytical techniques) provides a logical approach for managing total
project uncertainty. The key to the Triad approach is allowing expert decision making in the field to direct project
execution.

This paper describes application of the Triad approach at two very different Department of Defense (DoD) sites:
(1) a trichloroethylene residual source area located in 80 ft of vadose zone at Hill AFB, Utah, and (2) a site for the
future construction of an aircraft hanger at McGuire AFB, NJ. Hill AFB source zone characterization was
completed after a 10 day field effort. The project included direct push sampling using the Vertek Wireline CPT
soil sampler and analysis using direct sampling ion trap mass spectrometry (DSITMS) by US EPA Method 8265.
Between 60-90 samples were collected and analyzed each day with a total of greater than 600 discrete soil
samples collected and analyzed. The McGuire AFB investigated a potential chlorinated solvent source and
associated dissolved phase groundwater plume. The project included 15 membrane interface probe penetrations,
234 discrete soil samples (29 plan view locations) and 162 discrete groundwater samples (45 plan view locations).
All sampling tools were deployed using either CPT or percussion direct push techniques. The soil and groundwater samples were analyzed on site using DSITMS and EPA Method 8265. This project was completed in 15 field days and provided the necessary data for design and implementation of an interim remedial action. The data provided by the real time analysis of VOC samples allowed site managers and decision makers to optimize deployment of sampling crews in real time, thus addressing sampling uncertainty and reducing decision errors in both projects.


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**ISOTEC**

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**Pneumatic Fracturing, Inc.**

Installation of Permeable Reactive Barriers Using Pneumatic Injection

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**Abstract:**
Several methods of installing permeable reactive barriers (PRBs) have been developed over recent years. These techniques have evolved in order to address deeper contaminant plumes. One method that was developed to address this issue uses the patented pneumatic fracturing to emplace dry media such as iron filings. The technology, pneumatic injection, was patented by the New Jersey Institute of Technology (NJIT) in 1999.

This technology offers several advantages, especially with iron PRBs. It allows the installation of media much deeper than conventional methods, over a greater lateral distance, and at targeted depths. The second advantage
eliminates the concerns associated with solid iron walls (i.e., biofouling, precipitation, and unachievable reductions); the third reduces the amount of iron.

A column study was conducted for the preliminary design of an iron PRB in Gardena, CA. The site has the highest VOC contamination in three transmissive zones between 20 to 100 feet bgs. This technology can target the transmissive zones, while achieving reduction, and eliminate 60% of the iron required if a solid iron wall were installed.

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EBSI, Inc.
In-Situ LNAPL Remediation in Difficult Settings

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ECI

Description:
Free Product Fuel is especially challenging to remediate as it is both an immediate risk to health and safety, and prevents the remediation of dissolved phase contaminants for closure. Environmental Business Solutions International, Inc. (EBSI) has extensively used the On-Contact Remediation Process® family of in-situ technologies to configure methods to detect free-product, recovery for disposal when possible and then chemically treat the remaining free-product layer. Multiple sites have been treated across the U.S. under EBSI’s Pay-For-Performance Contracting Program. Other sites are underway at which EBSI is providing expertise, equipment, labor, and materials to apply chemical formulations designed by others under our Proxy-One Program.

Our case studies include live gas stations, under buildings, near live tanks and other difficult settings. The free product treatments start with specialized field testing to delineate the free product’s extent and condition along with factoring in additional vectors of cubic volume that are probably impacted but not easily verifiable. Once remediation starts, Propagation Injection Points are installed in a manner as to allow for the recovery of free product at the surface though biased displacement. Once the Propagation is installed it becomes a trap zone for free product and allows both vacuum truck service and in-situ chemical treatment.

One Propagation based injection point can reach up to a 60 foot radius and can do the work of 9 to 36 wells. The chemical processes used are specialized for free product and are real-time controlled for efficiency and the suppression of temperature and LEL levels. Numerous active LNAPL sites have been and are being treated with these methods across the Country.

Case studies include gas station projects in New Jersey and Pennsylvania, to Industrial and Bulk Storage Facilities in Massachusetts, New Jersey, North Carolina, Texas, and Florida. Contaminants range from gasoline and heating oil to phthalates and Number 6 fuel oil.
**Description:**
TerraTherm is the exclusive, worldwide provider of the In-Situ Thermal Desorption (ISTD) family of technologies. ISTD is a robust, field-proven remediation technology that has been proven capable of remediating essentially all hazardous organic compounds to levels at or below regulatory clean-up standards. ISTD is a unique technology compared with all other available technologies.

NO EXCAVATION REQUIRED - ISTD treats contaminated soils in place, even under buildings. Because no soil is excavated, neighbors and on-site workers need not be exposed to the odors, noise, dust, and truck traffic often associated with dig-and-haul projects.

ELIMINATES LIABILITIES - By eliminating contaminants in soil to non-detect levels, ISTD removes the site owner’s liabilities, thereby restoring the value of environmentally distressed property.

A GUARANTEE - Because ISTD is highly predictable and is capable of achieving 100% sweep efficiency within treatment areas, we can offer a guarantee that it will achieve the cleanup goals.
BROAD RANGE OF APPLICABLE CONTAMINANTS - ISTD can treat soils impacted with a broad range of volatile and semi-volatile contaminants, such as: PAHs, Pesticides, Dioxins, Coal Tar, Creosote, LNAPL, DNAPL, PCBs, Mercury, Explosives & Residues. The key to this wide breadth of applicability is our ability to heat soils to above the boiling points of the contaminants of concern when necessary.

FAST - A typical ISTD treatment period is 2 to 3 months, at which time the soil is clean! Total project timeframes are typically less than one year.

COST-EFFECTIVE - ISTD is highly competitive from a cost/risk basis. Pricing varies depending on the type of contaminants and project conditions.

WORKS EQUALLY WELL IN ALL SOIL TYPES, INCLUDING TIGHT CLAYS, AND IN HIGHLY HETEROGENEOUS SETTINGS - Heat flow through the soil formation is not limited by soil type or other factors (e.g. porosity and water content) that typically limit the effectiveness of remedial technologies that solely rely on the delivery and/or extraction of fluids through the subsurface (e.g. SVE/AS, multiphase extraction, in-situ chemical oxidation, surfactant flushing, steam, etc.). This is because the thermal conductivity of the entire range of soil types vary by a factor of only 4, while the fluid conductivities of soils at a site may vary by a factor of a million (1,000,000) or more. Because the thermal conductivity of soils is very uniform, ISTD is able to predictably achieve 100% sweep efficiency within the treatment zone regardless of soil type and degree of heterogeneity (i.e., ISTD is able to guarantee that the entire treatment zone will achieve the desired treatment temperature).

ENSURES EFFECTIVE CAPTURE OF VAPORS AND PREVENTS UNWANTED CONTAMINANT MOBILIZATION - ISTD employs a variety of features to ensure that heated vapors are captured and that contaminants are not mobilized outside of the treatment zone.

ENVIRONMENTALLY SAFE, PERFECT SAFETY RECORD - TerraTherm has maintained a perfect safety record since its founding.

APPLICABLE ABOVE AND BELOW THE WATER TABLE - ISTD technology is also applicable to the contaminants within soils below the water table as long as the soils can be heated to designated target treatment temperatures.

FIELD-PROVEN AT MANY SITES, FOR A VARIETY OF CONTAMINANTS - Please visit our website for details.
Environmental Chemistry Consulting Services, Inc.

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Abstract:
Environmental Chemistry Consulting Services, Inc. (ECCS) is one of the largest and most senior mobile laboratory service companies in the United States, and routinely produces fully defensible onsite data. ECCS provides proven infield characterization technologies that allow you to make informed decisions concerning site characterization or remediation activities on a real-time basis. We have nine mobile laboratories and have provided fast, effective, and reliable infield analytical services at more than 700 site investigation and remediation activities throughout the United States.

Consistent with the Accelerated Site Characterization (ASC) model, our mobile laboratory services dramatically improve the cost, speed, and data quality equation for site investigations and remediation support. We specialize in industrial chemical applications, agricultural chemical sites, and petroleum site services. ECCS continues their leadership role through the proper application of methods, strict adherence to quality control, and because of the considerable experience of our infield chemists.

Our mobile laboratory specialties include a wide range of semivolatile analyses with GC/MS, GC and HPLC. We have successfully analyzed thousands of samples for organochlorine pesticides (including toxaphene) by GC/EC, organonitrogen and organophosphorus pesticides by GC/NPD, acid herbicides by HPLC, and PCBs by GC/EC. Our services have included PNAs at manufactured gas sites, pentachlorophenol from wood preservative facilities, and benzidines from a former dye manufacturing facility. We also offer: onsite trace level analyses of explosives from former ordinance manufacturing facilities; GC/MS volatiles analyses of soils, waters and whole gas samples; and metals testing using flame AA.

Now is the time to contact ECCS. You will receive meaningful advice, candid feedback, and true cost-effective, quality solutions. Whether it’s a short, single site job; a simultaneous multiple-site weeklong characterization; or, a sizeable excavation requiring months of support- ECCS is your best choice.
SKC Inc. Sampling Technologies

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Description:
Safety and health professionals in the 21st century face new responsibilities in light of the shift from an industrial to a service-based economy in the U.S. and other developed countries and a heightened awareness of environmental issues in the general community. Therefore, current practitioners must therefore be aware of technology available to assess chemical and biological contaminants in the traditional industrial environment as well as in indoor and ambient air. It is also important that health and safety professionals recognize the capabilities and limitation of methodologies for specific applications. SKC offers a variety of sampling technologies to assess contaminants in different environments. U.S. OSHA, NIOSH, and EPA specify many of our products in government methods.

Most integrated sampling methods published by OSHA or NIOSH use active sampling techniques that employ an air sampling pump to draw an air/contaminant mixture into or through a sampling device. SKC offers sampling pumps with a variety of flow ranges and automatic features including timers, fault shutdown, constant flow, and computer compatibility. The research and development for one of our newest air samplers was funded by the Mickey Leland National Urban Air Toxics Research Center (NUATRC) in Houston, TX. The non-profit Leland Center is responsible for investigating public health risks posed by air toxics to urban populations. The private sector and the U.S. EPA jointly support this program.

The Leland Legacy™ Sample Pump offers constant flows from 5 to 15 L/min and 24-hour run times at 10 L/min with 12 inches of water backpressure. The set flow is achieved immediately at startup and is automatically corrected for variations in temperature and atmospheric pressure. The pump can be controlled using manual three-button programmability or PC programmability with optional SKC DataTrac® software.

SKC offers many other air sampling pumps for personal or area sampling. Recent developments include the AirChek® 2000 sampling pump with flow rates to 3.2 L/min. This sampling pump has a patented internal flow sensor and advanced electronic flow control. The internal sensor measures flow directly and acts as a secondary standard constantly maintaining the set flow rate. Flow can be calibrated by the user to an external primary standard and adjusted automatically.

Finally, to address the new mold remediation market, SKC introduces the QuickTake™ 15 sample pump. This pump offers constant flows from 5 to 15 L/min and run times up to 4 hours on one battery charge. QuickTake 15 was designed for use with the popular Air-O-Cell™ cassette or similar products for trapping mold spores and other particulates by impaction. The SKC QuickTake 15 sampler offers the advantage of battery operation, programmability and an optional wand for hard-to-reach areas.

SKC provides a complete line of sample collection media to meet the requirements of government agency sampling methods. Products include sorbent tubes, filters, sample bags, spore traps, and canisters. SKC also
offers passive samplers for many airborne contaminants. SKC passive samplers use solid sorbents or chemically treated paper to collect the contaminant of interest.

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