Dynamic Underground Stripping

(OST Ref. No. 7)

Dynamic Underground Stripping (DUS) is a combination of several technologies targeted to remediate soil and ground water contaminated with organic compounds. DUS is effective both above and below the water table and is especially well suited for sites with interbedded sand and clay layers. The main technologies which comprise DUS are: steam Injection at the periphery of a contaminated area to heat permeable subsurface areas, vaporize volatile compounds bound to the soil, and drive contaminants to centrally located vacuum extraction wells; electrical heating of less permeable clays and fine-grained sediments to vaporize contaminants and drive them into the steam zone; and underground imaging, primarily Electrical Resistance Tomography (ERT), which delineates heated areas to ensure total cleanup and process control.

DESCRIPTION OF THE DEPLOYMENT

Location: Lawrence Livermore National Laboratory, Gasoline Spill Site; Livermore, CA

Project Name: Gas Pad Site Remediation.

Date of Deployment: November, 1993 - March, 1994.

Technology User: University of California, (LLNL)

Deployment Value/Impact: The system removed over 7,000 gallons fo gasoline (more than original estimate of contamination) during 10 weeks of operation conducted in phases over a 1 year period. The maximum extraction rate was 250 gallons per day. DUS removed the localized underground spill at LLNL more rapidly and cost-effectively than the estimated effectiveness of competing baseline technologies of pump-and-treat or pump-and-treat with vacuum extraction. The cost savings for this technology at the Gasoline Spill Site, in Livermore, is close to $15M.

Point of Contact:

User Program POC:
Kim Abbott (DOE-OK) - Tel. 510-677-1501

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- University of California/Berkeley
- Lawrence Livermore National Lab

Funding Information: ($ in Thousands):
Total Estimated Funding: $15,368

Other Deployments:
This technology has not been applied anywhere else.

Internal Duct Characterization System

(OST Ref. No. 42)

The Internal Duct Characterization System (IDCS) is a remotely-operated inspection system designed to characterize and visually inspect contaminated ventilation duct work. The IDCS consists of a control station, a reel-mounted tether for data communication, and a pipe crawling vehicle. The IDCS vehicle can travel over 200 feet in round ducts six inches in diameter and larger, and in rectangular ducts six inches square and larger. The vehicle visually inspects the interior condition of ducts using a high-resolution color video camera, and has an integrated radiation sensor to detect significant levels of radioactivity. Directional sensors on the vehicle provide information to show vehicle position and attitude, and well as provide information which could be used for as-built mapping of the ductwork. The entire vehicle is made from stainless steel and is designed to be washed down/decontaminated. The IDCS system also provides limited contaminant sampling and decontamination capabilities.

DESCRIPTION OF THE DEPLOYMENT

Location: DOE-ID, Liquid Effluent Treatment & Disposal Facility at the Idaho Chemical Processing Plant

Project Name: No PBS data available, the deployment was at an operating facility

Date of Deployment: January 1995

Technology User: Westinghouse Idaho Nuclear Company (Lockheed Martin Idaho Technologies Co. is current M&O)

Deployment Value/Impact: An INEEL facility manager had a premature crack develop in an off-gas line. The purpose of the deployment was to assess the condition of approximately 225 feet of the off-gas line outside of the facility which was inaccessible because of exterior insulation. The IDCS successfully inspected approximately 210 feet of the line and provided the facility manager with important information on the interior condition of the off-gas line which indicated the line would need replacement much sooner than anticipated.

Point of Contact:

User Program POC:
Mr. David W. Robertson (DOE-ID) - Tel. 208-526-4953

OST Program POC:
Walter D. Willis (Idaho National Engineering and Environmental Laboratory) - Tel. 208-526-8613, email: ww2@inel.gov

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Inuktun Services, Automation Systems Associates, Idaho National Engineering and Environmental Laboratory

Funding Information: ($ in Thousands):
Total Estimated Funding: $850

Other Deployments:
This technology has not been applied anywhere else.

ResonantSonic Drilling

(OST Ref. No. 55)

ResonantSonic drilling has been demonstrated and deployed as an innovative tool to access the subsurface for installation of monitoring and/or remediation wells and for collection of subsurface materials for environmental restoration applications. The technology has been developed by industry with assistance from the U.S. Department of Energy (DOE) Office of Technology Development to ensure it meets the needs of the environmental restoration market. The ResonantSonic drilling technology: can provide excellent quality, relatively undisturbed, continuous core samples that can be used for contaminated site characterization and for subsurface engineering design; uses no drilling fluids and minimizes generation of waste associated with the drilling operations (no cuttings); provides an alternative drilling method that at some locations is more cost effective than the baseline technology (e.g., at Hanford it can augment or replace cable tool drilling); can be used to drill slant holes; can be safer because worker exposure is minimized, because drilling is faster and waste generated is minimized; and can be used for retrieving core materials from the subsurface (i.e., sample collection), for installation of monitoring wells, and for providing subsurface access for collection of ground water samples. The ResonantSonic drilling system consists of two components: the drill head and the resonator (i.e., the drill pipe or rod). Three different mechanisms allow the bit to penetrate the formation: displacement, shearing, and fracturing. At any particular site, the mechanism is dependent upon the soil medium being drilled. ResonantSonic drilling has been used at many geologically different sites ranging from unconsolidated gravel-rich material to sandstone/shale sequences to clay-rich glacial till sites. Continuous cores have been obtained at depths as great as 550 feet. Drilling rates range up to 260 feet per day. Costs range from $70 to $300 per foot depending upon the drilling system used, the drilling approach, the site geology, etc.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, Savannah River, SC

Project Name: A&M Area Remediation

Date of Deployment: 1995

Technology User: Westinghouse Savannah River Company

Deployment Value/Impact: This technology is an effective alternative to baseline drilling technologies because it uses no drilling fluids and minimizes generation of secondary waste associated with drilling operations, (no cuttings).

Point of Contact:

User Program POC:
- Mike Simmons (WSRC) - Tel. 803-725-1627
- Karen Jerome (SRS) - Tel. 803-725-5223

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
- Water Development Corporation
- Westinghouse Hanford Company
- Pacific Northwest Lab

Funding Information: ($ in Thousands):
Total Estimated Funding: $5,339

Other Deployments:
- Deployed in FY 1992 at Hanford in Richland, WA
- Deployed in FY 1994 at FEMP (OU5) in Cincinnati, OH

Passive Soil Vapor Extraction (Barometric Pumping)

(OST Ref. No. 56)

Barometric pumping employs atmospheric pressure fluctuations to carry air within the vadose zone to the atmosphere, where the contaminant vapors are exhausted. The technology can take two forms: (1) Wellhead PSVE- An open well screened well bore is installed to connect the atmosphere with the vadose zone. With installation of a one-way valve, air flow is only permitted to exit the wellbore, carrying contaminant vapor. The vapor can be captured with a stripping system or activated charcoal. (2) Surface PSVE- Air naturally cycles in and out of the soil in the vadose zone with atmospheric pressure fluctuations. The sweep of contaminated soil can be enhanced by covering surrounding soil with pavement or plastic sheeting. The gas exchange can be encouraged by plowing the surface of the contaminated area.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, 200 West Area carbon tetrachloride plume

Project Name: Passive Soil Vapor Extraction Demonstration

Date of Deployment: June-August, 1995

Technology User:

- Westinghouse Hanford
- Savannah River Site
- Sandia National Lab, Albuquerque
- INEEL, Idaho Falls

Deployment Value/Impact: PSVE proved able to reduce the mass of volatiles in the vadose zone to 50% in about half the time of diffusion alone. PSVE is used in the absence of wells screened above the water table and as a polishing tool after active vapor extraction. Costs of installation, operation and maintenance are low compared to active extraction. Industry uses it in petroleum spill remediation and for in situ bioremediation.

Point of Contact:

User Program POC:

- William Shaw (PNNL) - Tel. 509-372-6140
- Virginia Rohay (CH2M Hill) - Tel. 509-372-9351

OST Program POC:

- Jim Wright (DOE-SRS) - Tel. 803-725-5608
- Dave Biancosino (DOE-RL) - Tel. 509-372-4084

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
IT-Hanford, EPA Region X, INEEL, LLNL, LANL, PNNL, WSRC, and SEA, Inc.

Funding Information: ($ in Thousands):
Total Estimated Funding: $2,909

Other Deployments:

- In FY 1996 at INEEL (WAG 7 - Pit 2 at SDA), in Idaho Falls, ID
- In FY 1997 at Savannah River Site (A and M Area), in Aiken, SC

Direct Measurement of Strontium-90 in Subsurface Soils

(OST Ref. No. 70)

This technique is used to characterize potentially contaminated surface soils having beta emitting radionuclides or daughter products in the decay chain. The BetaScint-TM instrument uses multiple layers of coated optical fiber to measure nuclear radiation. It employs coincidence techniques to obtain high-resolution measurements of high-energy beta particle radiation while eliminating cosmic radiation and other forms of background radiation. Such high-energy beta particle radiation sources include strontium-90 and uranium-238, which are found in soils at some DOE sites. The viewing depth of this detector is 3-5 mm.

DESCRIPTION OF THE DEPLOYMENT

Location: Inhalation Toxicology Research Institute at Kirtland AFB

Project Name: Hot Ponds and Waste Water Lagoon Sites

Date of Deployment: September - October 1995

Technology User: Lovelace Biomedical and Environmental Research Institute

Deployment Value/Impact: Aided in real-time completion of remedial actions at the sites. Reduced number of verification samples required. Around 33% cost reduction.

Point of Contact:

User Program POC:
Joe Rudolf, DOE-AL, 505-845-4414

OST Program POC:
Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Pacific Northwest National Laboratory, BetaScint (TM)

Funding Information: ($ in Thousands):
Total Estimated Funding: $575

Other Deployments:

- 1994 at SLAPS (St. Louis Airport) in St. Louis, MO
- 1998 at LEHR (University of California) in Davis, CA

Pipe Explorer (TM) System

(OST Ref. No. 74)

The Pipe Explorer system, developed by Science and Engineering Associates, Inc.(SEA), under contract with the U.S. Department of Energy (DOE) Federal Energy Technology Center, has been used to transport various characterizing sensors into piping systems that have been radiologically contaminated. DOE´s nuclear facility decommissioning program must characterize radiological contamination inside piping systems before the pipe can be recycled, remediated, or disposed. The Pipe Explorer can be deployed through constrictions in the pipe, around 90° bends, vertically up and down, and in slippery conditions. Because the detector is transported inside the membrane, which is inexpensive and disposable, it is protected from contamination, which eliminates cross-contamination and false readings. Characterization sensors that have been demonstrated with the system thus far include: alpha, beta, and gamma detectors, video cameras, and pipe locators. Alpha measurement capability has been developed and will be demonstrated soon. The system is capable of deploying in pipes as small as 2-in. diameter and up to 250-ft long.

DESCRIPTION OF THE DEPLOYMENT

Location: FUSRAP, General Motors Adrian Plant, Adrian, MI

Project Name: N/A

Date of Deployment: April-May, 1995 **Technology User**: Bechtel National, Inc.

Deployment Value/Impact: Saved DOE in excess of 1 million dollars that would have been spent excavating and characterizing the drainlines.

Point of Contact:

User Program POC:

- Doug Denham (DOE-AL) - Tel. (505) 845-4846
- David Cremer, (SEA,Inc) Principal Investigator, (505) 884-2300

OST Program POC:
Robert Bedick (DOE-FETC) - Tel. (304) 285-4505

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Science and Engineering Associates, Inc.
- OST Industry Program

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,224

Other Deployments:

- Applied in FY 1996 at Grand Junction Project Office (Grand Junction Site) in Grand Junction, CO
- Applied in FY 1997 at Mound (Mound Site) in Miamisburg, OH
- Applied in FY 1998 at Portland Gas and Electric Trojan Nuclear Plant (Portland Gas and Electric Trojan Nuclear Plant) in Portland, OR
- Applied in FY 1997 at Argonne National laboratory (CP-5 Reactor) in Chicago, IL
- Applied in FY 1998 at Crystal River (Crystal River Nuclear Power Plant) in Crystal River, FL
- Applied in FY 1996 at Inhalation Toxicology Research Institute (ITRI) in Albuquerque, NM

Remotely Piloted Vehicles (RPVs) and Miniaturized Sensors

(OST Ref. No. 76)

Remotely piloted vehicles (RPVs) have been used to photograph archaeological sites for at least the past twenty years. They were originally developed to provide a low-cost means of making high resolution aerial observations to augment ground observations or to photograph areas that were not accessible from the ground. Recently the technology has been applied to the areas of waste site characterization, clean-up verification and facility monitoring (planning, construction and maintenance). An RPV can provide an up-to-date photograph of a site in a cost-effective and timely manner without the mobilization costs inherent in hiring a large-scale mapping company. In addition, RPVs are being developed that will provide a platform for lightweight sensors so that inexpensive geophysical surveys will soon be performed in place of the more expensive ground-based surveys and the lesser resolution (and more expensive) helicopter-based surveys. RPVs are also being developed that will perform geophysical surveys cheaply and safely in areas of nearly constant elevation. These vehicles will provide a platform for various sensors, including magnetometers, Very Low Frequency receivers and radiation monitors for mapping locations of buried waste, ground resistivity, radiological contamination and geological changes. The use of RPVs in hazardous areas (unexploded ordnance) would be especially cost-effective and far safer than ground based surveys which rise dramatically in cost as the hazard level increases.

DESCRIPTION OF THE DEPLOYMENT

Location: Oak Ridge National Laboratory, SWDA 4,5, & 6 and others

Project Name: Characterization Programs for SWDA 4, 5, and 6

Date of Deployment: April, 1995

Technology User: Lockheed Martin Energy Systems

Deployment Value/Impact: At a cost of $500 per site (for sites up to a hundred acres), photographs made using RPVs would cost two orders of magnitude less than what would be charged by a commercial mapping company ($58,000) to produce an orthophoto. The RPV-generated photo(s) would be rectified and used to update an existing base map. For geophysical surveys, RPVs would fill a niche in between ground-based surveys that cost approximately $1300 per acre and are slow but very detailed, and helicopter-based surveys that on the large scale are much faster, but lack the fine detail. RPV surveys would not have the resolution of the ground-based surveys, but would be much quicker and more cost effective. A geophysical survey of a 200 acre site would cost $11,500 using RPVs, $58,250 using a helicopter and $260,000 for a ground-based system.

Point of Contact:

User Program POC:
Dale Huff, DOE-OR, 423-574-7859

OST Program POC:
Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Oak Ridge National Laboratory, BAI Aerospace

Funding Information: ($ in Thousands):
Total Estimated Funding: $908

Other Deployments:

- FY96 - Oak Ridge National Laboratory (K-25) (Uranium Cylinder Yards) in Oak Ridge, TN
- FY96 - Portsmouth Gaseous Diffusion Plant, TN
- FY94 - Oak Ridge National Laboratory in Oak Ridge, TN

Expedited Site Characterization
(OST Ref. No. 77)

Expedited Site Characterization (ESC) is a rapid and cost effective methodology for conducting site characterization. ESC integrates site geology and hydrology information with contaminant analysis results from multiple techniques. Key characteristics include: a multidisciplinary team employing innovative technologies, where possible, on-site decision making, a dynamic work plan influenced by new data as it is acquired, and an emphasis on use of noninvasive and minimally invasive technologies to reduce investigation-derived wastes.

DESCRIPTION OF THE DEPLOYMENT

Location: FUSRAP, Saint Louis Airport Site

Project Name: SLAPS Characterization Project

Date of Deployment: August - September 1994

Technology User: Bechtel Corporation

Deployment Value/Impact: The St Louis Airport Site (SLAPS) is a 21-acre FUSRAP site located just north of the St. Louis Airport. Expedited Site Characterization methodology was used to characterize the location and extent of low-level radioactive contamination caused by the past storage of uranium-processing residues from the DOE nuclear weapons program.

Point of Contact:

User Program POC:	**OST Program POC**:
Jason Darby, DOE-OR, 423 241-6343	Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Argonne National Laboratory, Ames Laboratory

Funding Information: ($ in Thousands):
Total Estimated Funding: $6,636

Other Deployments:
- 1996 - Zone 12 Site Characterization at Pantex
- 1996 - Savannah River D-Area Oil Seepage Basin
- 1997 - Central Nevada Test Site

Stainless Steel Beneficial Reuse

(OST Ref. No. 80)

This project is investigating the use of stainless steel radioactive scrap metal for fabrication of waste storage containers. The metal to be recycled originated from, but is not limited to, process water heat exchangers and reactor primary coolant piping. The radioactive scrap metal designated for reuse must qualify as Low Specific Activity items as defined by the U.S. Department of Transportation. The product containers, which retain low levels of contamination, will be utilized in 'controlled' locations only.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site

Project Name: SR-ER09, HWCTR project

Date of Deployment: September 1995

Technology User: Westinghouse Savannah River Company

Deployment Value/Impact: The beneficial reuse of contaminated metal illustrates DOE's ingenuity and comittment to recycle contaminated scrap metal and convert this DOE-liability material into valuable waste storage products. The containers fabricated consists of B-25 boxes, 55 gallon drums, 85 gallon overpacks, transportable mixed waste boxes, and radiation shielding blocks.

Point of Contact:

User Program POC:
George Mishra (DOE-SR) - 803-725-7239

OST Program POC:
Jerry Hyde (DOE-HQ) - 301-903-7914

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Carolina Metals

Funding Information: ($ in Thousands):
Total Estimated Funding: $5,064

Other Deployments:
No additional deployments in FY1995

In Situ Permeable Flow Sensor

(OST Ref. No. 99)

The In Situ Permeable Flow Sensor uses a thin cylinder heater buried in the ground to directly measure the direction and magnitude of 3-D groundwater flow in porous aquifers. Temperature distribution on the cylinder surface varies as a function of groundwater flow magnitude and direction. Previous technologies were labor intensive and required that large volumes of contaminated water be pumped to the surface for storage and disposal.

DESCRIPTION OF THE DEPLOYMENT

Location: Edwards Air Force Base, TCE groundwater plume, Operable Unit 1

Project Name: The In-Well Vapor Stripping Demonstration

Date of Deployment: December 1994 - August 1995

Technology User: US Air Force

Deployment Value/Impact: ISPFSs were deployed to monitor the hydrologic regime during a demonstration of in-well vapor stripping to remediate TCE in ground water. Three ISPFSs were installed to characterize the ground-water flow field around the remediation well at distances of 17, 35, and 50 ft from the well. The circulation system produced flow away from the well in the upper part of the aquifer and toward the well in the lower part of the aquifer The radial distance of the circulation cell is heavily dependent on the anisotropy in hydraulic conductivity in the formation. All three sensors measured horizontal flow, even 50 ft from the well, helping significantly to understand the dynamics of the remedial system.

Point of Contact:

User Program POC:
David Steckel (USAF), Tel. 805-277-1474

OST Program POC:
David Biancosino (DOE-RL), Tel. 509-372-4084

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Laboratories

Funding Information: ($ in Thousands):
Total Estimated Funding: $2,528

Other Deployments:

- In FY 1995, at Savannah River Site (M-Area; TNX), Aiken, SC
- In FY 1995, at Hanford (Columbia River at site boundary), Richland, WA

In Situ Permeable Flow Sensor

(OST Ref. No. 99)

The In Situ Permeable Flow Sensor uses a thin cylinder heater buried in the ground to directly measure the direction and magnitude of 3-D groundwater flow in porous aquifers. Temperature distribution on the cylinder surface varies as a function of groundwater flow magnitude and direction. Previous technologies were labor intensive and required that large volumes of contaminated water be pumped to the surface for storage and disposal.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, M-Area; TNX

Project Name: The In Situ Permeable Flow Sensor

Date of Deployment: January-December, 1995

Technology User: WSRC

Deployment Value/Impact: Flow sensor probes were installed to monitor the effects of in situ air stripping (air sparging) and in situ bioremediation, which were being demonstrated to treat volatile organic compounds in soils and ground water at the M Area. The remediation technologies injected air into the ground below the water table at a depth of approximately 150 ft. The probes were installed to monitor the area of influence of the injected air. A second demonstration was conducted at the TNX Area to provide information to validate flow sensor data. The ground-water velocity measured with the flow sensors was compared to that measured using standard hydrological methods. In both cases, the magnitude of the measured velocity was linearly related to the pumping rate, and the direction of the flow measured was towards the pumping well. In general, in water-saturated sediments the probes are capable of accurately measuring ground-water flow velocities in the range of approximately 5 x 10-6 to 5 x 10-3 cm/s.

Point of Contact:

User Program POC:

- Tom Temples (DOE-SR), Tel. 803-725-9571 (TNX)
- Mike Simmons (DOE-SR), Tel. 803-725-1627 (M-Area)

OST Program POC:
Jim Wright (DOE-SR) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Laboratories

Funding Information: ($ in Thousands):
Total Estimated Funding: $2,528

Other Deployments:

- In FY 1995, at Edwards Air Force Base (TCE groundwater plume), Rosamond, CA
- In FY 1995, at Hanford (Columbia River at site boundary), Richland, WA

In Situ Permeable Flow Sensor

(OST Ref. No. 99)

The In Situ Permeable Flow Sensor uses a thin cylinder heater buried in the ground to directly measure the direction and magnitude of 3-D groundwater flow in porous aquifers. Temperature distribution on the cylinder surface varies as a function of groundwater flow magnitude and direction. Previous technologies were labor intensive and required that large volumes of contaminated water be pumped to the surface for storage and disposal.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, Columbia River at site boundary

Project Name: Groundwater Project - 100 Areas - Hanford Site

Date of Deployment: May - September, 1994

Technology User: Westinghouse Hanford

Deployment Value/Impact: ISPFSs were successful in providing insight into the interaction between ground water beneath the site and surface water in the Columbia River at the site boundary. The level of the Columbia River varies from 3 to 5 ft daily in response to variations in release from an upstream dam. The seasonal variance in river stage is 6 to 8 ft, lower in the fall and higher in the spring. ISPFSs demonstrated relatively steady vertical and downstream components of flow that were essentially not correlated with river stage. During times of high-river stage, water flowed from the river into the bank, whereas during times of low-river stage, ground water flowed toward the river. Ground-water/surface-water interactions showed a time lag of 5 h, as the river stage changes. Close to the river bank, three components of ground-water flow interact in a complex manner: relatively steady flow from the interior of the Hanford Site to the near-bank environment, relatively steady flow downstream, and temporally variable flow in and out to the banks of the river in response to fluctuations in river stage.

Point of Contact:

User Program POC:
Arlene Tortoso (DOE-RL), Tel. 509-373-9631

OST Program POC:
Dave Biancosino (DOE-RL), Tel. 509-372-4084

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Laboratories

Funding Information: ($ in Thousands):
Total Estimated Funding: $2,528

Other Deployments:

- In FY 1995, at Edwards Air Force Base (TCE groundwater plume), Rosamond, CA
- In FY 1995, at Savannah River Site (M-Area; TNX), Aiken, SC

In Situ Permeable Flow Sensor

(OST Ref. No. 99)

The In Situ Permeable Flow Sensor uses a thin cylinder heater buried in the ground to directly measure the direction and magnitude of 3-D groundwater flow in porous aquifers. Temperature distribution on the cylinder surface varies as a function of groundwater flow magnitude and direction. Previous technologies were labor intensive and required that large volumes of contaminated water be pumped to the surface for storage and disposal.

DESCRIPTION OF THE DEPLOYMENT

Location: Strategic Petroleum Reserve, Weeks Island, LA

Project Name: Groundwater flow velocity in the sinkhole

Date of Deployment: June, 1994

Technology User: Strategic Petroleum Reserve Project Management Office, DOE

Deployment Value/Impact: SPFSs were used to monitor ground-water flow into a sinkhole that had formed over the edge of a former salt mine where DOE had stored 72 million barrels of crude oil. Characterization revealed that the sinkhole was the surface expression of a sand-filled conduit within the salt. Flow sensors were installed in the conduit to measure downward flow of ground water into the salt dome. A downward flow of approximately 1 ft/day was measured. The velocity of flow measured by the ISPFSs convinced decision makers that the site was unsuitable for storage of crude oil. The oil was removed, and the facility was abandoned. During removal of the oil, flow sensors were used to monitor the flux of brine into the conduit.

Point of Contact:

User Program POC:
Jerry Berndsen (DOE-Weeks Is. Mine Integrity Group Chairman), Tel. 504-734-4044

OST Program POC:
Jim Wright, Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Laboratories

Funding Information: ($ in Thousands):
Total Estimated Funding: $2,528

Other Deployments:

- In FY 1995, at Edwards Air Force Base (TCE groundwater plume), Rosamond, CA
- In FY 1995, at Savannah River Site (M-Area; TNX), Aiken, SC
- In FY 1995, at Hanford (Columbia River at site boundary), Richland, WA

HaloSnif

(OST Ref. No. 103)

HaloSnif was designed to monitor carbon tetrachloride vapor in the vadose zone at the Hanford Site. However, it can measure any volatile chlorinated compound in air, gas, or water. HaloSnif was evaluated at Hanford as a real-time monitoring system for measuring carbon tetrachloride concentrations in soil gas extracted at the vapor extraction site. HaloSnif may be useful in process or facility monitoring at DOE or industrial sites. During monitoring operations, HaloSnif continuously draws an air sample through a critical orifice into the plasma chamber where it is mixed with helium and excited with a radio-frequency signal. The intensity of the chlorine emission as a result of this process is directly proportional the concentration of chlorine in the sample. Real-time concentrations of total chlorinated compounds are displayed on the monitor for observation by on-site personnel.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford 200W Carbon Tetrachloride Plume

Project Name: RL-ER08 Groundwater Management

Date of Deployment: August 1995

Technology User: Westinghouse Hanford

Deployment Value/Impact: Halosnif operates rapidly at the site (real time) and gives improved accuracy and reliability over baseline methods

Point of Contact:

User Program POC:
- K. M. Thompson (DOE-RL) Tel.509-373-0750
-

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
- PNNL
- Quanta Physik

Funding Information: ($ in Thousands):
Total Estimated Funding: $644

Other Deployments:
In FY 1993 at Tinker AFB in Oklahoma City, OK

Cryogenic Drilling

(OST Ref. No. 155)

This project is developing an innovative method of borehole drilling which employs conventional air drilling equipment that has been modified so that the flushing fluid is super-cold nitrogen. The cold gas flow freezes the moisture in the soil surrounding the hole and prevents collapse. Freezing has the advantage of preventing water or contaminants from entering the borehole and reaching the surface or other non- contaminated strata. The method may also allow a more accurate means of sampling subsurface solids and fluids. Application of the cryo-drilling method requires a special drill string and swivel. These components must be made from stainless steel or other alloy(s) that do not become brittle at low temperatures and must be fitted to the rig. The current experience is that these operations are neither expensive nor technically difficult. This method also requires that liquid nitrogen be provided during the drilling operations, together with the necessary transport and handling equipment. Contrary to popular belief, liquid nitrogen is no longer an exotic material; it is commercially available in tonnage quantities, and can be delivered to most sites by road tanker. The liquid costs between 5 and 10 cents per liter, and the project estimates that the nitrogen costs for drilling typical wells will be a few hundred dollars at most. The additional costs of these two special items are offset by the reduced time that is required to drill the well, principally because of the reduction in trouble time associated with borehole collapse.

DESCRIPTION OF THE DEPLOYMENT

Location: Lawrence Berkeley National Laboratory, LBNL

Project Name: Cryogenic Drilling Deployment

Date of Deployment: May, 1995

Technology User: Lawrence Berkeley National Lab (LBNL)

Deployment Value/Impact: In the case of the wells that were cryo-drilled at LBNL, it was impossible to drill one of the holes by conventional means. In addition, there are time savings resulting from not having to install or remove a casing to stabilize the borehole and from being able to drill a smaller diameter borehole due to the lack of a casing. In the long run, this technology will reduce the total effective project cost.

Point of Contact:

User Program POC:
Kim Abbott (DOE-OK) - Tel. 505-677-1501

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
University of California/Davis, (LBNL)

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,460

Other Deployments:
This technology has not been applied anywhere else.

Acoustic Characterization of Wastes in Double-Shelled Underground Storage Tanks

(OST Ref. No. 175)

This technology adapts two commercially available acoustic devices to characterize wastes and locate objects in the tanks. One system uses echo sounding to locate waste layer interfaces and objects in large high level waste (HLW) tanks. The other system measures density and changes in density of tank waste during mixing operations for mitigating hydrogen buildup or for preparation for waste retrieval.

DESCRIPTION OF THE DEPLOYMENT

Location: Tank SY-101, Hanford/Richland, WA

Project Name: Waste Characterization in Tank SY-101

Date of Deployment: July 1994 - June 1995

Technology User: Center for Non-destructive Evaluation (CNDE), Westinghouse Hanford

Deployment Value/Impact: Data from the acoustic sensors helped verify that mixing was occurring during the stirring of Tank SY101. The absence of reflections from sludge interface, seen in other tanks, helped colloborate mixing was occurring. Stirring of the tank was done to mitigate hydrogen gas buildup and a potential explosion.

Point of Contact:

User Program POC:
Craig Groendyke, DOE-RL, 509-376-9811

OST Program POC:
Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Center for Nondestructive Evaluation (CNDE), Ames Laboratory, AIRMAR Technology

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,621

Other Deployments:
None

Infrared Analysis of Wastes Using Transient Infrared Spectroscopy (TIRS)

(OST Ref. No. 215)

Transient Infrared Spectroscopy (TIRS) is a noncontact, on-line analysis technique for monitoring the composition of process streams of solid or viscous liquid materials. The surface of the molten encapsulated waste stream is cooled by a small air jet as it passes through the field of view of an infrared spectrometer. The change in the observed infrared spectrum caused by the cooling jet is used to compute the composition of the encapsulated waste. The technique is useful for any molecular species that has infrared absorption bands in spectral regions distinct from the strongest bands of the host matrix.

DESCRIPTION OF THE DEPLOYMENT

Location: Rocky Flats, CO

Project Name: Polymer Encapsulation of Low Level Mixed Waste

Date of Deployment: September 1995 **Technology User**: RFETS

Deployment Value/Impact: The TIRS system enabled the determination of the composition of several salts in a molten polymer stream as the mixture came out of the extruder. The monitor was tested on four waste process streams: two kinds of fly ash, molten salt oxidation (MSO) waste, and an MSO surrogate. The system was able to quantitatively determine the waste loading in the polymer stream in real time.

Point of Contact:

User Program POC:	**OST Program POC**:
Gary Huffman, DOE-RF, 303-966-7490	Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Ames Laboratory

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,479

Other Deployments:

- 1996 at Rocky Flats site near Denver, CO
- 1994 at Brookhaven National Laboratory

In Situ Measurement of Volatile and Semi-Volatile Organic Compounds in the Subsurface

(OST Ref. No. 219)

The overall goal of this effort is to develop methods and technology that will couple a CPT with field-deployable gas chromatography/mass spec-trometry (GC/MS) instrumentation to transfer VOCs and SVOCs from subsur-face material at depth to the analytical instrument in the field. Sampling, preconcentration, and analytical equipment will be directly coupled to a CPT to provide on-line, near-real-time analyses for VOCs (e.g., trichloroethylene, benzene) and SVOCs (e.g., polynuclear aromatic hydrocarbons, polychlori-nated biphenyls) in subsurface materials. Preconcentration devices will be interfaced to GC/MS instrumentation and coupled to sampling devices housed in a CPT for in situ quantitative measurement of VOCs in soil gas and groundwater, and for screening of VOC and SVOC levels in the soil external to the penetrometer wall. The VOCs and SVOCs liberated from subsurface material will be carried to the surface by an inert, heated transfer line, preconcentrated, and analyzed by thermal desorption GC/MS. This method follows EPA SW846 method 8270 and generate regulatory quality data in real time.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, Area D

Project Name: Identification of Volatile Organic Compound Contaminants in the Subsurface

Date of Deployment: September 1995 **Technology User**: SRTC

Deployment Value/Impact: Significant schedule acceleration and cost savings due to on site analyses.

Point of Contact:

User Program POC:	**OST Program POC**:
Mitchell Erickson, DOE-EML, 212-620-3619	Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Argonne National Laboratory

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,129

Other Deployments:
None

Geophysical Data Fusion for Subsurface Imaging

(OST Ref. No. 290)

A prototype fusion workstation has been developed that processes multiple sensor data with sufficient fusion automation to be accessible to engineers with minimal training in data fusion technology. The software will be used for characterization of hazardous waste sites by delineation of contaminant plumes and by identification of thin clay layers and geological discontinuities up to a depth of 300 feet. Fusion methodology may have wide applicability to the numerous sites that have environmental management needs. Fusion methodology has been applied to Time Domain Electromagnetics (TDEM) and seismic data with the goal of obtaining shallow, high-resolution subsurface images. It combines non-invasive geophysical sensors including TDEM and near surface seismic exploration techniques. A high frequency seismic source is used to identify thin strata, while algorithms will be developed for differential processing of TDEM which will result in a three-dimensional display. The main elements of a fundamental data fusion system have TDEM and seismic data processed separately to provide inputs to sensor data fusion. Current TDEM subsurface images are obtained by an EM-inversion process that adjusts the image until it is consistent with the data. Fundamental sensor fusion adjusts the image until it is simultaneously consistent with data from all the sensors. EM inversion uses pre-processed data rather than raw data in the inversion steps leading to a geologic cross section. Fundamental sensor fusion uses the same pre-processed data as EM inversion and also uses pre-processed data from other sensors. In addition, sensor fusion may use geologic cross sections from individual sensors to initialize fusion processing. Geological site conditions and geophysical boundary conditions are also used in the fusion process. The fundamental sensor fusion approach combines data from complimentary sensors with explicit geophysical understanding to form a subsurface image. Information contained in the data is directly combined with physical information to form the best image.

DESCRIPTION OF THE DEPLOYMENT

Location: Old Burial Ground & A/M Area, Savannah River Site, SC

Project Name: A/M Area RCRA Part B Permit

Date of Deployment: October - December 1995

Technology User: Coleman Research Corporation/ThermoElectron/FACT

Deployment Value/Impact: Increased confidence in characterization from statistically processing a large volume of data. Significantly improved data processing quality. Improved visualization for decision making. Reduced need for monitoring wells. $35K savings per operable unit application.

Point of Contact:

User Program POC:
Sharon Johnson, DOE-SR, 803-725-5793

OST Program POC:
Robert Bedick, DOE-FETC, 304-285-4505

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Pacific Northwest National Laboratory, Coleman Research Corporation, ThermoElectron, FACT

Funding Information: ($ in Thousands):
Total Estimated Funding: $4,450

Other Deployments:
1995 - Hanford Site, WA

Portable Analyzer for Chlorinated Compounds

(OST Ref. No. 313)

A fully portable, hand-held, solid-state-sensor-based monitoring system that measures low concentrations of chlorinated organic compounds has been developed and is available for field demonstration. The system is capable of detecting chlorinated hydrocarbons in the range of 0.2-25 ppm and up to 500 ppm with an internal dilution feature that is incorporated into the instrument. The portable analyzer can be used to analyze samples from start-up in less than 15 minutes or in a continuous monitoring mode in 10 minutes or less. The system is designed for field use by technicians wearing protective clothing and for easy maintenance. The instrument can be operated from an AC line or from an internal battery. Benefits: Selective detection of chlorinated organics in mixture with other hydrocarbons Reduced analytical costs through screening to reduce the number of samples requiring laboratory analysis Nearly immediate results and low limits of detection enhance applications for worker health and safety monitoring, process monitoring, or initial characterization of spills and historical releases

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, Hanford Site 200 Area, Richland, WA

Project Name: Hanford Site, 200 Area

Date of Deployment: FY 1995

Technology User: Westinghouse Hanford Company

Deployment Value/Impact: The portable analyzer was used to monitor levels of chlorinated hydrocarbons in bore holes within the 200 Area, without requiring the extraction of samples and analysis off-site.

Point of Contact:

User Program POC:
John Neath (DOE-RL) Tel. (509)372-4876

OST Program POC:
Robert Bedick (DOE-FETC) - Tel. (304) 285-4505

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Transducer Research, Inc.
- OST Industry Program

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,512

Other Deployments:
Applied in FY 1995 at INEEL (In use in quarterly monitoring) in Idaho Falls, ID

Portable Analyzer for Chlorinated Compounds

(OST Ref. No. 313)

A fully portable, hand-held, solid-state-sensor-based monitoring system that measures low concentrations of chlorinated organic compounds has been developed and is available for field demonstration. The system is capable of detecting chlorinated hydrocarbons in the range of 0.2-25 ppm and up to 500 ppm with an internal dilution feature that is incorporated into the instrument. The portable analyzer can be used to analyze samples from start-up in less than 15 minutes or in a continuous monitoring mode in 10 minutes or less. The system is designed for field use by technicians wearing protective clothing and for easy maintenance. The instrument can be operated from an AC line or from an internal battery. Benefits: Selective detection of chlorinated organics in mixture with other hydrocarbons Reduced analytical costs through screening to reduce the number of samples requiring laboratory analysis Nearly immediate results and low limits of detection enhance applications for worker health and safety monitoring, process monitoring, or initial characterization of spills and historical releases

DESCRIPTION OF THE DEPLOYMENT

Location: INEEL, Radioactive Waste Management Complex (RWMC), ID

Project Name: N/A

Date of Deployment: January 1996 **Technology User**: Lockheed Martin

Deployment Value/Impact: Routine quarterly monitoring at a cost savings of $185 per sample

Point of Contact:

User Program POC:	**OST Program POC**:
George Schneider (DOE-ID) - Tel. (208) 526-6789	Robert Bedick (DOE-FETC) - Tel. (304) 285-4505

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Transducer Research, Inc.
- OST Industry Program

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,512

Other Deployments:
Applied in FY 1995 at Hanford (Hanford Site 200 Area) in Richland, WA

Innovative Directional and Position Specific Sampling Technique (POLO)

(OST Ref. No. 316)

As a key Department of Energy (DOE) need is the characterization of sites through underground direct sampling, or through the monitoring of underground conditions. The POLO system is believed to be the only downhole position location tool which will meet the operational constraints of penetrometers and lysimeters as they are currently used and provide accurate downhole three-dimensional position determination. Further, the POLO system, used in conjunction with a steerable head, offers the oportunity to significantly extend the application of existing sampling techniques from their current mode of operation in vertical approximate location penetrations to both angled insertion and directional control of insertion to specific locations. The POLO system has the potential to provide a reduction in public and occupational health risk as well as environmental risk by providing greater capability in characterization and monitoring through directional placement of sampling devices adjacent to steel or other magnetic material. Time of remediation will also be improved due to reduction in characterization time and monitoring device installation time, both of which affect remediation time.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, (SRS), SC

Project Name: No Project Name information has been defined

Date of Deployment: FY 1995

Technology User: No Technology User information has been defined

Deployment Value/Impact: No Rationale information has been defined

Point of Contact:

User Program POC:
Jim Wright (DOE-SR)- Tel. (803) 725-5608

OST Program POC:
Robert Bedick (DOE-FETC) - Tel. (304) 285-4505

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- UTD, Inc.
- OST Industry Program

Funding Information: ($ in Thousands):
Total Estimated Funding: $719

Other Deployments:
This technology has not been applied anywhere else.

Biomolecular Probe Analysis: Bioremediation Organisms

(OST Ref. No. 468)

The DNA probe technology was compared to the baseline technology for monitoring population changes (the 'most probable number' technique) which involves taking soil samples, culturing the microorganisms in those samples, and counting the microorganisms that have grown in the culture. Using DNA probes to measure population and activity levels involves utilizing a technique called nucleic acid hybridization. This technique involves three steps. First, nucleic acids (either DNA or ribonucleic acid [RNA]) are chemically extracted from the microbial community present in the environmental sample. Second, specific nucleic acid sequences corresponding to a gene of interest (e.g., the ability to degrade trichloroethylene [TCE]) are produced and labeled with a highly sensitive chemical signal. Third, the labeled nucleic acid sequence (i.e., the probes) is applied to the nucleic acids extracted from the environmental sample under conditions that allow the probe to find and bind to identical and highly similar sequences in the environmental sample. After the unbound probe is removed, the resulting signal is measured to identify the presence and relative abundance of microorganisms that are degrading (for RNA) or have the potential to degrade (for DNA) the contaminant of interest. An increase in the intensity of the signal or an increase in the frequency of a positive signal is used to monitor the perfomance of the bioremediation process.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, Landfill, M and D Area

Project Name: Sanitary Landfill Site

Date of Deployment: October - December, FY95.

Technology User: WSRC

Deployment Value/Impact: The deployment of this technology showed improvement over the baseline due to a much faster incubation period for the organisms, as well as an ability to indicate the types of bacteria present in the soil.

Point of Contact:

User Program POC:
Terry Hazen (LBNL) - Tel. 803-557-7713 (formerly with SRS)

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Microbial Insights, Inc.

Funding Information: ($ in Thousands):
Total Estimated Funding: $315

Other Deployments:
This technology has not been applied anywhere else.

HeavyWeight Cone Penetrometer

(OST Ref. No. 489)

The cone penetrometer is a truck-mounted device that rapidly penetrates into the ground to collect characterization data. The device has been geotechnically applied for approximately 50 years, but is relatively new for environmental restoration. The cone penetrometer rod has a conical tip of up to 1.75 inches in diameter. It pushes hydraulically into the ground with pressures up to 70,000 pounds. The hole generated by the cone penetrometer retains the outside diameter of the rod and can be grouted for ground-water protection, preventing the escape of contaminants as the probe is withdrawn. For soil characterization, as the rod progresses into the ground, a computer reads data from sensors located in both the tip and the side of the probe. The cone penetrometer can monitor for contaminants as the probe is advanced. It can leave screens in place as the rod is withdrawn. The cone penetrometer can advance through fine-grained soil at a rate of 40 to 50 feet an hour. This tool has been adapted for use in the gravel/cobble subsurface common to arid sites. At this time the reliability of the cone penetrometer varies with soil type. When used in gravel, the cone penetrometer maintains approximately 90% reliability (minimal refusal) with two attemps in gravels to depths of 50 feet. In gravels to 100 feet, the percentage drops to approximately 50-75%. In soft soil, the cone penetrometer maintains near 100% reliability.

DESCRIPTION OF THE DEPLOYMENT

Location: Pantex

Project Name: High Explosive/Rad Site

Date of Deployment: July - September, FY95

Technology User: Mason & Hanger (Pantex M&O)

Deployment Value/Impact: The soil at Pantex has high concentration soft clays and silts in the near surface, this is underlain by a caliche Acaprock@ that limits the effective depth of a small diameter tool such as a cone penetrometer. As a result, this system was not always able to attain the expected total depths and could not provide as much useable data as anticipated. Soil samples were obtained by removing the tool, the sensor replaced and boring continued. It was a relatively slow process in comparison to the information collected. At Pantex, considering the information collected and the cost of the system, a hollow-stem auger would have provided equivalent information for less money. For shallow investigations the best system that was ever used at Pantex was the sonic drilling system.

Point of Contact:

User Program POC:
Lee Jackson (DOE-Pantex) - Tel. 806-477-6448

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Batelle, PNNL, Hanford

Funding Information: ($ in Thousands):
Total Estimated Funding: $357

Other Deployments:

- In FY 1993 at Hanford (200-ZP-2-OU), Richland, WA
- In FY 1993 at Hanford (200-ZP-2-OU), Richland, WA
- In FY Unknown at Argonne National Lab (RS 400; ENE 319 Landfill; RS 387; 800 Area Landfill), Argonne, IL
- In FY 1994 at FEMP, OH

Field Screening Laboratory System

(OST Ref. No. 552)

The objective of the Field Screening Laboratory is to develop a mobile field screening laboratory capable of high-quality, same-day metals and organic analyses of toxic, radioactive, or mixed waste environmental samples. The Field Screening Laboratory intends to rapidly develop new methods by enhancing and more fully utilizing the capabilities of commercially available analytical instruments. These instruments include an X-ray fluoresence (XRF) spectrometer for metals analyses of soil/sediment samples and a gas chromatograph with a mass spectrometer (GC-MS) for volatile organic analyses of water and soil samples. XRF is a bulk characterization technique for the rapid, simultaneous, and non-destructive detection of all elements heavier than flourine for soil and sediment environmental samples. The GC-MS is used for volatile organic analysis by collecting gas extracted from the sample. The mass spectrometer reads the chromatograph and identifies organic contaminants.

DESCRIPTION OF THE DEPLOYMENT

Location: Argonne National Lab, RS 387; 800 area landfill

Project Name: 317-319 ENE Area

Date of Deployment: July- Sept, 1995

Technology User: University of Chicago, (ANL)

Deployment Value/Impact: Field Screening Lab System was significantly less costly than alternative off-site commercial lab. Also, data was gathered in realtime which had a positive impact on the schedule.

Point of Contact:

User Program POC:
Michael Ferrigan (DOE-CH) - Tel. 630-252-2570

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Lab (SNL)

Funding Information: ($ in Thousands):
Total Estimated Funding: $260

Other Deployments:
This technology has not been applied anywhere else.

Long Range Alpha Detector (LRAD)

(OST Ref. No. 596)

The Long-Range Alpha Detector (LRAD) soil surface monitor is a large, flat box in which the open end is placed on top of the soil. Radiation from the soil ionizes the air in the box. The amount of ionized air, which is proportional to the amount and type of radiation, is measured. This method is particularly sensitive to alpha radiation, which is emitted by uranium and transuranic elements. Two hand-held, LRAD-based monitors are being designed for routine inspection of the UF6 storage cylinders at Portsmouth, Paducah, and Oak Ridge. One design is for detecting uranium contamination in areas not accessible using standard health physics equipment. The other design is for quantifying leak rates from fill valves so replacements can be prioritized.

DESCRIPTION OF THE DEPLOYMENT

Location: FUSRAP, St. Louis

Project Name: Hazelwood Interim Storage Site

Date of Deployment: June-July 1995

Technology User: University of California/Davis (LANL)

Deployment Value/Impact: The LRAD soil monitoring application was a valuable tool used to verify that the remediation work was successful and the site was clean.

Point of Contact:

User Program POC:
Duncan MacArthur (LANL) - Tel. 505-667-8943

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Eberline Instruments, Santa Fe, NM,
- LANL, Los Alamos, NM

Funding Information: ($ in Thousands):
Total Estimated Funding: $1,125

Other Deployments:
In FY 1993 at Los Alamos National Lab (Five LANL Env. Restoration sites; three LANL sites for Health and Safety office concerns; Uranium critical assembly building), Los Alamos, NM

Air Quality Monitoring for Alpha Contamination

(OST Ref. No. 681)

Long-Range Alpha Detection (LRAD) is based on the principle of the detection of ions created in ambient air by alpha particles. The ions are collected on a grid where a small electric current is induced and measured with a sensitive electrometer.

DESCRIPTION OF THE DEPLOYMENT

Location: Nevada Test Site, Mercury, NV

Project Name: Alpha Containment Confirmation

Date of Deployment: September 1995

Technology User: Los Alamos National Laboratory

Deployment Value/Impact: These instruments were deployed as experimental units to assist in the confirmation of the containment of alpha active material inside experimental chambers at the U1a Complex. The results derived from the deployment were not completely satisfactory. Future deployment will depend on further analysis of the data collected and the availability of resources to pursue project.

Point of Contact:

User Program POC:

- Julie Carpenter, DOE-NV, 702-295-7620
- Richard Henderson, LANL, 505-667-3362

OST Program POC:

Dirk Schmidhofer, DOE-NV, 702-295-0159

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Los Alamos National Laboratory

Funding Information: ($ in Thousands):

Total Estimated Funding: $185

Other Deployments:

None

LDUA Stereo Viewing System

(OST Ref. No. 890)

The Light Duty Utility Arm Stereo Viewing System uses a pair of cameras in conjunction with special hardware to allow the perception of depth. The hardware is modified from state-of-the-art technology for use in radioactive environments. The camera signals are processed by the stereo viewing system and displayed on a conventional monitor. Special liquid crystal display shutter glasses are synchronized with the processed image on the monitor, creating the perception of depth.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, Tank TX-115

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: May - September 1995

Technology User: Westinghouse Hanford Company

Deployment Value/Impact: The Stereo Viewing System provides stereoscopic viewing of Light Duty Utility Arm activities. This capability improves the control of the Light Duty Utility Arm performance in DOE's underground radioactive waste storage tanks and allows operators to evaluate the depth of pits, seams, and other anomalies. Potential applications include Light Duty Utility Arm deployment operations at the Oak Ridge Reservation, Hanford Site, and the Idaho National Engineering and Environmental Laboratory.

Point of Contact:

User Program POC:	**OST Program POC**:
Catherine Louie, DOE-RL, Tel. 509-376-9234	Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Westinghouse Hanford Company
- Pacific Northwest National Laboratory
- Sandia National Laboratory
- Idaho National Engineering and Environmental Laboratory
- Oak Ridge National Laboratory

Funding Information: ($ in Thousands):
Total Estimated Funding: $965

Other Deployments:
No Related Deployments infomation has been defined

Electromagnetic Geophysical Surveyor

(OST Ref. No. 1206)

An automated data aquisition system for collecting closely spaced magnetic data over large areas. Technology is used to identify the location of buried waste objects.

DESCRIPTION OF THE DEPLOYMENT

Location: Brookhaven National Laboratory, BNNL 007-006

Project Name: Chemical/Animal/Glass Holes Removal Action

Date of Deployment: April, 1995

Technology User: Sage Earth Science, Idaho

Deployment Value/Impact: This technology was used to locate 50 pits which had been used to dispose of laboratory wastes, chemical containers and animal caracasses. Results of the magnetic survey were fully consistent with findings of groung-penetrating radar and other electromagnetic survey. The pits locations were defined with high accuracy. The data allowed better estimates of amounts of buried wastes compared to early estimates as well as locating each pit for eventual excavation.

Point of Contact:

User Program POC:
Gail Penny (BNL) - Tel. 516-344-3429

OST Program POC:
Jim Wright, Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Westinghouse-Hanford
- PNL

Funding Information: ($ in Thousands):
Total Estimated Funding: $100

Other Deployments:
In FY 1996, at FUSRAP (Praxair and Colonie)

Electromagnetic Geophysical Surveyor

(OST Ref. No. 1206)

An automated data aquisition system for collecting closely spaced magnetic data over large areas. Technology is used to identify the location of buried waste objects.

DESCRIPTION OF THE DEPLOYMENT

Location: Argonne National Lab, RS 400; ENE 319 Area

Project Name: CH-ANLERA ANL-E Remedial Actions

Date of Deployment: Fiscal Year 1995

Technology User: Argonne National Laboratory

Deployment Value/Impact: No Rationale infomation has been defined

Point of Contact:

User Program POC:
Mike Ferrigan (DOE-CH) Tel. 630-252-2570

OST Program POC:
Jim Wright, DOE-SR, SCFA Manager - 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Westinghouse-Hanford
- PNL

Funding Information: ($ in Thousands):
Total Estimated Funding: $100

Other Deployments:

- Demonstrated in FY 1996 at FUSRAP (Praxair and Colonie) in Colonie, NY
- Deployed in FY 1995 at Brookhaven National Laboratory (BNNL 007-006) in Upton, NY

Process for Contaminant Removal and Waste Volume Reduction to Remediate Groundwater Containing Certain Radionuclides, Toxic Metals and Organics

(OST Ref. No. 1522)

The aim of this project was to develop and demonstrate an improved ex situ treatment process for removing ground water contaminants. A combination of steps were used consisting of sequential chemical conditioning, microfiltration and dewatering by low-temperature evaporation and/or filter pressing to achieve high contaminant removal efficiencies. The conditioning of the contaminated water by a sequential addition of chemicals and adsorption/ion exchange materials produces a poly-disperse system of size enlarged complexes of the contaminants in three distinct configurations: water-soluble metal complexes, insoluble metal precipitation complexes and contaminant-bearing particles of ion exchange and adsorbent materials. Waste volume is reduced by dewatering of the polydisperse system by cross-flow microfiltration, followed by low-temperature evaporation. The bulk of the filtrate is discharged if it meets the specified target water quality, or is recycled.

DESCRIPTION OF THE DEPLOYMENT

Location: Chalk River, Ontario, Canada

Project Name: Spring B Remediation Project

Date of Deployment: October - September, 1995

Technology User: Atomic Energy of Canada

Deployment Value/Impact: The application of CHEMIC technology at the waste management site has resulted in the elimination of Sr-90 activity into a surface water system (swamp) transferred from an unlined trench through the groundwater to a surface spring. On a yearly basis about 0.2 Ci (7.2 E09 Bq) are removed from the groundwater discharge (spring) utilizing a 24 hour/day, 7 day/week operation.

Point of Contact:

User Program POC:
Leo Buckley (Atomic Energy of Canada) - Tel. 613-584-3311

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Argonne National Lab
- Atomic Energy of Canada

Funding Information: ($ in Thousands):
Total Estimated Funding $0.0

Other Deployments:
This technology has not been applied anywhere else.

Micropurging of Wells

(OST Ref. No. 1762)

For water well monitoring purposes, it is essential that sampling have a minimum interference with natural aquifer conditions. Water within the screened section of a monitor well flows through the casing at its normal ground water flow velocity. Therefore, a sample collected from within the screened section represents the aquifer formation water. The baseline sampling approach involves purging three well volumes at a low rate (< 0.5 liters/minute) such that only limited draw-down occurs and, consequently, mixing of the stagnant water above the screened interval with the formation water may take place. The Low Volume Micropurging method involves only purging (at a rate of < 1 gpm) the volume of water contained within the discharge lines and pump prior to measurement of field chemical parameters and sample collection.

DESCRIPTION OF THE DEPLOYMENT

Location: Princeton, PPPL10-11

Project Name: CH-PPPLRA / PPPL Remedial Actions

Date of Deployment: Fiscal Year 1995

Technology User: Princton Plasma Physics Laboratory

Deployment Value/Impact: Benefits include: (1) a dramatic reduction in the amount of Investigation Derived Wastes (IDWs) - contaminated purge water that has to be treated or shipped out for disposal; (2) the amount of sampling time is greatly decreased which leads to lower sampling costs; (3) the Low Volume micropurging methodology can be used with any purging/sampling device, whereas baseline purging can only be done with a handful of devices and can still be time consuming due to the very low purging rates; and (4) there are no draw-down or colloidal effects.

Point of Contact:

User Program POC:
Jeffery Makiel (DOE-PG) Tel. 609-243-3721

OST Program POC:
Jim Wright, DOE-SR, SCFA Manager - 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
LLNL Environmental Restoration Division

Funding Information: ($ in Thousands):
Total Estimated Funding: $219

Other Deployments:

- Deployed in FY 1993 at FEMP (OU5) in Ohio
- Demonstrated in FY 1995 at Lawrence Livermore National Laboratory (Main Site, Site 300) in Livermore, CA
- Deployed in FY 1997 at LLNL (Site 300) in Livermore, CA

Micropurging of Wells

(OST Ref. No. 1762)

For water well monitoring purposes, it is essential that sampling have a minimum interference with natural aquifer conditions. Water within the screened section of a monitor well flows through the casing at its normal ground water flow velocity. Therefore, a sample collected from within the screened section represents the aquifer formation water. The baseline sampling approach involves purging three well volumes at a low rate (< 0.5 liters/minute) such that only limited draw-down occurs and, consequently, mixing of the stagnant water above the screened interval with the formation water may take place. The Low Volume Micropurging method involves only purging (at a rate of < 1 gpm) the volume of water contained within the discharge lines and pump prior to measurement of field chemical parameters and sample collection.

DESCRIPTION OF THE DEPLOYMENT

Location: Lawrence Livermore National Laboratory, Main Site, Site 300

Project Name: OK-002 / Lawrence Livermore National Laboratory (LLNL) - Site 300 Remedial Action

Date of Deployment: August 1995

Technology User: Lawrence Livermore National Laboratory

Deployment Value/Impact: Benefits include: (1) a dramatic reduction in the amount of Investigation Derived Wastes (IDWs) - contaminated purge water that has to be treated or shipped out for disposal; (2) the amount of sampling time is greatly decreased which leads to lower sampling costs; (3) the Low Volume micropurging methodology can be used with any purging/sampling device, whereas baseline purging can only be done with a handful of devices and can still be time consuming due to the very low purging rates; and (4) there are no draw-down or colloidal effects.

Point of Contact:

User Program POC:
Kim Abbott (DOE-OK) Tel. 510-637-1501

OST Program POC:
Jim Wright, DOE-SR, SCFA Manager - 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
LLNL Environmental Restoration Division

Funding Information: ($ in Thousands):
Total Estimated Funding: $219

Other Deployments:

- Demonstrated in FY 1995 at Princeton (PPPL10-11) in Princeton, NJ
- Deployed in FY 1993 at FEMP (OU5) in Ohio
- Deployed in FY 1997 at LLNL (Site 300) in Livermore, CA

In Situ Air Stripping (Sparging) Horizontal Wells

(OST Ref. No. 1918)

The use of horizontal well provides better contact with contaminated subsurface strata than vertical wells. In Situ Air Stripping (Sparging) via horizontal wells combines the functions of two baseline technologies: soil vapor extraction (SVE) and pump and treat. SVE targets the vadose zone and pump and treat targets the saturated zone. Two subparallel horizontal wells are used for air injection and vapor extraction. The lower horizontal is used to inject air under pressure into or below the saturated zone. Air bubbles through the saturated zone contacting, adsorbing, and/or separating phase contaminants into the vadose zone (the zone above the water table). Finally, the air and vapors are extracted by the upper horizontal well. During this process, contaminants are volatilized into the air stream and exit the subsurface through the upper horizontal well. Using air stripping, contaminants are extracted as vapor, reducing the treatment facilities needed to handle the large bulk of VOC contaminated ground water removed by pump-and-treat system.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, A/M Area

Project Name: A/M Groundwater Corrective Action

Date of Deployment: January-December 1995

Technology User: WSRC

Deployment Value/Impact: The cost value associated with this technology is an 80% return on investment as compared to the baseline technology.

Point of Contact:

User Program POC:
Mike Simmons (DOE-SRS), Tel. (803)725-1627

OST Program POC:
Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Groundwater Technologies, Itasca Partners, WSRC

Funding Information: ($ in Thousands):
Total Estimated Funding: $0

Other Deployments:
This technology has not been applied anywhere else.

Rapid Geophysical Surveyor

(OST Ref. No. 1995)

The Rapid Geophysical Surveyor consists of magnetic-field sensors, a calibrated measuring wheel, and a microprocessor-based data logger mounted on a hand-pushed, non-ferrous vehicle. The data logger utilizes menu-driven software so that the key field survey parameters can be configured by the user. The user is required to push a 20-lb cart to collect magnetic data. Magnetic data are automatically collected and stored at user-specified intevals as close as 2-in. apart along survey profile lines. These data form a high-resolution database capable of locating individual objects and potentially determining object orientation, shape, and depth to burial. There is no input required for this passive system, and the output of the RGS is a set of spatially correlated magnetic data.

DESCRIPTION OF THE DEPLOYMENT

Location: Los Alamos National Laboratory, Albuquerque, NM

Project Name: LANL

Date of Deployment: April 1995

Technology User: Los Alamos National Laboratory

Deployment Value/Impact: No Rationale infomation has been defined

Point of Contact:

User Program POC:
Pam Saxman (DOE-AL) - Tel. (505) 845-4846

OST Program POC:
James Wright (DOE-SR) - Tel. (803) 725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Idaho National Engineering Laboratory

Funding Information: ($ in Thousands):
Total Estimated Funding: $100

Other Deployments:
Deployed (type: DOE) in FY 1995 at Brookhaven National Laboratory (BRNL 006-007) in Upton, NY

Rapid Geophysical Surveyor

(OST Ref. No. 1995)

The Rapid Geophysical Surveyor consists of magnetic-field sensors, a calibrated measuring wheel, and a microprocessor-based data logger mounted on a hand-pushed, non-ferrous vehicle. The data logger utilizes menu-driven software so that the key field survey parameters can be configured by the user. The user is required to push a 20-lb cart to collect magnetic data. Magnetic data are automatically collected and stored at user-specified intevals as close as 2-in. apart along survey profile lines. These data form a high-resolution database capable of locating individual objects and potentially determining object orientation, shape, and depth to burial. There is no input required for this passive system, and the output of the RGS is a set of spatially correlated magnetic data.

DESCRIPTION OF THE DEPLOYMENT

Location: Brookhaven National Laboratory, BRNL 006-007

Project Name: Chemical Hole Removal Action

Date of Deployment: July 1995

Technology User: Brookhaven National Laboratory

Deployment Value/Impact: Technology helped to pinpoint the location of buried waste pits.

Point of Contact:

User Program POC:	**OST Program POC**:
Gail Penny (DOE-CH) - Tel. 516-344-3429	Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Idaho National Environmental Engineering Lab

Funding Information: ($ in Thousands):
Total Estimated Funding: $100

Other Deployments:
Applied in FY 1992 at LANL.