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Assessment and Evaluation of Technologies For Environmental Restoration

Progress Report To

The United States Department of Energy
Savannah River Site
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Submitted by

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DISCLAIMER

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Assessment and Evaluation of Technologies For Environmental Restoration

Summary

More than 300 nuclear and commercial non-nuclear technologies that have the potential of meeting DOE-SR's environmental restoration needs have been identified from various sources. The technologies identified will be assessed and evaluated in terms of function, performance, user-friendliness, regulatory, safety and health, costs, etc. A relational database structure has been selected for the technology database. Filemaker Pro 4.0 is the selected data management software. Filemaker has the capability to store data as text, numbers, pictures and video clips.

North Carolina A&T State University hosted a National Conference on Environmental Remediation Science and Technology on September 8-10, 1998. The abstracts of papers presented were distributed during the conference. A conference proceedings will be published. The following remaining project tasks are in progress: technology assessment and evaluation, development of a user-friendly database and publication of conference proceedings.

INTRODUCTION

North Carolina Agricultural and Technical State University (NCA&TSU) is a comprehensive State University with more than 90 academic programs (Certificate, B.A., B.S., M.A., and Ph.D.) offered through the Schools of Agriculture, Business and Economics, Education, Nursing, Technology, College of Engineering, and the College of Arts and Sciences. The University enrolls more than 7,500 students from 62 foreign countries. Faculty and staff number nearly 1,300.

TECHNOLOGY ASSESSMENT AND EVALUATION DESCRIPTION

Nuclear and commercial non-nuclear technologies that have the potential of meeting the environmental restoration objectives of the Department of Energy are being evaluated. A detailed comparison of innovative technologies available will be performed to determine the safest and most economical technology for meeting these objectives. Information derived from this effort will be matched with the multi-objective of the environmental restoration effort to ensure that the best, most economical, and the safest technologies are used in decision making at USDOE-SRS. Technology-related variables will be developed and the resulting data formatted and computerized for multimedia systems. The multimedia system will be made available to technology developers and evaluators to ensure that the safest and most economical technologies are developed for use at SRS and other DOE sites.

Identification of Nuclear and Non-Nuclear Technologies for Environmental Restoration

More than 300 nuclear and non-nuclear technologies that have the potential of meeting DOE's environmental restoration needs have been identified from various sources. A list of technologies is located in the Appendix.

Technology Sources

The following technology sources were used to develop a list of nuclear and non-nuclear technologies for assessment and evaluation: SRS homepage, Federal Databases (Alternative Treatment Technology Information Center, Bioremediation in the Field Search System, Business Gold, Case Study Data System, Cleanup Information, Bulletin Board System, Cost of Remedial Action Model, Defense Environmental Network Information Exchange, Energy Science and Technology Data Base, Environmental Technology Information System, Global Network for Environmental Technology, Hazardous Waste Superfund Collection Data Base, New Technology for DOE, Research in Progress Data Base, Soil Transport and Fate Data Base, Vendor Information System for Innovative Treatment Technologies, and Waste Management Information System), Center for Environmental Research Information, Defense Technology Information Center, Technology Transfer Newsletter, and Remedial Technologies Network. These technology sources were available on the internet. The Remediation Information Management System (RIMS) database of the Remedial Technologies Network (RTN) was a major source of information on the more than 300 technologies. The RIMS database is comprehensive and contains most of the information needed to assess and evaluate technologies. The database was exhaustive and regularly updated. The database characteristics were noted.

Information from Technology Sources

The following kinds of information were obtained from technology sources: Technology Type, Vendor, Phone Number, Fax Number, Email, Homepage, Technology Performance, When Technology was developed, Cost-Effectiveness, Technology Uses, Technology limitations, User-friendliness, and Technology Associated Health and Safety Issues.

Assessment and Evaluation of Technologies

The technologies identified will be assessed and evaluated in terms of function and performance requirements, Problems and user-friendliness, Regulatory, Safety and Health Issues, Costs, Cultural Concerns, Privatization, End Users, Pollution Prevention Measures, Recycling Efforts, Waste Minimization Efforts, Employee Training, Public Outreach Efforts, Contaminant group, Media Types, and Technology Types.

Technology Database

The technology database to be developed will be based on the assessment and evaluation information. The database will be flexible and user-friendly. The structure and content of database will match DOE-SR's objectives. A relational database structure has been chosen for the technology database. Filemaker Pro 4.0 is the selected relational database management software. This software is a cross-platform application which is available for the following operational systems: Windows 95/98, Windows NT and Apple Macintosh. Filemaker Pro 4.0 is a user-Friendly application for creating and managing databases. Filemaker has the capability to store these forms of data: text, numbers, pictures and video clips. Hence, it is very versatile in it's applicability. Additionally, Filemaker Pro can be used as an internet (web-based) database server. Templates in Filemaker are used to present database information in a way the user specifies. The embedded search engine in Filemaker is very efficient and easy to manipulate. It has a flexible "find" mechanism with scriptible scheme. Filemaker is a cost-effective option for developing database management systems.

Database Content

The database content will include information from technology sources, assessment and evaluation. Information will be categorized to allow a comparison among similar technologies. A "Solution based tree" database will be developed to help end-users in choosing appropriate technologies for environmental restoration. Technologies will be categorized as follows:

- Nuclear and Non-Nuclear
- Media
- Insitu/Exsitu
- Contaminant Group/Technology Types

Media Types

Media Types include: soil, sludge, solid, sediment, groundwater, off-gas, nonaqueous phase liquid, etc.

Contaminant Groups

Contaminant groups include: volatiles, solvents, heavy metals, radioactive metals, corrosives, explosives, radionuclides, etc.

Technology Types

Technology types include: adsorption, air sparging bio/phytoremediation, bioventing, fracturing, chemical treatment, separation, etc.

Student Participation

Thirteen A&T students (see appendix) participated in the technology assessment and evaluation project. Each student provided a description of ten non-nuclear technologies used for environmental restoration. The students were awarded scholarships ranging from $500 - $900 based on quality of work performed.

Student Internship at DOE-SR

The following students were interns at DOE-SR in Summer 1998:

Tara Rowland - Chemical Engineering Graduate
Tosha McDougal - Agricultural Education
Chadd Mathewson - Environmental Science
Raymond Turner - Environmental Science

NATIONAL CONFERENCE ON ENVIRONMENTAL REMEDIATION SCIENCE AND TECHNOLOGY

North Carolina A&T State University, USDOE - Savannah River Site, U.S. Environmental Protection Agency, U.S. Army Industrial Operation Command, USDOE - Albuquerque Operations Office, The Greensboro Area Chamber of Commerce and the City of Greensboro sponsored a "National Conference on Environmental Remediation Science and Technology" on September 8-10, 1998 in Greensboro, N.C.

The purpose of the conference was to address environmental remediation technology needs, solutions and research programs. The goal of the conference was to foster relationships that could result in partnerships needed to protect the environment and improve the quality of life. More than 70 technical papers and exhibits were presented during the two day conference. Conference program abstracts, and instructions for conference proceedings are in the Appendix. An innovative water treatment technology was demonstrated during the conference.

The National Conference Proceedings will be published by Battelle Press. The deadline for full paper submission is February 26, 1999. The finished book will be 81/2 11 (hard cover).

PARTNERSHIP BETWEEN PARALLAX, INC. AND NC A&T STATE UNIVERSITY

Subgrant Funding Decrease

An agreement has been reached with Parallax, Inc. to reduce the current $31,887 to $15,000 (see Parallax's letter in the Appendix). A&T needs the $16,887 to support faculty who will work on technology assessment/evaluation and database/website development. Parallax will continue to provide technical support needed to complete work on technology assessment and evaluation.

ASSOCIATED DELIVERABLES THAT WILL BE ACHIEVED

- Complete Technology Assessment and Evaluation
- Develop a Technology Database
- Host a Technology Conference
- Submit a Final Project Report
- Complete Informational Material (Newsletter)
- National Conference on Environmental Remediation Science and Technology Abstracts and Proceedings

REMAINING PROJECT TASKS TO BE COMPLETED (NO-COST EXTENSION)

- Assessment and Evaluation of Technologies
- Development of Technology Database
- Publication of National Conference on Environmental Remediation Science and Technology Proceedings by Battelle Press, Ohio
- Completion of Final Project Report

APPENDIX

A list of Identified Environmental Technologies

A list of Undergraduate Scholarship Awards

National Conference on Environmental Remediation Science and Technology Announcement

National Conference on Environmental Remediation Science and Technology Program

National Conference on Environmental Remediation Science and Technology Abstracts

Confirmation of Funding Decrease By Parallax

Acid Extraction	Lockheed Martin Corporation
cid Extraction Treatment System (AETS)	Center for Hazardous Materials Research (CHMR)
Acidification-Volatilization & Recovery	Viking Industries, Inc.
Acoustic-Enhanced Remediation	Weiss Associates
ACT*DE*CON	Selective Environmental Technologies, Inc.
Activated Alumina	
Advanced Chemical Treatment	MARCOR Remediation, Inc.
Advanced Integrated Solvent Extraction and- Ion Exchange Systems	Argonne National Laboratory
Air-Sparged Hydrocyclone	Advanced Processing Technologies, Inc.
Alternating Current Electrolysis	Water and Slurry Purification Process (WASPP) Corporatic
Aminoplast Capillary Technology	Landmark Environmental, Inc.
Anaerobic Biotransformation with Steam Injection	ENSR Consulting and Envineering
APEG-PLUS Process	Galson Remediation Corporation
Aquathermolysis	
Aqueous Biphasic Extraction System	Argonne National Laboratory
Barrier System	International Environmental Technologies (IET)
Batch Steam Distillation & Metals Extraction	IT Corporation
Biocat	Yellowstone Environmental Science, Inc., (YES)
Biochemical Recovery of Radionuclides and Heavy Metals	Brookhaven National Laboratory
Biodrain	International Environmental Technologies, Inc.
Bioinjection	Keller Environmental, Inc.
iological Air Treatment (BAT) System	Allied Signal Environmental Systems & Services, Inc.
Biopurge	Enviro FX, Inc.
Bioreactors	Environsystems, Inc.
Bioremediation of Explosives-Contaminated Soil	
Bioremediation-Soil and Groundwater	KEMRON Environmental Services, Inc.
Bioremediation-Solid Phase	Arctech Inc.
Bioremediation-Solid Phase	Earth Tech
Bioslurping	
Bio-Solution	Cherokee Environmental Group
Biosorption	
BioSparge System	Enviro FX, Inc.
Biosurfactants	
Biovac	Terra Vac, Inc.
Bioventing	
BTS Method	Bioremediation Technology Services, Inc
Campbell Centrifugal Jig	Montana Tech of the University of Montana
Carbon Aerogel Capacitive Deionization of Water	Lawrence Livermore National Laboratory
Carbon Dioxide Blasting	Alpheus Cleaning Technologies
Carbon Dioxide Pellet Surface Cleaning	
Catalytic Extraction Process	M4 Environmental , L.P.
Catalyzed Decomposition	U.S. EPA National Risk Management Research Laboratory
Ceramic Immobilization of Radioactive Wastes	
Ceramic Silicone Foam Encapsulation	Orbit Technologies, Inc.

TECHNOLOGIES	VENDORS
ChemChar Process	University of Missouri
Chemfix	Chemfix Technologies, Inc.
CHEMIC Ultrafiltration of Toxic Metals in Wastewater	Atomic Energy of Canada Limited (AECL)
Chemical Oxidation	
Chemical Treatment	G.E.M., Inc.
Chemically-Enhanced Solubilization for Aquifer Remediation (CESAR	INTERA, Inc.
Chitosan Derivative	Humboldt State University
Clean Soil Process (CSP)	Thermo Design Engineering, Ltd.
Coaxial Groundwater Ventilation (KGB)	IEG Technologies Corporation
Co-Burning Technology	Barr Engineering Company
Colloid Polishing Filter Method	Filter Flow Technology, Inc.
Compact Procesing Unit (CPU)	Battelle Pacific Northwest Laboratory
Composting	
Corpex Technology	Corpex Technologies, Inc.
Countercurrent Decanting	Westinghouse Savannah River Company
Cryofracture	General Atomics
Cryogenesis Surface Decontamination System	CryoGenesis
Cryogenic Retrieval	Sonsub, Inc.
CURE Electrocoagulation Wastewater Treatment System	CURE International, Inc.
Cyclone Furnace Vitrification	Babcock & Wilco Nuclear Environmental Services, Inc.
Cyclone Melting System (CMS)	Vortec Corporation
Cyclone Furnace Vitrification	Babcock & Wilcox Nuclear Environmental Services, Inc.
DC Graphite Arc Furnace	Electro-Pyrolysis, Inc.
Deact Soil Washing	Advanced Recovery Systems, Inc.
Debris Washing System	U.S. EPA and IT Corporation
DeCaF	Advanced Recovery Systms, Inc.
DeHg	Advanced Recovery Systems, Inc.
Density-Driven Convection (DDC)	Wasatch Environmental, Inc.
Depocrete	Cancrete Environmental Solutions, Inc.
DETOX	Delphi Research, Inc.
Detoxifier In Situ Steam/Hot-Air Stripping Unit	Alternative Technologies for Waste, Inc.
Diatomite	Landmark Environmental, Inc.
Diphonix	Eichrom Industires, Inc.
Dispersion by Chemical Reaction (DCR) Technology	SOUND Environmental Services, Inc.
Distillation	
DOWEX Ion Exchange Resins	Dow Chemical Company
Dual Auger System	In-Situ Fixatiion, Inc.
Dual Phase Extraction	
Dual Vacuum Extraction	Terra Vac, Inc.
DUCRETE Shielding	Starmet Corporation
DuraMelter	GTS Duratek
Dynamic Underground Stripping (DUS)	Lawrence Livermore National Laboratory
Ecolotree Buffer	Ecolotree Inc.
Ecolotree Cap	Ecolotree Inc.

TECHNOLOGIES	VENDORS
ectroacoustic Dewatering	Battelle Memorial Institute
ElectroChemical GeoOxidation (ECGO)	ManTechn International Corporation
Electrode Assisted Soil Washing	Toxic Environmental Control Systems, Inc.
Electrofrac Detoxification System	Bio-Electrics, Inc.
Electrokinetic Decontamination Process	ISOTRON Corporation
Electrokinetic Remediation	Massachusetts Institute of Technology
Electrokinetic Remediation	Sandia National Laboratories
Electrokinetic Remediation	
Electrokinetic Remediation of Contaminated Soil	Lynntech, Inc.
Electrokinetic Transport	Envirogen, Inc.
Electrokinetic Treatment	Electro-Petroleum, Inc.
Electrokinetically Enhanced Bioremediation	
Electro-Klean Electrokinetic Soil Processing	Electrokinetics, Inc.
Electroreclamation	Geokinetics International, Inc.
Enviroglass	Molten Metal Technology
EnviroMech Gold Biocatalytic Contaminant Degradation	ECO-TEC, Inc.
Enzymatic Reduction of Uranium	U.S. Geologic Survey
FE-ACTIVE	First Environment, Inc.
Forced Aeration Contaminant Treatment (FACT)	ABB Environmental Services, Inc.
Fungal Composting	Environmental BioTechnologies, Inc.
Geo-Cleanse Process	Geo-Care, Inc.
ass Material Oxidation & Dissolution System	Oak Ridge National Laboratory
Heap Leaching	Geochem Division of Terra Vac
High-Energy Electron Beam Irradiation	High Voltage Environmental Applications, Inc.
High-Force Magnetic Separators	International Process Systems, Inc.
High-Gradient Magnetic Separation for Radioactive Soils and P	Los Alamos National Laboratory
High-Temperature Joule-Heated Vitrification	EnVitCo, Inc.
Horizontal Drilling	Drillex System, Inc.
Horizontal Drilling	
Hot-Recycled-Solid (HRS) Retorting Process	Lawrence Livermore National Laboratory
Houdini	RedZone Robotics, Inc.
Humasorb	Arctech, Inc.
Hydraulic Fracturing	FRX, Inc.,
Hydraulic Fracturing	
Hydraulic Fracturing/FracTool	Golder Applied Technologies, Inc.
Hydrolytic Terrestrial Dissipation	HyroScience, Inc.
ID-20 Chemical Neutralization Process	Cunningham-Davis Environmental (CDE Resources, Inc.)
IE-911 Ion Exchange Resins	UOP Ionsiv
Imbiber Beads	Imbibitive Technologies Corporation (IMTECH)
In Situ Air Atripping	Westinghouse Savanah River Company
In Situ Grouting and Retrieval	Idaho National Engineering Laboratory
In Situ Plasma Vitrification	Georgia Institute of Technology Construction Research Ce
Situ Saturated Zone Treatment	Oak Hill Company, Ltd.
n Situ Solidification/Stabilization Technology	Geo-Con, Inc.

TECHNOLOGIES	VENDORS
In Situ Vitrification	Geosafe Corporation
In Situ Waste Destruction & Vitrification	Teton Technologies, Inc.
In-Situ Air Stripping	Westinghouse Savannah River Company
In-Situ Bioremediation of Chlorinated Solvents with Natural Ga	Westinghouse Savannah River Company
InSitu Bioremediation Treatment System	R.E. Wright Environmental Inc.
In-Situ Bioremediation(ISB)	Terra Systems, Inc.
In-Situ Corona	Battelle Pacific Northwest Laboratory
InSitu Soil Vapor Extraction (SVE)	
ISOTEC	In-Situ Oxidative Technologies, Inc. (ISOTEC Inc.)
Joule-Heated Vitrification	
KPEG	SDTX Technologies, Inc.
Lasagne	Monsanto Company
LEADX	Proactive Environmental Research & Development, Inc.
Light Activated Reduction of Chemicals (LARC)	Arctech, Inc.
Light Duty Utility Arm	Spar Aerospace, Ltd.
Linear Contanment Remediation System	Horizontal Technologies, Inc.
LLC, Aeration Curtain	Radian International
LLC, Aquadetox/Soil Vapor Extraction (SVE)	Radian International
LLC, CRYOCELL	RKK-SoilFreeze Technologies
LLC, CRYOSWEEP	RKK-SoilFreeze Technologies
LLC, ISOCELL	RKK-SoilFreeze Technologies
LC, Supercritical Carbon Dioxide Extraction	Kaiser-Hill Company
LLCX, CRYOCELL	RKK-SoilFreeze Technologies
MAECTITE Chemical Treatment Process	Sevenson Environmental Services, Inc.
MAG*SEP	Selective Environmental Technologies, Inc.
Magnetic Barrier Separation	S.G. Frantz Company, Inc.
Magnetically Assisted Chemical Separation (MACS)	Argonne National Laboratory
Mechanical Volatilization Screening	O'Brien & Gere Engineers, Inc.
MecTool Remediation System	Millgard Environmental Corporation
Mediated Electrochemical Oxidation (MEO)	EOSystems, Inc.
Mercon	Solucorp Industries
Mercrobes Mercury Reduction Technology	AP Technologies, Inc.
Metal Separation by Liquid Ion Exchange	Met-Tech Systems, Ltd.
Metal Treatment Technology	RMT, Inc.
Meta-Lock	Klean Earth Environmental Company (KEECO, Inc.)
Metals Recovery and Recycling System	International Environmental Trading Company, Inc.
Methanol Extraction Process	Environmental Treatment and Technologies Corporation
METLCAP Chemical Cement	Stark Encapsulation, Inc.
Metrax	Integrated Chemistries, Inc.
Microfiltration Technology	DuPont/Oberlin
Microwaste Solidification	EET Corporation
Microwaste Waste Solidification	EET Corporation
ni-Miser	Recra Environmental , Inc.
Modular Integrated Treatment System (MITS)	On-Site Technologies

TECHNOLOGIES	VENDORS
..olten Salt Oxidation	Lawrence Livermore National Laboratory
Montan Wax Barrier	Golder Associates Corporation
MSRDI Combination Technology Mercury Treatment System	Mountain States R&D International, Inc.
National Laboratory Modified Sulfur Cement Encapsulation	Idaho National Engineering Laboratory/Brookhaven
Oclansorb	Hi-Point Industries, Ltd.
Oil Gator	Product Services Company
OptiSorb Encapsulate	Aqualogy BioRemedics
OW*WW*ER Wastewater Treatment System	Wheelabrator Clean Air Systems, Inc.
Oxy Vac	Terra Vac, Inc.
Oxygen Release Compound (ORC)	Regenesis Bioremediation Products, Inc.
Palladium-Iron Dechlorination of Organic Compounds	Research Corporation Technologies, Inc.
Perma-Fix Process	Perma-Fix Environmental Services, Inc.
Phosphate-Induced Metal Stabilization (PIMS)	UFA Ventures, Inc.
PHOSter	Freemean & Vaughn Engineering, Inc.
Photolytic and Biological Soil Detoxification	IT Corporation
Phytoremediation	
Phytoremediation/Hyperaccumulation	
Pile Biodegradation (Biopile)	
Plasma ARc Centrifugal Treatment (PACT) System	Retech, Inc.
Plasma Energy Recycle and Conversion (PERC)	Thermo Conversion Corporation
Plasma Hearth Process	Science Applications International Corporation
..sma Vitrification	
Plasma Waste Converter	Startech Environmental Corporation
Pneumatic Fracturing Extraction	Accutech Remedial Systems
Pneumatic Soil Fracturing (PSF)	Terra Vac, Inc.
PneumaticFractureing Extraction	Accutech Remedial Systems
Polyethylene Encapsulation	Envirocare of Utah, inc.
Polymer-Based Solidification/Stabilization	
Polywall Barrier System	Horizontal Technologies, Inc.
Pozzolanic Solidification/Stabilization	
Pressure Dewatering	
Pyretron Thermal Destruction System	American Combusion, Inc.
Pyrodigestion	Clean Technologies
Pyrolysis	
Quantum Catalytic Extraction Process (Q-CEP)	Molten Metal Technology, Inc.
Quick-Purge	Integrated Environmental Solutions, Inc.
RadAway	The Molecular Company, Inc.
RaDFix Harmonic Compaction	Ryan-Murphy, Inc.
Radio Frequency Heating	IIT Research Institute
Radionuclide Separation Process (RASEP)	ADTECHS Corporation
Relclaim	Environmental Fuel Systems, Inc.
Remediation Using Foam Technology	Argonne National Laboratory
..sin-in-Pulp/Carbon-in-Pulp	Kvaerner Metals
..HM-10000 Process	TechTran Environmental, Inc.

TECHNOLOGIES	VENDORS
rocTec Stabilization	Starmet Corporation
Rosie II	RedZone Robotics, Inc.
ROVCO2	Oceaneering International, Inc.
SAREX Chemical Fixation Process	Separation & Recovery Systems, Inc.
Segmented Gate System (SGS)	Thermo NUClean
Self-Sealing/Self-Healing Barrier (SS/SH)	Water Technology International Corporation
Sepor System	U.S. Naval Academy
Shallow Soil Mixing	Geo-Con, Inc.
Soil Leaching and Enviro-Clean Technologies	Lewis Environmental Services, Inc.
Soil Recycle Treatment Train	Toronto Harbour Commissioners
Soil Remediation and Cleaning Products	BioGenesis Enterprises, Inc.
Soil Washing	TVIES, Inc.
Soil Washing System (BSWS)	Brice Environmental Services Corporation (BESCORP)
Soil Washing Technology	ARCADIS Geraghty & Miller, Inc.
Soil Washing Technology	GHEA Associates
SOIL*EX	Rust Federal Services
Soil/Sediment Washing Technology	Bergmann USA
Solid Organic Phase Extraction (SoPE)	Envirogen, Inc.
Solidification & Immobilization of Radioactive Wastes in Cement	
Solidification and Stabilization	WASTECH, Inc.
Solidification/Stabilization	
olidification/Stabilization Technology	STC Remediation, Inc.
Solvated Electron Technology (SET)	Commodore Environmental Services, Inc.
Sonic Reactor (or Sonic Grinder)	ARC Sonics, Inc.
Sparge VAC	Terra VAc, Inc.
SpargePurge	NEPCCO Environmental Systems
SpinTek	SpinTek Systems
Spray Aeration Vacuum Extraction (SAVE) System	Remediation Service Interational
SRTALK Process for Technetium Extraction	Oak RidgeNational Laboratory
Stabilization of Lead Bearing Waste	Forrester Environmental Services, Inc.
Steam Enhanced Recovery	R.E. Wright Environmental, Inc.
Steam Reforming-Synthetica Technologies Detoxifier (STD)	Scientific Ecology Group (SEG)
Stir-Melter	Stir-Melter Inc.
STRATEX (Stratified Temperature Extractor)	ARCADIS Geraghty and Miller, Inc.
Subsurface Volatilization and Ventilation System	Billings and Associates, Inc.
Super All #38	Solution Distributors
Supercritical Carbon Dioxide Extraction	Kaiser-Hill Company
Supercritical Water Oxidation	Summit Research Corporation
SuperLig Ion Exchange Resins	IBC Advanced Technologies, Inc.
Supported Liquid Membrane	Commodore Separation Technologies, Inc.
Surfactant Remediation	Surtek, Inc.
TechXtract	EET, Inc.
rra Wash Soil Washing	Terra Resources, Ltd.
TERRAMET Heavy Metal Removal Technology	Doe Run Company

TerraSure (TM)	Terranalysis Corporation
,rra-VIT Vitrification Technology	Battelle Pacific Northwest National Laboratory
The Ultimate Solution	MeltTran, Inc.
Thermal Distillation and Recovery	Caswan Environmental Services, Ltd.
Thermex	Chem-Nuclear Systems, Inc.
Thermoplastic Stabilization/Solidification	
TIE-96 Ion Exchange Resins	UOP
Transuranium Extraction (TRUEX) Process	Argonne National Laboratory
TR-Detox	Environmental Technology (U.S.), Inc.
Treatment Walls	
Truclean Soil Washing System	Lockheed Martin Corporation
Two-Phase Extraction system	Xerox Corporation
Two-Phase Vacuum Extraction	Dames and Moore
Two-Phase Vacuum Extraction	Smith Technology Corporation
Ultrasound-Enhanced Soil Washing	New Jersey Institute of Technology
Uranium Heap Leaching Technology	Los Alamos National Laboratory
VAC*TRAX Thermal Desorption	Rust Federal Services, Inc.
VaporPurge	NEPCCO Environmental Systems
Vegetable Oil Remediation	Battelle Pacific Northwest Laboratory
VESTRIP	Ejector Systems, Inc.
Waste Acid Detoxification and Reclamation	Viatec Recovery Systems, Inc.
Wet Oxidation	
;t Oxidation (WetOx) Process	ADTECHS Corporation
WR2	Alternative Biowaste Elimination Technologies (ABET), Ltd
XeChlor Process	Xetex Corporation
X-Ray Treatment	Pulse Sciences, Inc.

WMI_ID	TECH_NAME	MANUFCTR	VENDOR	FRST_NAME	MID_
WMI0201	Plasma Hearth		Science	Ray	
WMI0202	Plasma		General		
WMI0203	Plasma Waste		Startech	Joseph	L.
WMI0204	OxyVac		Terra Vac, Inc	Charles	
WMI0205	Pneumatic Soil		Terra Vac, Inc	Jim	V.
WMI0206	Pneumatic		Accutech	John	J.
WMI0207	Polyethylene		Brookhaven	Paul	
WMI0208	Polymer-Based		General		
WMI0209	Polywall Barrier		Horizontal	Donald	R.
WMI0210	Pozzolanic		General		
WMI0212	Pyretron Thermal		American	Gregory	
WMI0213	Pyrodigestion		Clean	David	T.
WMI0214	Pyrolis-General		General		
WMI0215	Quantum		Molten Metal	Earl	
WMI0216	Quick-Purge		Integrated	Robert	W.
WMI0217	RadAway		The Mloecular	Nanette	
WMI0218	RaDFix Harmonic		Ryan-Murphy, Inc	Bruce	T.
WMI0219	Radio Frequency		IIT Research	Jim	
WMI0220	Robotics		Foster-Miller	Blair	J.
WMI0301	Aquaplant		Bioremediation	David	D
WMI0302	BIOX Biotreater		Bioscience, Inc	Jay	B.

WMI_ID	WMI0201
TECH_NAME	Plasma Hearth Process
MANUFCTR	
VENDOR	Science Applications International Corp.
FRST_NAME	Ray
MID_INI	
LAST_NAME	Geimer
TITLE	
OFFICE	Manager, Waste Mgt. Tech. Div
ADDR_LN1	545 Shoup Avenue
ADDR_LN2	
CITY	Idaho Falls
ZIPCODE	83402-3575
PROVINCE	
STATE	ID
COUNTRY	USA
PHONE	208 528 2114
FAX	208 528 2194
E_MAIL	Ray_Geimer@cpqm.saic.com
WBSITE_ADR	http://www.saic.com
MEDIA	Debris (concrete, steel, etc.), Waste
CNMT_GROUP	Heavy metals, Radionuclides, VOCs
CHEMICALS	Barium, dichlorobenzene, Naphthalene,
CHEM_SRCES	Mixed wastes, Radioactive wastes
NUCLEAR	Nuclear, non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	DOE tested
TESTSITES	
GEO_REGION	
TECH_CTGRY	Thermal Destruction, Thermal treatment,
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0202
TECH_NAME	Plasma Vitrification-General
MANUFCTR	
VENDOR	General
FRST_NAME	
MID_INI	
LAST_NAME	
TITLE	
OFFICE	
ADDR_LN1	
ADDR_LN2	
CITY	
ZIPCODE	
PROVINCE	
STATE	
COUNTRY	
PHONE	
FAX	
E_MAIL	
WBSITE_ADR	
MEDIA	Clay soil, Soil, Waste
CNMT_GROUP	Dioxins, heavy Metals, inorganics, Nonmetals,
CHEMICALS	Arsenics, Barium, cadmium, calcium, carbon,
CHEM_SRCES	Asbestos, Biological or Medical wastes,
NUCLEAR	nuclear, non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, DOD-DOE-EPA field
TESTSITES	
GEO_REGION	
TECH_CTGRY	Stabilization/Immobilization, thermal
IN_EX_SITU	In situ, Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0203
TECH_NAME	Plasma Waste Converter
MANUFCTR	
VENDOR	Startech Environmental Corporation
FRST_NAME	Joseph
MID_INI	L.
LAST_NAME	Longo
TITLE	
OFFICE	President, CEO
ADDR_LN1	79 Old Ridgefield Road
ADDR_LN2	
CITY	Wilton
ZIPCODE	06897
PROVINCE	
STATE	CT
COUNTRY	USA
PHONE	203 762 2499
FAX	203 761 0839
E_MAIL	info@startech.net
WBSITE_ADR	http://www.startech.net
MEDIA	Waste
CNMT_GROUP	Radionuclides, SVOCs, VOC
CHEMICALS	Radionuclides, VOCS
CHEM_SRCES	Radioactive wastes
NUCLEAR	nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available
TESTSITES	
GEO_REGION	
TECH_CTGRY	Low energy ionization, Reovery/Recycling,
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0204
TECH_NAME	OxyVac
MANUFCTR	
VENDOR	Terra Vac, Inc
FRST_NAME	Charles
MID_INI	
LAST_NAME	Pineo
TITLE	
OFFICE	Marketing Manager
ADDR_LN1	1555 Williams Drive, Suite 102
ADDR_LN2	
CITY	Marietta
ZIPCODE	30066-6682
PROVINCE	
STATE	GA
COUNTRY	USA
PHONE	770 421 8808
FAX	770 421 8188
E_MAIL	
WBSITE_ADR	
MEDIA	Sediment, Soil
CNMT_GROUP	Petroleum Hydrocarbons, VOCs
CHEMICALS	Benzene, Ethylbenzene, Methyl Terbutyl
CHEM_SRCES	Gasoline service station, Petroleum
NUCLEAR	Non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated
TESTSITES	
GEO_REGION	
TECH_CTGRY	Chemical treatment NOS, Delivery system,
IN_EX_SITU	In situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0205
TECH_NAME	Pneumatic Soil fracturing (PSF)
MANUFCTR	
VENDOR	Terra Vac, Inc
FRST_NAME	Jim
MID_INI	V.
LAST_NAME	Rouse
TITLE	
OFFICE	Principal Geohydrologist
ADDR_LN1	1401 Dave Street, Suite 500
ADDR_LN2	
CITY	Newport Beach
ZIPCODE	92660
PROVINCE	
STATE	CA
COUNTRY	USA
PHONE	714 252 8900
FAX	714 252 8901
E_MAIL	
WBSITE_ADR	
MEDIA	Bedrock (e.g., siltstone, sandstone, slate,
CNMT_GROUP	Halogenated VOCs, Petroleum
CHEMICALS	Aliphatic Hydrocarbons, VOCs
CHEM_SRCES	Petroleum Hydrocarbons
NUCLEAR	Non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated
TESTSITES	
GEO_REGION	
TECH_CTGRY	Delivery system, Fracturing
IN_EX_SITU	In situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0206
TECH_NAME	Pneumatic Fracturing Extraction
MANUFCTR	
VENDOR	Accutech Remedial System
FRST_NAME	John
MID_INI	J.
LAST_NAME	Liskowitz
TITLE	
OFFICE	Project Manager
ADDR_LN1	Cass street at highway 35
ADDR_LN2	
CITY	Keyport
ZIPCODE	07735
PROVINCE	
STATE	NJ
COUNTRY	USA
PHONE	908 739 6444
FAX	908 739 0451
E_MAIL	
WBSITE_ADR	
MEDIA	Bedrock (e.g., siltstone, sandstone, slate,
CNMT_GROUP	Halogenated Organic Solvents, Halogenated
CHEMICALS	Aliphatic Hydrocarbons, Benzene,
CHEM_SRCES	Contaminated Clay layers, Halogenated
NUCLEAR	Non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, DOD-DOE-EPA
TESTSITES	
GEO_REGION	
TECH_CTGRY	Excavation/Extraction system, Fracturing,
IN_EX_SITU	In situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0207
TECH_NAME	Polyethylene Encapsulation
MANUFCTR	
VENDOR	Brookhaven National Laboratory
FRST_NAME	Paul
MID_INI	
LAST_NAME	Lagerman
TITLE	
OFFICE	
ADDR_LN1	P. O. Box 5000
ADDR_LN2	
CITY	Upton
ZIPCODE	11973-5000
PROVINCE	
STATE	NY
COUNTRY	USA
PHONE	516 344 2777
FAX	516 344 4486
E_MAIL	
WBSITE_ADR	http://www.bnl.org
MEDIA	Waste
CNMT_GROUP	Heavy Metals, Inorganics, Nonmetals,
CHEMICALS	Cadmium, lead, Nitrate (NO3-), Radionuclide
CHEM_SRCES	Mixed wastes (radioactive and hazardous),
NUCLEAR	Nuclear, Nonnuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, DOE and field
TESTSITES	
GEO_REGION	
TECH_CTGRY	Stabilization/immobilization
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0208
TECH_NAME	Polymer-Based
MANUFCTR	
VENDOR	General
FRST_NAME	
MID_INI	
LAST_NAME	
TITLE	
OFFICE	
ADDR_LN1	
ADDR_LN2	
CITY	
ZIPCODE	
PROVINCE	
STATE	
COUNTRY	
PHONE	
FAX	
E_MAIL	
WBSITE_ADR	
MEDIA	Clay soil, Debris (concrete, steel, etc),
CNMT_GROUP	Cyanides, Halogenated Organic solvents,
CHEMICALS	Aluminum, Arsenic, cadmium, Chromium,
CHEM_SRCES	Battery cycling (lead contaminated soils),
NUCLEAR	Nuclear, nonnuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated,
TESTSITES	
GEO_REGION	
TECH_CTGRY	Stabilization/immobilization
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0209
TECH_NAME	Polywall Barrier System
MANUFCTR	
VENDOR	Horizontal Technologies, Inc
FRST_NAME	Donald
MID_INI	R.
LAST_NAME	Justice
TITLE	
OFFICE	President
ADDR_LN1	4767 Pine Island Road, NW
ADDR_LN2	
CITY	Matlacha
ZIPCODE	33993
PROVINCE	
STATE	FL
COUNTRY	USA
PHONE	941 283 5640
FAX	941 283 2222
E_MAIL	info@horizontal.com
WBSITE_ADR	
MEDIA	Clay soil, DNAPLs, Ground water, LNAPLs,
CNMT_GROUP	Non given
CHEMICALS	Non given
CHEM_SRCES	Non given
NUCLEAR	
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, Used in industry
TESTSITES	
GEO_REGION	
TECH_CTGRY	Barrier, Stabilization/immobilization, Vertical
IN_EX_SITU	In situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0210
TECH_NAME	Pozzolanic
MANUFCTR	
VENDOR	General
FRST_NAME	
MID_INI	
LAST_NAME	
TITLE	
OFFICE	
ADDR_LN1	
ADDR_LN2	
CITY	
ZIPCODE	
PROVINCE	
STATE	
COUNTRY	
PHONE	
FAX	
E_MAIL	
WBSITE_ADR	
MEDIA	Clay soil, Debris (concrete, steel, etc),
CNMT_GROUP	Heavy metals, Inorganics, Nonmetals, PCBs
CHEMICALS	Aluminum, Arsenic, cadmium, Chromium,
CHEM_SRCES	Asbestos, Baghouse dust, fly ash, Battery
NUCLEAR	Non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated,
TESTSITES	
GEO_REGION	
TECH_CTGRY	Chemical treatment NOS,
IN_EX_SITU	In situ, Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0212
TECH_NAME	Pyretron Thermal Destruction System
MANUFCTR	
VENDOR	American Combustion, Inc
FRST_NAME	Gregory
MID_INI	
LAST_NAME	Gitman
TITLE	
OFFICE	President
ADDR_LN1	2985 Gateway Drive, Suite 100
ADDR_LN2	
CITY	Norcross
ZIPCODE	30071
PROVINCE	
STATE	GA
COUNTRY	USA
PHONE	770-564-4180
FAX	770-564-4192
E_MAIL	info@americancombustion.com
WBSITE_ADR	http://www.americancombustion.com/
MEDIA	Soil, Waste
CNMT_GROUP	PAHs, PNAs, Petroleum Hydrocarbons
CHEMICALS	Acenaphthylene, Antracene, Fluoranthene,
CHEM_SRCES	Coal tar, Petroleum Hydrocarbons
NUCLEAR	non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	commercially available, EPA Site
TESTSITES	
GEO_REGION	
TECH_CTGRY	Incineration, thermal Destruction, thermal
IN_EX_SITU	Ex Situ
GEN_REMARK	Vendor has a toll-free telephone #:
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0213
TECH_NAME	Pyrodigestion
MANUFCTR	
VENDOR	Clean Technologies, Inc
FRST_NAME	David
MID_INI	T.
LAST_NAME	Smith
TITLE	
OFFICE	Vice President, Engineering
ADDR_LN1	1717 West Sixth Street, Suite 238
ADDR_LN2	
CITY	Austin
ZIPCODE	78703
PROVINCE	
STATE	TX
COUNTRY	USA
PHONE	512-322-9139
FAX	512-322-9389
E_MAIL	
WBSITE_ADR	
MEDIA	Soil
CNMT_GROUP	SVOCs, VOCs
CHEMICALS	Acenaphthene, Anthracene,
CHEM_SRCES	Biological waste, Medical waste, Wood
NUCLEAR	non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, bench tested, field
TESTSITES	
GEO_REGION	
TECH_CTGRY	Chemical treatment NOS, Molten metal
IN_EX_SITU	Ex situ
GEN_REMARK	Address of company is in different (in
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0214
TECH_NAME	Pyrolis-General
MANUFCTR	
VENDOR	General
FRST_NAME	
MID_INI	
LAST_NAME	
TITLE	
OFFICE	
ADDR_LN1	
ADDR_LN2	
CITY	
ZIPCODE	
PROVINCE	
STATE	
COUNTRY	
PHONE	
FAX	
E_MAIL	
WBSITE_ADR	
MEDIA	Sediment, Sludge, Soil, Waste, Wastwater
CNMT_GROUP	Halogenated VOCs, Heavy metals, Inorganic,
CHEMICALS	No specific chemicals
CHEM_SRCES	Biological waste, Medical waste, Chemical
NUCLEAR	nuclear, non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commeercially available, DOD and EPA
TESTSITES	
GEO_REGION	
TECH_CTGRY	Distillation, recovery/recycling, pyrolysis,
IN_EX_SITU	In situ, Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0215
TECH_NAME	Quantum Catalytic Extraction Process
MANUFCTR	
VENDOR	Molten Metal Technology, Inc
FRST_NAME	Earl
MID_INI	
LAST_NAME	McConchie
TITLE	
OFFICE	Vice President of Marketing
ADDR_LN1	400-2 Totten Pond Road
ADDR_LN2	
CITY	Waltham
ZIPCODE	02154
PROVINCE	
STATE	MA
COUNTRY	USA
PHONE	617 47 9700
FAX	
E_MAIL	
WBSITE_ADR	http://www.mmt.com/
MEDIA	Waste
CNMT_GROUP	Radionuclides
CHEMICALS	Lanthanides, Radionuclides, Uranium
CHEM_SRCES	Mixed wastes (radioactive and hazardous),
NUCLEAR	nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	DOE tested, field demonstrated
TESTSITES	
GEO_REGION	
TECH_CTGRY	Molten metal treatment, separation process,
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0216
TECH_NAME	Quick-Purge
MANUFCTR	
VENDOR	Integrated Environmental Solutions, Inc
FRST_NAME	Robert
MID_INI	W.
LAST_NAME	Bass
TITLE	
OFFICE	President
ADDR_LN1	3787 Old Middleburge Road
ADDR_LN2	
CITY	Jacksonville
ZIPCODE	32210
PROVINCE	
STATE	FL
COUNTRY	USA
PHONE	904-778-1188
FAX	904-778-0201
E_MAIL	
WBSITE_ADR	
MEDIA	Ground water, Soil
CNMT_GROUP	Petroleum hydrocarbon, VOCs
CHEMICALS	Benzene, Ethylbenzene, Methyl Terbutyl
CHEM_SRCES	Petroleum Hydrocarbons
NUCLEAR	non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated
TESTSITES	
GEO_REGION	
TECH_CTGRY	Air Sparging, Delivery system
IN_EX_SITU	In situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0217
TECH_NAME	RadAway
MANUFCTR	
VENDOR	The Mloecular Company, Inc.
FRST_NAME	Nanette
MID_INI	
LAST_NAME	Newell
TITLE	Dr.
OFFICE	President/CEO
ADDR_LN1	2611 third Avenue, Suite 200
ADDR_LN2	
CITY	Portland
ZIPCODE	97201
PROVINCE	
STATE	OR
COUNTRY	USA
PHONE	503- 274-4407
FAX	503 241 0827
E_MAIL	nan@ortel.org
WBSITE_ADR	
MEDIA	Waste, waterwaste
CNMT_GROUP	Radionuclides
CHEMICALS	Chlorides, Iodine, phospate, Radionuclides
CHEM_SRCES	Biological or medical wastes, Chemical
NUCLEAR	Nuclear, non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available
TESTSITES	
GEO_REGION	
TECH_CTGRY	Filtration NOS, Volume reduction
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0218
TECH_NAME	RaDFix Harmonic Compaction
MANUFCTR	
VENDOR	Ryan-Murphy, Inc
FRST_NAME	Bruce
MID_INI	T.
LAST_NAME	Hissom
TITLE	Mr.
OFFICE	President
ADDR_LN1	11912 Washington Street
ADDR_LN2	
CITY	Northglenn
ZIPCODE	80234
PROVINCE	
STATE	CO
COUNTRY	USA
PHONE	303 252 7200
FAX	303 427 1955
E_MAIL	
WBSITE_ADR	
MEDIA	Soil
CNMT_GROUP	Heavy metals, Radionuclides
CHEMICALS	Cadmium, Chromium, Radionuclides
CHEM_SRCES	Baghouse dust, fly ash, Mixed waste
NUCLEAR	Nuclear, non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated,
TESTSITES	
GEO_REGION	
TECH_CTGRY	Stabilization, Immobilization
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0219
TECH_NAME	Radio Frequency Heating
MANUFCTR	
VENDOR	IIT Research Institute
FRST_NAME	Jim
MID_INI	
LAST_NAME	Strangle
TITLE	
OFFICE	
ADDR_LN1	10 West 35th Street
ADDR_LN2	
CITY	Chicago
ZIPCODE	60616
PROVINCE	
STATE	IL
COUNTRY	USA
PHONE	313 567 4256
FAX	312 567 4087
E_MAIL	jstrangle@hq.iitri.com
WBSITE_ADR	http://ittri.com
MEDIA	Clay soil, soil
CNMT_GROUP	Halogenated organic solvents, Halogenate
CHEMICALS	Aldrin, Aliphatic. Dieldrin, Edrin, Pesticides,
CHEM_SRCES	Contaminated clay layer, Halogenated
NUCLEAR	non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, DOD-DOE-EPA field
TESTSITES	
GEO_REGION	
TECH_CTGRY	Excavation/Extraction System
IN_EX_SITU	In situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0220
TECH_NAME	Robotics
MANUFCTR	
VENDOR	Foster-Miller
FRST_NAME	Blair
MID_INI	J.
LAST_NAME	Hough
TITLE	
OFFICE	Business Manager
ADDR_LN1	350 Second Avenue
ADDR_LN2	
CITY	Waltham
ZIPCODE	02154
PROVINCE	
STATE	MA
COUNTRY	USA
PHONE	617 684 4406
FAX	617 890 8515
E_MAIL	
WBSITE_ADR	htpp:/www.foster-miller.com
MEDIA	Building decontamination, Debris, Sludge,
CNMT_GROUP	Radionuclides
CHEMICALS	Radionuclides
CHEM_SRCES	Explosives/munitions/propellants
NUCLEAR	Nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, DOD-DOE-EPA field
TESTSITES	
GEO_REGION	
TECH_CTGRY	Delivery system, Excavation/Extraction
IN_EX_SITU	In situ, Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0301
TECH_NAME	Aquaplant Biofilter System
MANUFCTR	
VENDOR	Bioremediation Services, Inc
FRST_NAME	David
MID_INI	D
LAST_NAME	Emery
TITLE	
OFFICE	President
ADDR_LN1	12130 NE Ainsworth Circle, Suite 220
ADDR_LN2	
CITY	Portland
ZIPCODE	97220-9009
PROVINCE	
STATE	OR
COUNTRY	USA
PHONE	503-253-9579
FAX	503-253-9629
E_MAIL	
WBSITE_ADR	
MEDIA	ground water, landfill leachate, surface water,
CNMT_GROUP	cyanides, petroleum hydrocarbons, VOCs
CHEMICALS	liphatic Hydrocarbons, Benzene, Cyanide,
CHEM_SRCES	Explosives/munitions/propellants
NUCLEAR	nuclear, non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commeercially available, Used in industry
TESTSITES	
GEO_REGION	
TECH_CTGRY	bilogical treatment, phytoremediation,
IN_EX_SITU	Ex situ
GEN_REMARK	Company has a toll-free telephone: 1-800 775
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

WMI_ID	WMI0302
TECH_NAME	BIOX Biotreater
MANUFCTR	
VENDOR	Bioscience, Inc
FRST_NAME	Jay
MID_INI	B.
LAST_NAME	Hill
TITLE	Mr.
OFFICE	Product Manager
ADDR_LN1	1550 Valley Center Parkway, Suite 140
ADDR_LN2	
CITY	Bethlehem
ZIPCODE	18017
PROVINCE	
STATE	PA
COUNTRY	USA
PHONE	610-974-9693
FAX	610 691 2170
E_MAIL	toll-free tel: 800-627-3069
WBSITE_ADR	
MEDIA	Ground water, Surface water, Waste water
CNMT_GROUP	Petroleum Hydrocarbon, VOC, SVOC
CHEMICALS	Aliphatic Hydrocarbon, Butanone, Phenol,
CHEM_SRCES	Chemical manufacturing waste, Petroleum
NUCLEAR	non-nuclear
ABSTRACT	
DEVELOPMNT	
APPLCATION	
TEC_STATUS	Commercially available, field demonstrated
TESTSITES	
GEO_REGION	
TECH_CTGRY	Biological Enzymes treatment
IN_EX_SITU	Ex situ
GEN_REMARK	
COST	
LIMITATION	
HLTH_SFTY	
PERFMNCE	

CHRIS S. LEE
UNDERGRADUATE SCHOLARSHIP APPLICATION

Ten Non-nuclear Technologies Used for Environmental Restoration

I. Using Sunlight and Anaerobic Treatment To Clean Up Organic Contaminants In Groundwater

The technology uses the photocatalyst titanium dioxide to decompose organic contaminant in groundwater. The contaminated water contains large quantities of trichloroethylene (TCE) and other chemical used to clean engine parts. In this process, sunlight illuminates the contaminated water contained in a transparent receiver. Modeling estimates obtained from 30 minutes batch experiments projected that approximately 3 minutes of exposure is necessary in a continuous mode to reduce TCE from 200 to 5 ppb, the EPA standard for drinking water. Contaminants are oxidized to CO_2, H_2O, and HCl (for chlorocarbons). These intermediates are not toxic but if they are hazardous more exposure is required to destroy them. The treated water is sent to a holding tank where the suspended catalyst is settled. The clean water is decanted, pumped to a treatment unit and eventually discharged to an arroyo.
Solar photocatalytic process was designed by the National Renewable Energy Laboratory and Lawrence Livermore National laboratory, Livermore, CA. [1]

II. Fiber Reinforced Plastic Reuse

Mazada Motor Corp., Hiroshima, Japan has developed a fiber-reinforced plastic (FRP) that can be recycled up to five times. Mazada uses liquid crystal polymers made from polyester resins that can combined with conventional thermoplastics such as polypropylene. The composite, still in precommercial production, will be used as a structural material for automobile frames, and can be recycled as original material at least five times. When the material is recycled, the liquid crystal polymers – even if ground – rebind after melting into fibrous structures of the original strength. [2]

III. Getting Lead out from Lead Soil

A concentrated chloride extraction process has been designed to remove high concentrations (typically 5-10%) of lead from soils, particularly at lead battery waste sites, while producing a treated soil usable as backfill and a recyclable, concentrated lead soil. These continuous 3-stages countercurrent extraction process produces treated soil suitable for replacement on-site, and lead hydroxide, which can be reprocessed to recover lead. The case of solvent regeneration minimizes waste disposal. Solvent recycling has been very successful and pilot-plant tests have required little salt or water makeup. Moreover, this process uses less expensive extractant, and lead is readily recovered by a modest pH increase. The University of Houston, TX designed the extraction process. [3]

IV. HCl Extraction

Concurrent Technologies Corp., Pittsburgh, PA, has developed an acid extraction treatment system (AETS) to remove heavy metal contaminants (ex. Arsenic, chromium, cadmium, copper, nickel, lead, and Zinc) from soils. Following the treatment, clean soil may be returned to the site or used as fill. The heavy metals, which extracted from the process, are concentrated in a form potentially suitable for recovery and reuse. The soil is mixed with lime and fertilizer to neutralize any residual acid. No wastewater streams are generated by the process. Treatment capacity is expected to range up to 30 ton/h, which met the regulatory levels. Cost ranges from $120/yd^3 to $180/ yd^3 of soil depending on the site size, soil type, and contaminant condition. [4]

V. Warming Of Frozen Soil Speeds Decontamination

ENSR Consulting and Engineering, Acton, MA, has developed a new technique to bioremediate contaminated soils in subfreezing temperature. Cold weather has proved to be a stubborn barrier in the use of bioremediation to clean up contaminated soils. ENSR has built on-site bioremediation cells equipped with portable vapor extraction systems (VES) that raise and maintain the temperature to the degree required for natural biological degradation. In a 1992 diesel spill in AK, approximately 600 yds^3 of soil were contaminated by a leaking underground storage tank. ENSR graded an area adjacent to the site and fitted it with a leachate collection system and Permalon liner. A sand base was placed over this, followed by vent pipes. The contaminated soil was excavated and placed atop the pipes. Finally, The pile was equipped with soaker hoses and covered in black plastic. Nutrients then were injected into the contaminated soil along with water. By pumping in warm air and drawing it through the pile via the VES during cold weather, the technicians were able to maintain the optimum condition for biological degradation. [5]

VI. Phytoextraction Toxic metals in the Soils

Phytotech, Inc., Monmouth Junction, NJ, uses phytoextraction (extracting toxic metals using specially selected quick-growing plants that incorporate toxic in their roots and stems) to clean heavy metals in soils. The tall, fast growing crop plants are grown on contaminated soil and harvested after metals accumulate in the plant tissues. The degree of accumulation can be as high as 2% of the plants' aboveground dry weight, leaving clean soil in place that meets or exceeds regulatory clean-up levels. After accumulation in the plant tissue, the contaminant metal must be disposed of but the amount of disposable biomass is a small fraction of the amount of soil treated. For example, phytoextraction of a typical 10acre site to remove 400ppm of lead from the top 1 ft would require disposal of only about 300 tons of biomass. This just needed 6 to 8 crops, with 3 or 4 crops required per growing season. This process can be used to clean soils or sediments contaminated with lead, cadmium, chromium, and radioactive materials such as cesium/strontium and uranium. [6]

VII. Exhaust Gas Put To Good Use

The BOC Group, Murray Hill, NJ has developed a technique to captured Carbon dioxide, nitrogen, and argon efficiently and economically from exhaust gas. The gas is treated to remove particular matter and then compressed to between 1 and 15 psig. The gas is purified to remove trace contaminants, and then separated to produce fractions that are rich in carbon dioxide and nitrogen. The fraction rich in carbon dioxide is liquefied and distilled to remove volatile contaminants, producing pure CO_2. The nitrogen-rich fraction is purified and cryogenically distilled to produce pure nitrogen and argon. [7]

VIII. Skidmounted, Aboveground Soil Washing Technology

Brice Environmental Services Corp. (BESCORP), Fairbanks, AK, has developed a skidmounted, aboveground soil washing process that reduces the overall volume of heavy metals-contaminated even after washing. Soil is cleaned by intensive scrubbing, followed by density, magnetic, and size separations. This technology remediates soils at rates of 10 to 40ton/h, depending on the contaminants and soil. This technology combined with the acid leaching process on a small-arms range operated by the Department of Defense in Fort Polk, LA. The result from Fort Polk showed the combination process consistently removed more than 99% of the lead in the soil. The processed soil averaged less than 200 mg/kg total lead after treatment with average Toxicity Characteristic Leaching Procedure levels below 2mg/L. Soil washing allows both unrestricted reuse of treated soil on-site and recycling of recovered metals, which are not possible with stabilization or disposal options.[8]

IX. New Catalyst Decomposes Oil

Mazada Motor Corp., Hiroshima, Japan has developed a decomposition catalyst capable of recovering oil from all type of plastic, including thermosets and composites such as fiber reinforced plastics. Plastic is heated in a furnace and vaporized. Then, the gas is transferred to the decomposition catalyst chamber, where it comes into contact with the catalyst. The plastics decompose into oil-based products as gasoline and kerosene. The catalyst can also decompose chlorinated plastics, including polychlorinated vinyl, eliminating the need to pre-sort plastics for recycling. Moreover, the catalyst is capable of breaking down the shredded plastics remaining from scrapped vehicles. The catalyst proved that more than 60 % by weight of shredded plastic from cars could be recovered as oil. [9]

X. Electrokinetic Extraction Metals and Organic Contaminants From Soils

Lockheed Martin Missiles and Space Co., Palo Alto, CA, and Geokinetics International, Inc., Seattle, WA has designed an Electrokinetic Remediation (ER) process for removing metals and organic contaminants from soil, mud, and sludge. Treatment concentrations range from a few to tens of thousands of parts per million. This technology is most appropriate for sites with contaminated estuaries, river mud, sewage and processing sludge, and fines remaining after soil washing. The process can be used with virtually any substrate but its effectiveness is sharply reduced for wastes with moisture content of less then 10%. It can remove over 99.9% of contaminants in the substrate. [10]

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1. "Sunlight and Anaerobic Treatment To Clean Up Organic Contaminants In Groundwater," *Chemical Engineering Progress*, vol. 89/ No.1, pp. 19-20, January 1993.

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3. "Getting Lead Out From Lead Soil," *Chemical Engineering Progress*, vol. 93/ No.9, pp. 14, September 1997.

4. "HCl Extraction," *Chemical Engineering Progress*, vol. 93/ No.9, pp. 12, September 1997.

5. "Warming of Frozen Soil Speeds Decontamination," *Chemical Engineering Progress*, vol. 88/ No.4, pp. 23, April 1992.

6. "Harvesting Toxic metals," *Chemical Engineering Progress*, vol. 93/ No.9, pp. 19, September 1997.

7. "Exhaust Gas Put To Good Use," *Chemical Engineering Progress*, vol. 89/ No.1, pp. 21, January 1993.

8. "Skidmounted, Aboveground Soil Washing Technology," *Chemical Engineering Progress*, vol. 93/ No.9, pp. 12, September 1997.

9. "New Catalyst Decomposes Oil," *Chemical Engineering Progress*, vol. 89/ No.1, pp. 14, January 1993.

10. "Electrokinetic Extraction," *Chemical Engineering Progress*, vol. 93/ No.9, pp. 16, September 1997.

PLACE STAMP HERE

North Carolina A&T State University
Dr. Godfrey A. Uzochukwu, Director
Waste Management Institute
P.O. Box 1090
Greensboro, N.C. 27411

U.S. Department of Energy

EPA
U.S. Environmental Protection Agency

U.S. Army, IOC

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WMI

National Conference on Environmental Remediation Science and Technology

Greensboro Hilton
Greensboro, North Carolina
September 8-10, 1998

Sponsored by: Waste Management Institute
Air Force FAST Center for Environmental Remediation
DOE Samuel Massie Chair of Excellence Program
(North Carolina A&T State University)
and
U.S. Department of Energy
Savannah River Operations Office

•

U.S. Department of Energy
Albuquerque Operations Office

•

U.S. Environmental Protection Agency (RTP)

•

U.S. Army Industrial Operations Command,
Rock Island, Il

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Parallax, Inc.

Abstract Submission Deadline - July 31, 1998
Registration Deadline - August 31, 1998

Web address: http://www.ncat.edu/~wmi/

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PURPOSE

To provide a forum for USDOE-SRS, USEPA, US Army IOC, other Federal Agencies, Industrial Technology Users and Colleges/Universities to address remediation technology needs, solutions and research.

TOPIC AREAS

- Bioremediation
- Fate and Transport of Contaminants
- Pollution Prevention
- Other innovative remediation technologies

Authors should submit 2 copies of one page abstract (see format) to the following organizing Chairpersons:

BIOREMEDIATION

Dr. G.B. Reddy
Department of Natural Resources
North Carolina A&T State University
Greensboro, North Carolina 27411
(336) 334-7779 • Fax (336) 334-7844
Email: reddyg@ncat.edu

FATE AND TRANSPORT OF CONTAMINANTS

Dr. Vinayak Kabadi
Department of Chemical Engineering
North Carolina A&T State University
Greensboro, North Carolina 27411
(336) 334-7564 • Fax (336) 334-7904
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POLLUTION PREVENTION AND OTHER INNOVATIVE REMEDIATION TECHNOLOGIES

Dr. Shoou-Yuh Chang
Department of Civil Engineering
North Carolina A&T State University
Greensboro, North Carolina 27411
(336) 334-7737 • Fax (336) 334-7667
Email: chang@garfield.ncat.edu

ABSTRACT FORMAT

Abstracts (350 words) should be written in English and typed single-spaced (size 12 font). Prepare abstract on a standard size white paper (8 1/2-in by 11 in). Leave 1 inch margins left, right, top and bottom. Center the title (maximum 12 words, bold type, all caps) at the top of the page. Leave one line space after the title and list all authors and their affiliations including city, state/province and country. The name of the corresponding/presenting author should be underlined. Leave one line space after the authors and begin the abstract text. Leave one line space between paragraphs. Do not indent paragraphs.

☆DO NOT FAX OR EMAIL ABSTRACTS

Abstracts should be submitted by mail only.
Abstract deadline is July 31, 1998

National Conference on Environmental Remediation Science and Technology
September 8-10, 1998

Greensboro Hilton
Greensboro, North Carolina

Registration Form

Name: _____
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Conference Fee:	General ○ $100	○ $150
	Student ○ $50	○ $75
	Exhibitor ○ $150	○ $200

Exhibitors will be provided an exhibit table and space.

Make checks payable to: North Carolina A&T State University

Mail completed form and check to:
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Waste Management Institute
North Carolina A&T State University
P.O. Box 1090
Greensboro, N.C. 27411

(336) 334-7030 • Fax (336) 334-7399

A final program will be mailed to participants who registered for the conference.
NOTE: Conference attendees should contact the Greensboro Hilton at (800) 379-8000 for accommodations. Identify yourself as a participant of the National Conference on Environmental Remediation Science and Technology.

National Conference on Environmental Remediation Science and Technology

September 8 -10, 1998

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Welcome!

Greensboro Hilton
Greensboro, North Carolina
September 8-10, 1998

Conference Participants:
The purpose of the National Conference on Environmental Remediation Science and Technology is to address environmental remediation technology needs, solutions, and research programs. Our goal is to foster relationships that could result in partnerships needed to protect the environment and improve the quality of life. Thank you for supporting our conference.

Godfrey A. Uzochukwu, Ph.D., LSS
Professor and Director of the Waste Management Institute,
NC A&T State University

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Albuquerque Operations Office

•

U.S. Environmental
Protection Agency (RTP)

•

U.S. Army
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The Greensboro Area
Chamber of Commerce

•

The City of Greensboro
(Mayor's Office)

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- S. L. Wang
- Kenneth Roberts
- Abdul Mohammed
- Herbert Nwankwo
- Emmanuel Nzewi
- Yusuf Adewuyi

A special thanks to Dr. Gail Mosby, Sharon Waldrum, Mary Petty, Shirley Clegg, and Nettie Rowland (A&T) Susan Connor and Laura Scott (DOE-AL), Tania Smith and Ahmet Suer (DOE-SRS/Westinghouse), who had assisted to make this conference a success.

Keynote Speakers

Biographical Sketch

HARRY M. THRON, JR.

Harry (Hap) Thron is currently the Headquarters Program Manager for Environmental Restoration with the U. S. Department of Energy, a $100 million annual program executed by the Savannah River Site. Hap holds Bachelors and Master Degrees from Georgia Tech in Chemical Engineering and Metallurgy and a Masters Degree in Engineering Management from George Washington University. He has held numerous senior technical positions in both the U.S. Environmental Protection agency and the Department of energy spanning a Federal Career of nearly 30 years. He has extensive experience in industrial waste water treatment and soil/ground water remediation.

JOHN KINGSCOTT

Mr. Kingscott is a supervisory engineer with EPA's Technology Innovation Office. This office is responsible for furthering the use of new treatment technologies in the Superfund, Underground Storage Tank and RCRA Corrective Action Programs. He is responsible for a variety of activities to assist private developers of new technologies, to improve decision-making for innovative technologies, and to enhance communication between technology developers and users.

Mr. Kingscott holds Bachelors and Masters degrees in Engineering from the University of Michigan. He is a registered professional engineer.

BRENDA RUSSELL

Brenda Russell is the Vice President for Community Relations at CSX Corporation, Richmond, VA. She was appointed to that position in 1998. She has worked for the following agencies: Manufacturers Hanover Trust Company, New York; Balch and Bingham, Birmingham, Alabama; Greenberg, Traurig, Hoffmam, Lipoff, Rosen & Quentel, Miami; Seyfarth, Shaw, Fairweather & Geraldson, Chicago and Carney and Brothers, Ltd, Chicago and CSX Transportation, Jacksonville, Fla.

Ms. Russell holds the A.B. degree from Harvard, Radcliffe College and J.D. from the University of Virginia.

THOMAS F. HEENAN

Thomas F. Heenan was appointed Assistant Manager for Environmental Quality effective June 1, 1996.

In that position he is responsible for all aspects of managing the environmental remediation program, site regulatory and compliance programs, as well as all site environmental monitoring activities, and activities related to management of low level radioactive waste, hazardous and mixed waste, transuranic waste, and sanitary waste. He is also responsible for Pollution prevention, technology development and public participation activities related to those programs.

Prior to his current position, Mr. Heenan was Assistant Manager for Environmental Restoration and Solid Waste at SR since December 1993 and Assistant Manager for Environmental, Safety, Health and Quality Programs at SR since January 1989.

He served at the San Francisco Operations Office (SAN) of DOE from 1976 until 1989. At SAN he held assignments on a range of environmental and energy programs, covering the full spectrum of technologies from nuclear through solar and conservation. From 1984 until 1989, he was Assistant Manager for Energy Programs at SAN.

Mr. Heenan began his Federal service in 1968 as a member of the RDT Intern Program. After a series of development assignments, he served several HQ organizations through 1976.

Mr. Heenan holds a Bachelor of Science degree in physics and mathematics from Manhattan College in New York City and a Master of Science degree in mechanical engineering from Carnegie Mellon university.

He resides in Aiken with his wife and child.

National Conference on Environmental Remediation Science and Technology

Thursday, September 10, 1998

General Session

8:30-9:00 am

Keynote Speaker: Cynthia Anderson

Ms. Cynthia Anderson is the Director of Environmental Restoration Division, United States Department of Energy, Savannah River Site, Aiken, South Carolina. She was appointed to that position in 1994. She is responsible for the remediation of inactive waste sites and decommissioning of surplus facilities to ensure that the environment, health, and safety of people are protected. A native of Charleston, South Carolina, Ms. Anderson is a graduate of Claflin College.

Tuesday

Tuesday, September 8

4:00-7:00 pm	REGISTRATION
6:30-8:00 pm	Reception

Wednesday

Wednesday, September 9

7:30-8:30 am	Continental Breakfast
7:30 am-5:00 pm	Registration
8:30 am-5:00 pm	Demonstration of Advanced Water Treatment Systems Custom-Engineered Systems, Atlanta, GA Georgia Room

General Session
Carolina Room/Virginia Room

8:30-8:40 am	Welcome Dr. Edward B. Fort, Chancellor North Carolina A&T State University
8:40-9:20 am	Keynote: *The Role of Innovative Technology in Achieving DOE's Cleanup Goals.* Harry M. Thron, Jr. U.S. Dept. of Energy, Washington, D.C.
9:20-9:30 am	Refreshment Break
9:30 am-5:00 pm	Exhibits Open

Notes

Wednesday

September 9

Concurrent Session 1 • 9:30 - 11:30

▼ BIOREMEDIATION

Carolina Room
Presiding: **Thomas Jordan**

9:30 - 9:50
The Use of Oxygen Release Compound (ORC®) and Hydrogen Release Compound (HRC™) for Enhanced Bioremediation
Patrick Hicks, Stephen Koenigsberg
Regenesis Bioremediation Products
San Juan Capistrano, CA

9:50 - 10:10
Mycological Potential for Trichloroethylene Remediation
Michelle R. Mims, Gudigopuram B. Reddy, Vestle Shirley
North Carolina A&T State University

10:10 - 10:30
The Isolation and Characterization of Propylene and Triethylene Degrading Bacteria
Dexter McQueen, Chintan J. Joshi, Amphayphet Thongkhouang, Thomas Jordan
NC A&T State University

10:30-10:50
Innovative Tools to Assess Microbial Communities during Bioremediation
Susan M. Pfiffner, Craig Brandt, Anthony Palumbo, Jack Schryver, Jonas Almeida
Univ. of Tennessee, Knoxville
Oak Ridge National Laboratory, Tennessee
Universidade Nova de Lisboa, Portugal

10:50 - 11:10
Comparative Study of Biodegradabilities of Fuel Systems Icing Inhibitors
Pavithra Jayaraman, Keith Schimmel, Dexter McQueen, Thomas Jordan
NC A&T State University

▼ FATE AND TRANSPORT

Virginia Room
Presiding: **Dr. S. Y. Chang,** NCA&T

9:30 - 9:50
Numerical Solution of Linear Nonlinear Equations in Groundwater Flow Modeling
C.T. Kelley, E.W. Jenkins
North Carolina State University

9:50 - 10:10
Modeling EM-Enhanced Aggregate Remediation
Aaron A. Jenkins
Case Western Reserve University

10:10 - 10:30
Effects of Clay on Transport of Contaminants: Governing Equations Via HMT
Lynn S. Bennethum, John H. Cushman, Marcio A. Murad
University of Colorado, Denver

10:30-10:50
A Random Process Model for Contaminant Transport
Jeffrey V. Butera
High Point University High Point, NC

10:50 - 11:10
Modeling of the Effect of Thermal in Situ Technologies on the Dynamics of Subsurface Microorganisms
Jayaraman Vinod Narayanan, Keith Schimmel, Rhea Powell, Lisa Carmichael, Tameka Terry
NC A&T State University

Notes

Luncheon

11:45-1:15
Luncheon
Speaker: *Overview of Innovative Site Remediation Technologies.*
John Kingscott
U.S. Environmental Protection Agency Washington, DC

Wednesday

Concurrent Session 2 • 1:30-3:20

▼ BIOREMEDIATION

Carolina Room
Presiding: **Dr. Palumbo,**
Oak Ridge National Laboratories, TN

1:30 - 1:50
Biodegradation of Explosives from Contaminated Soil
William W. Clarkson, Gregory Wilber, W. Craig Light, Ryan D. Hort
Oklahoma State University, Stillwater

1:50 - 2:10
A Practical Approach to Bioremediating Residential Fuel Oil Spills
John E. Palmer, Tom Smith
BPA Environmental & Engineering, Inc.
Greensboro, NC
REMTec, Laurel Springs, NC

2:10 - 2:30
An Exposure time Model for metabolic Lag Effects on insitu Bioremediation
T.R. Ginn
University of California at Davis

2:30 - 2:50
Aerobic Bioremediation of Methyl Tertiary Butyl Ether (MTBE)
Patrick Hicks
Regenesis, Kingwood, TX

2:50 - 3:10
Mobile Laboratory Determination of Natural Attenuation for Remedial Investigations and Actions
John V. Hawkins, Lonnie Fallin
ONSITE Environmental Laboratories
Reidsville, NC & Dover, NJ

▼ ENVIRONMENTAL TECHNOLOGIES

Virginia Room
Presiding: **Emmanuel Nzewi,**
NC A&T

1:30 - 1:50
Development of a Relational Database for Remediation Technologies
Emmanuel Nzewi, G.A. Uzochukwu, Herbert Nwankwo
NC A&T State University

1:50 - 2:10
Hydrodehalogenation of 2- and 3 Carbon Halogenated Organic Groundwater Contaminants Using a Palladium Catalyst and Hydrogen Gas
Gregory V. Lowry, Martin Reinhard
Stanford University, CA

2:10 - 2:30
Hydrotreatment of Sulfur-Containing Organics Using High Surface Area Molybdenum Nitride Catalysts
Kenneth L. Roberts, Eric J. Markel
NC A&T State University
Exxon Research & Eng. Company, TX

2:30 - 2:50
In-Situ Thermal Desorption For Rapid, Source Removal of Contaminated Soils
H.J. Vinegar, **Ed Matuszak,**
Shell E&P) Technology Company, TX
Therra Environmental Services
Woodlands, TX

2:50 - 3:10
The Selective Catalytic Reduction of NO By Propylene Over Pt/Al2O3 and Pt/Sio2
Dinyar K. Captain, Michael D. Amiridis
University of South Carolina, SC

Notes

Break

3:10-3:20 Refreshment Break

Wednesday

Concurrent Session 3 • 3:20 - 5:10

▼ ENVIRONMENTAL TECHNOLOGIES

Carolina Room
Presiding: **Yusuf Adewuyi,**
NC A&T

3:20 - 3:40
The Use of Regenerative Activated Carbon Filtration for Water Treatment
Oliver Johnson
Custom Engineered Systems, Inc.
Atlanta, Georgia

3:40 - 4:00
Pollution Prevention Based on the ISO 14000 Environmental Management Standards
Sanjiv Sarin
NC A&T State University

4:00 - 4:20
Substitution Pollution Prevention
William B. Campbell
Parallax, Inc.
Oak Ridge, TN

4:20 - 4:40
Low Level Mixed Waste Management
Shoou-Yuh Chang, Bryan Morton
NC A&T State University

▼ FATE & TRANSPORTATION

Virginia Room
Presiding: **Dr. Jeffrey Butera,**
High Point University

3:20 - 3:40
An optional Estimation Scheme for Subsurface Contaminant Transport Model
Shoou-Yuh Chang, Subhraj Jonnalagedda
North Carolina A&T State University

3:40 - 4:00
Extraction of Pollutants from Soil with Organic Surfactants
Mufeed M. Basti, Yusef G. Adewuyi, Othman Al-Saleh, G.B. Reddy
North Carolina A&T State University

4:00 - 4:20
D&D Quantity Takeoff and Cost Model for Environmental Remediation Project
Musibau A. Shofoluwe, Jim Wingate
North Carolina A&T University
Fluor Daniel Fernald Corporation

4:20 - 4:40
Mapping Contaminated Well Sites in Guilford County, North Carolina Using GIS Technology
B. Eric Funderbunk, Lanell Ogden
NC A&T State University

4:40 - 5:00
Kinetic and In Situ FTIR Studies of the Catalytic Oxidation of 1, 2-Dichlorobenzene Over Vanadia-Based Catalysts
Sundaram Krishnamoorthy, Michael D. Amiridis
University of South Carolina, Columbia

Notes

6:00-8:00 pm - Tour of Greensboro (Meet in Hotel Lobby)

Thursday

September 10, 1998

7:30-8:30 pm	Continental Breakfast
7:30-12:00 pm	REGISTRATION
8:30-5:00 pm	*Demonstration of Advanced Water Treatment Systems* Custom Engineered Systems Atlanta, Georgia Georgia Room
3:15 - 4:15 pm	EPA Workshop Virginia Room Information Resources Workshop for Consulting Engineers and Project Managers **Jeff Heimerman**

General Session

8:30-9:00 am	Keynote: *Environmental Restoration Overview* **Tom Heenan** U.S. Dept. of Energy, Savannah River Site Aiken, South Carolina
9:00-9:10 am	Refreshment Break
9:10 - 5:00 pm	Poster Session (Authors present from 10:00 am-2:00 pm)
9:30 - 5:00 pm	Exhibits Open

Notes

Thursday

September 10

Concurrent Session 4 • 9:10-11:30

▼ BIOREMEDIATION

Carolina Room
Presiding: **Lisn Carmichael**

9:10 - 9:30
Field GC/MS, HPLC and EDXRF Sor Remedial Investigations at Former Army Ordnance Plant
John V. Hawkins, Lonnie Fallin
Brigett Brooks, Doug Peery
ONSITE Environmental
Laboratories, NC
Montgomery Watson
DP Consultants, LLC

9:30 - 9:50
Bioremediation and Microbial Ecology
Anthony V. Palumbo, Jizhong Zhou,
Barry Kinsall, Chuanlun Zhang,
Susan M. Pfiffner, Tommy Phelps
Oak Ridge National Laboratory, TN

9:50 - 10:10
Estimation of Biodegradation Rates for Natural Attenuation at Hazardous Wastes Sites
Hanadi S. Rifai, **Monica P. Suarez**

10:10 - 10:30
Technology Innovations for Environmental Restoration
Woody Lupton, Amy L. Southmayd
Bechtel Savannah River Inc., Aiken, SC
Westinghouse Savannah River Co.,Aiken, SC

10:30 - 10:50
Comparative Effects of PH on Macrophyte Growth Success in a Restored Wetland
John B. Williams, Henrietta V. Coleman,
Jawana Pearson
South Carolina State University, Orangeburg

10:50-11:10
Assessment of Metal Removal from Coal Pile Run Off Waters
Victor Ibeanusi, Donna Phinney,
Michelle Thompson, Amy Smith,
Brandon Wilburn
Spelman College, Atlanta, Georgia

▼ ENVIRONMENTAL TECHNOLOGIES

Virginia Room
Presiding: **Lanny Weimer,**
Terra-Kleen Response Group

9:10 - 9:30
Nondispersive Liquid-Liquid Extraction of Cadmium, Cobalt, Copper and Zinc by Dehpa and Stripping with EDTA,
Keith Schimmel, Shamsuddin Ilias,
Akella Srinivas, Tsatsu Nukunya
NC A&T State University

9:30 - 9:50
New PCB Regulations Cut On-Site Clean Up Costs
Lanny Weimer, Alan B. Cash
Terra-Kleen Response Group, Inc.
San Diego, CA
University of Tennessee, Knoxville
Ellicott City, MD

9:50 - 10:10
Low-Profile Stripping of Organic Pollutants
Yusuf G. Adewuyi, Riyad Jadalla,
Collins Appaw
University of Houston, Texas
NC A&T State University
Greensboro, NC

10:10 - 10:30
Development of PC- Workstation Cluster for Groundwater Modeling
Emmanuel U. Nzewi, Duncan Ngari
NC A&T State University
North Carolina A&T State University

10:30 - 10:50
Remediation of MTBE Contaminated Groudwater with High Energy Electron Beam Injection
William J. Cooper, Thomas Tobien,
Michael G. Nickelsen, Paul M. Tornatore,
Kimberly S. Newman, Kellie Gregorie
University of North Carolina, Wilmington
Haley and Aldrich of New York

10:50-11:10
Developing a User-Centered Database System for Assessment and Evaluation of Environmental Restoration Technologies
Herbert E. Nwankwo, Emmanuel Nzewi,
Godfrey Uzochukwu
NC A&T State University

Notes

Luncheon

11:45-1:15
Corporate Partnerships with Colleges and Universities
Brenda Russell
CSX Corp.

Thursday

September 10

Concurrent Session 5 • 1:30-3:20

▼ ENVIRONMENTAL TECHNOLOGIES

Carolina Room
Presiding: **Y.D. Yeboah,**
Clark Atlanta University

1:30 - 1:50
Application of Flow Reversal in Membrane Flux Enhancement: A Theoretical and Experimental Study of Ultrafiltration of BSA
Sirena C. Hargrove, Shamsuddin Ilias
NC A&T State University

1:50 - 2:10
Non-Thermal Plasma Discharge for Effective Nox Removal
Y.D. Yeboah, Z. Wang, T. Bai, K. Bota, J.W. Rogers, G.E. Rolader, J.H. Batteh, S. Federle
Clark Atlanta University Atlanta, Georgia
Science Applications International, Inc. Atlanta, Georgia
U.S. Air Force, Eglin AFB Eglin, Florida

2:10 - 2:30
Electrokinetically Enhanced Reduction of Cr (VI) in Porous Media
Antoinette Weeks, Sibel Pamukcu
Lehigh University Bethlehem, PA

2:30 - 2:50
Degradation of PCBS, and Other Chlorinated and Non-Chlorinated Contaminants by Electrochemical Peroxidation
Michele Wunderlich, Ronald Scrudato, Lauren Falanga
SUNY at Oswego, New York

2:50 - 3:10
Protocol for Testing Portable Cord Connected in Room Air Cleaners
Ronnie Isaac, H. Singh, Brian Krafthefer, L. Sparks
Honeywell, Inc.
USEPA

▼ FATE & TRANSPORT

Virginia Room
Presiding: **Dr. V.N. Kabadi,**
NC A&T

1:30 - 1:50
Treatment of Rubber Thread Manufacturing Industry Wastewater Using an Upflow Anaerobic Filter
P. Agamuthu, R.M. Subbiah
University of Malaysia

1:50 - 2:10
Effective Properties of Heterogeneous Isotropic Aquitards
T. Sarris, E.K. Paleologos
University of South Carolina

2:10 - 2:30
Volatile Losses and Global (?) Redistribution of PCBS During Soil Remediation
Michele Wunderlich, Ronald Scrudato, Lauren Falanga
SUNY at Oswego, New York

2:30 - 2:50
Barometric Pumping for Characterizations and Remediation
Joseph Rossabi, Brian D. Riha
Westinghouse Savannah River Company
Aiken, South Carolina

2:50 - 3:10
Environmental Stability of Window Composting of Explosive Contaminated Soils
Mark L. Hampton, Wayne Sisk
U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Break

3:10 - 3:20 Refreshment Break

Exhibits

Georgia Room

Bob Bever
Durham GEO
2175 W. Park Ct.
Stone Mountain, GA 30087

Shane F. Blackwell
USEPA/Tetra Tech EM Inc.
1593 Spring Hill Rd.
Suite 300
Vienna, VA. 22182

Dolan Falconer
Parallax, Inc.
320 Interstate North Pkwy
Atlanta, GA. 30331

John V. Hawkins
ONSITE Environmental Laboratories, Inc.
1918 Pickrell Road
Reidsville, NC 27320

Patrick Hicks Regenesis
Bioremediation Prod.

Oliver Johnson
Custom Engineered Systems, Inc
6981-F Roswell Rd.
Atlanta, GA. 30328

Michael F. Tillery
PO Box 12249
Washington, DC 20005

Michele Wunderlich
SUNY at Oswego
Environmental Research
Oswego, NY

Ahmet Suer
United States Department of Energy
Savannah River Operations Office

Kenneth Webb
Shamrock Environmental Group

Godfrey Uzochukwu
Waste Management Institute

V.N. Kabadi
Center for Environment Remediation

Woody Lupton
Bechtel Savannah River, Inc.
Aiken, SC

Thursday

September 10

Concurrent Session 6 • 3:20-4:50

▼ INNOVATIVE TECHNOLOGIES
Carolina Room
Presiding: **Kenneth Roberts,**
NCA&T

3:20 - 3:50
Hydrotreatment of Sulfur--Containing Organics using High Surface Area Molybdenum Nitride Catalysts
Kenneth L. Roberts, Eric Markel
NC A&T University
Exxon Research & Engineering Company

3:50 - 4:10
Reducing Nutrient Discharges -Innovative Water Treatment Technology for Removing Nitrogen from Wastewater
Robert Ferguson, Alan Seech
W.R. Grace & Co., Yardley, PA
Grace Canada Inc., Ontario, Canada

4:10 - 4:30
Technology Innovations for Environmental Restoration
Woody Lupton, Amy L. Southmayd
Bechtel Savannah River Inc., Aiken, SC
Westinghouse Savannah River Co.
Aiken, SC

4:30-4:50
Supported TiO2 Catalyst for Photocatalytic Degradation of Organic Pollutants
S. **Begum,** D. Williams, and V.N. Kabadi
North Carolina A&T State University

4:50
Adjourn

Thank you for supporting this conference!

Posters

Georgia Room

Dose Dependent Study of Ethoxpresorafion O-Deethylase (EROD) Activity in Channel Catfish Exposed to River Extracts as a Biomaker of Contaminations
Christian Onuh, Patience Obin
Xavier University of Louisiana
New Orleans, Louisiana

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Accelerated Solvent Extraction Spectrometry for Determination and Gas Chromatography/Mass Spiekometry for Determination of Polcyclic Aromatic Hydrocarbons in Smoked Food Samples
Monique Lewis, Binh Le, Arthur Lee, Burde Kamth, Guangdi Wang
Xavier University of Louisiana
New Orleans, Louisiana

•

Selective Catalytic Reduction of NO and N2O By Propylene in Excess Oxygen
Meredith A. Watson, Tammie R. Gause, Kenneth L. Roberts
NC A&T State University

•

Partition Coefficients of Organic Pollutants between Aqueous and Non-Aqueous Phases
Kwame Hammond, Vinayak N. Kabadi
North Carolina A&T State University

•

Molecular Dynamics Computer Simulations for Henry's Constants of Organic Materials at the Air-Water Interface
Parag Adhangale, Vinayak N. Kabadi
North Carolina A&T State University

•

Life Scholars Program:
Getting on the Graduate Students Interest in Science
Lamoyne Williams, Sally O'Connor
Xavier University of Louisiana
New Orleans, Louisiana

PUBLICATION OF CONFERENCE PROCEEDINGS

National Conference on Environmental Remediation Science and Technology

September 8-10, 1998

Greensboro, North Carolina

Each speaker/presenter at the National Conference on Environmental Remediation Science and Technology is strongly encouraged to submit a technical paper (4 pages maximum) for publication in the Conference Proceedings. Requirements for publication (content and format) will be mailed to all authors/speakers in approximately four weeks.