

In Well Vapor Stripping

(OST Ref. No. 6)

In-Well Vapor Stripping extracts volatile organic compounds (VOCs) dissolved in groundwater, and removes these contaminants as a vapor. The technology is based on a well within a well design. Groundwater is recirculated by air injected through the central well. VOCs dissolved in groundwater are vaporized and transferred to the flowing air bubbles. The outer well is kept under vacuum where VOC vapors are extracted in the off-gas stream. The outer well delivers the off-gas stream to the surface for treatment.

DESCRIPTION OF THE DEPLOYMENT

Location: Edwards Air Force Base, CA

Project Name: IRP Site SD-019 In-Well Vapor Stripping

Date of Deployment: January-July, 1996 **Technology User:** USAF

Deployment Value/Impact: The IWVS system was successful in significantly reducing the concentration of TCE in the ground water: by nearly 2 orders of magnitude to below the regulatory limit of 5 ppm in the shallow zone of the aquifer, and by about 40% (from 290 to 173 ppm) in the lower zones of the aquifer. The zone of influence defined by the TCE reduction was at least a 50-ft radius in the upper zone of the aquifer and at least a 10-ft radius in the lower zone. This asymmetrical cleanup zone is the result of the geologic heterogeneities at the site. The stripping ratio of the system averaged 90% (i.e., 90% of the contaminant was removed per pass through the system). The system proved both efficient and effective in removing the contaminant from the aquifer.

Point of Contact:

User Program POC:

David Steckel (Edwards Air Force Base - USAF), Tel. 805-277-1474

OST Program POC:

Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

EG&G Environmental, Inc, Stanford University Department of Geological & Environmental Sciences, Pacific Northwest National Laboratory, NoVOCs Inc.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$8,031

Other Deployments:

- In FY 1997, at Brookhaven National Laboratory (OU-3), Upton, NY
- In FY 1997, at Savannah River Site (A&M Area), Aiken, SC
- In FY 1997, at Otis AFB, Cape Cod, MA

Environmental Measurement While Drilling

(OST Ref. No. 8)

In Environmental Measurements-While-Drilling (EMWD), down-hole sensors are located behind the drill bit and linked by a high-speed data transmission system to a computer at the surface. Sandia-developed Windows based software is used for data display and storage. As drilling is conducted, data is collected on the nature and extent of contamination, enabling on-the-spot decisions regarding drilling and sampling strategies.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, M-Area

Project Name: F-Retention Basin

Date of Deployment: January, 1996

Technology User: WSRC

Deployment Value/Impact: Deployed in conjunction with Directional Drilling (TMS #650), to delineate distribution of Cs-137, Co-60 and other radionuclides, using alpha radiation detector and Geiger Mueller Tube. Field test was successful, accomplishing real-time subsurface detection of elevated gamma-radiation levels. Regulatory acceptance, however, was an issue - regulators' requirement to submit samples for laboratory analysis adversely impacted the cost-effectiveness of the system. In general, the EMWD System represents an innovative blending of new and existing technologies to obtain real-time data during drilling. Substantial cost savings result by minimizing the number of samples required for off-site confirmatory analyses. It enables distinguish contaminated from non-contaminated areas in real-time while drilling beneath a hazardous waste site. Worker safety is enhanced as a result of minimizing waste generation and by quickly alerting field personnel to potentially hazardous conditions. The system is currently compatible with fluid miser drill pipe, a directional drilling technique that use minimal drilling fluids and generates little or no secondary waste.

Point of Contact:

User Program POC:

Les Germany (DOE-SR), Tel. 803-725-8033

OST Program POC:

Jim Wright (DOE-SR) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Sandia National Laboratory and Charles Machine Works, Inc.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,173

Other Deployments:

This technology has not been applied anywhere else.

Out of Tank Evaporator

(OST Ref. No. 20)

The mobile evaporator can be used to concentrate liquid waste in order to reduce the volume of the waste for storage or prepare it for immobilization. The evaporator operates below normal atmospheric pressure, allowing excess water to boil off at lower temperatures. At the Oak Ridge Reservation, the mobile evaporator achieved a 90 gallons per hour boil off rate with a decontamination factor of over 1,000,000 (reduction of radioactivity in condensate compared to waste feed).

DESCRIPTION OF THE DEPLOYMENT

Location: Oak Ridge, ORNL Melton Valley Storage Tanks

Project Name: OR-43203, Bethel Valley Remedial Action, Gunite and Associated Tanks Treatability Study (GAATTS)

Date of Deployment: March - May 1996 **Technology User:** Lockheed Martin Energy Systems

Deployment Value/Impact: Evaporators are routinely used at Department of Energy Sites and are typically large, fixed facilities which are costly to construct and operate. The mobile evaporator offers flexibility of operations, and the ability to move the process to the location needed. The mobile evaporator offers a significantly lower capital investment, shorter fabrication schedule, and rapid installation.

Point of Contact:

User Program POC:
Jacquie Noble-Dial, DOE-OR, Tel. 423-241-6184

OST Program POC:
Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Oak Ridge National Laboratory, Argonne National Laboratory, Delta Thermal

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$2,362

Other Deployments:

No Related Deployments information has been defined

Cesium Removal Using Crystalline Silicotitanate

(OST Ref. No. 21)

The Cesium Removal System is a modular, compact ion-exchange unit that can be transported to tank sites. The system consists of ion-exchange columns packed with crystalline silicotitanate, a highly selective inorganic sorbent. As the waste flows through one column to the next, the cesium is trapped in the sorbent. Because the crystalline silicotitanate is highly selective for cesium, very little cesium remains in the waste. Crystalline silicotitanate is commercially available in both powdered and pelletized forms.

DESCRIPTION OF THE DEPLOYMENT

Location: DOE-OR - Oak Ridge National Laboratories - Melton Valley Storage Tanks

Project Name: OR-43203, Bethel Valley Remedial Action, Gunite and Associated Tanks Treatability Study (GAATTS)

Date of Deployment: September 1996 **Technology User:** Lockheed Martin Energy Systems

Deployment Value/Impact: Radioactive waste in many of Department of Energy's underground tanks contains cesium. If the cesium is separated from the waste, the remaining bulk of the waste can be disposed of as low-level waste. Disposal of low-level waste is less expensive and poses less risk. Cesium removal is needed at the Hanford Site, Oak Ridge Reservation, Idaho National Engineering and Environmental Laboratory, and the Savannah River Site.

Point of Contact:

User Program POC:
Jacquie Noble-Dial, DOE-OR, Tel. 423-241-6184

OST Program POC:
Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Pacific Northwest National Laboratory, Oak Ridge National Laboratory, Westinghouse Hanford Company, UOP Inc.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$6,058

Other Deployments:

No Related Deployments information has been defined

Thermal Enhanced Vapor Extraction System (TEVES)

(OST Ref. No. 47)

Thermally Enhanced Vapor Extraction performed a demonstration comparing the relative merits of AC heating and radio frequency (RF) heating coupled with vacuum vapor extraction to mobilize contaminants. AC heating was found to be challenged by dry sand/silts and required a moderate amount of water added to the top of the excitor row of electrodes to moderate localized drying and increase resistance. The RF technology produced more efficient heating (based on the amount of energy applied per temperature rise) than the AC method. The RF technology required 24-hour attendance to monitor and adjust a matching network that equalizes the output impedance of the RF transmitter to the dynamically changing impedance of the treatment zone soils. For the large power applications that would be used in a commercial RF soil heating process, an automated matching network is a necessary component. The TEVES program developed an automated matching network in 1996. The TEVES technology has been demonstrated at two locations. The first was a fire training pit contaminated with jet fuel. A soil zone six feet by twelve feet was remediated to a depth of six feet. A vacuum recovery shell was used to collect fuel from the surface. The test operated for 12 days reached a soil temperature of 150 degrees C. The second demonstration was performed at LLNL Site 300 (near Livermore, CA) and combined vacuum vapor extraction and powerline frequency soil heating. A demonstration was then performed on the Chemical Waste Landfill at Sandia National Laboratories. The demonstration was used on an area of assorted containerized wastes. The patent for the TEVES process is held by IIT Research Institute, which has served as the commercial partner in the demonstration.

DESCRIPTION OF THE DEPLOYMENT

Location: Sandia National Laboratories, Chemical Waste Landfill

Project Name: Chemical Waste Landfill Cleanup

Date of Deployment: January - June, 1996 **Technology User:** DOE, EPA, DOD

Deployment Value/Impact: TEVES technology removed 250lbs of organic chemicals in soil from chemical landfill. Also deployment provided near full-scale cost and performance information.

Point of Contact:

User Program POC:

Dennis Olona (DOE-AL) - Tel. 505-845-4296

OST Program POC:

Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

IIT Research Institute, Chicago, IL

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$2,683

Other Deployments:

No other deployments of this technology have occurred to date.

Flameless Thermal Oxidation

(OST Ref. No. 52)

The Flameless Thermal Oxidation (FTO) has been demonstrated to be an effective destruction technology for process and waste stream off-gas treatment of volatile organic compounds (VOCs), and in the treatment of VOC and chlorinated volatile organic compounds (CVOCs) off-gases generated during site remediation. The FTO process efficiently converts VOCs and CVOCs to carbon dioxide, water and hydrogen chloride.

DESCRIPTION OF THE DEPLOYMENT

Location: INEEL, WAG-7, OU 708

Project Name: Organic Carbon in the Vadose Zone

Date of Deployment: January, 1996-
(Ongoing)

Technology User: LMITCO WAG-7

Deployment Value/Impact: Deployment is targeting VOCs (CCI4, 1,1,1 TCA, TCE, and PCE) in the vadose zone that have leaked from Rocky Flats Facility-stored sludge drums. The Recuperative Thermal Oxidation comprises three units (two - at 400 scfm, one - at 200 scfm), and has so far retrieved some 40,000 lb of VOCs. Thanks to the low VOC concentrations - and the correspondingly low emissions of HCl, one of the breakdown products, scrubbers are not required. Annual cost savings with respect to baseline technologies are estimated at \$0.75 million.

Point of Contact:

User Program POC:
Patti Kroupa (DOE-Idaho), Tel. 208-526-8419

OST Program POC:
Jim Wright, DOE-SR, SCFA Manager - Tel.
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TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Thermatrix, Inc., Westinghouse Savannah River Company

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$80

Other Deployments:

None

SEAMIST

(OST Ref. No. 53)

SEAMIST has been demonstrated and deployed as an innovative tool to better access the subsurface for characterization and monitoring of contaminants in both vertical and horizontal boreholes, both above and below the water table. SEAMIST consists of an airtight membrane liner pneumatically and/or hydraulically emplaced inside a borehole, simultaneously maintaining the integrity of the borehole and permitting collection of contaminant samples from the subsurface at discrete depth intervals. Instrumentation can be used in horizontal, vertical, enlarged, constricted, and curved holes.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, South Carolina

Project Name: A/M Area

Date of Deployment: Third Quarter of FY97 **Technology User:** WSRC

Deployment Value/Impact: SEAMIST provides quality samples of subsurface chemistry and hydrogeology. It lines the borehole temporarily or permanently, preventing the borehole from collapsing, limiting movement of air into the subsurface, and preventing liquid vertical mixing. It acts as a downhole support platform for sampling devices and instrumentation. SEAMIST liners cost less than \$1000 for several-hundred-foot lengths, and are most cost-effective when requirements call for more than one characterization technology to be used within a single borehole. They can be greater than three times more cost-effective than conventional lysimeters when attempting to collect pore fluid samples from the unsaturated zone.

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:

Eastman Cherrington Environmental

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$2,413

Other Deployments:

- In FY 92, at Lawrence Livermore National Laboratory (Tritiated water plume tracking), Livermore, CA
- In FY 94, at ORNL
- In FY 93, at SNL: gas sampling and permeability measurement underneath chemical waste landfill
- In FY 94, at LANL: vapor sampling tubes and absorbent collectors beneath an old rad. waste landfill
- In FY 92, at Hanford: carbon tet plume monitoring
- In FY 92, at WIPP: map and measure underground brine flows.

Passive Soil Vapor Extraction (Barometric Pumping)

(OST Ref. No. 56)

Passive Soil Vapor Extraction (PSVE) technology takes advantage of natural pressure gradients to cause the flow of contaminant-laden subsurface air from the vadose zone to the surface. These gradients are caused by changes in atmospheric pressure which fluctuate diurnally and with the movement of large air masses. Application of PSVE involves the creation and utilization of pathways, such as wells and pipe collection networks, to produce a directed air-flow in response to natural pressure changes.

DESCRIPTION OF THE DEPLOYMENT

Location: INEEL, Radioactive Management Complex WAG 7 - Pit 2 at SDA

Project Name: ID-ER-06; Enhanced Passive Extraction Vapor System

Date of Deployment: January 1996 **Technology User:** LMITCO WAG-7

Deployment Value/Impact: A system consisting of a surface seal, collection plenum, and one way relief valve to the soil surface above the contaminant plume induces a net upward soil gas velocity in the contaminated soil. The daily sinusoidal velocity cycle is rectified to eliminate its downward (inhaling) velocity component and allow the normal upward (exhaling) component. The resulting net upward velocity sweeps the contaminant vapors up from the source, releasing them to the atmosphere in small concentrations. This process is applied to a 100' X 100', VOCs-contaminated site without resort to boreholes, off-gas treatment, or site power. Thirty two probes measure soil gas pressure and VOC concentration gradients. Generally, this system's cost is less than half the cost estimated for conventional solutions.

Point of Contact:

User Program POC:

Patti Kroupa (DOE-INEEL), Tel. 208-526-8419

OST Program POC:

Jim Wright, Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Science and Engineering Associates, Inc. (SEA)

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$2,909

Other Deployments:

- FY 1995, Hanford (200 West Area carbon tetrachloride plume), Richland, WA
- FY 1997, Savannah River Site (A/M Area), Aiken, SC

Electrokinetics - Arid

(OST Ref. No. 57)

The Electrokinetics - Arid technology creates an electric field in soil to force radionuclide and metal contaminants in low-permeability soils toward in situ electrodes. The contaminants are then removed with minimal excavation required. A moisture-addition method has been developed for soils without sufficient moisture.

DESCRIPTION OF THE DEPLOYMENT

Location: Sandia National Laboratories, Chemical Waste Landfill

Project Name: Electrochemical Demonstration at the Unlined Chromic Acid Pit

Date of Deployment: May 96 - November 97 **Technology User:** Sandia National Laboratories (SNL)

Deployment Value/Impact: A 12'x12'x6' thick cell (864 Cu. ft) contaminated by chromate (CrO₄) was treated. In general, electrokinetic removal of heavy metals is far more selective than baseline excavation/disposal, creating a smaller volume for ultimate disposal. This technology also fills a technology gap (permits remediation) where (a) heavy metals contaminate deep arid soils (too deep to excavate), and (b) heavy metals contaminate soil under buildings or other valuable structures. As the process operates in situ with a minimum of surface equipment and activity, worker safety and risk issues are less of a concern than with baseline excavation.

Point of Contact:

User Program POC:

Doug Denham (DOE-AL), Tel. 505-845-4846

OST Program POC:

David Robertson (DOE-ID), Tel. 208-526-4953

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Sandia National Laboratories (SNL)

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$3,576

Other Deployments:

This technology has not been applied anywhere else.

Automated Control System for Soil Vapor Extraction

(OST Ref. No. 64)

The Automated Control System is a refinement added to an existing Soil Vapor Extraction unit which allows the unit to be monitored as it performs remediation tasks.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, A/M Area

Project Name: Remote Site Controllers for Soil Vapor Extraction Units

Date of Deployment: Installation: August 1996 to December 1996
Testing: January 1997 to present

Technology User: Environmental Restoration Division at SRS.

Deployment Value/Impact: This system provides an automated method of control of the soil vapor extraction technology, as opposed to a manual system.

Point of Contact:

User Program POC:

Tom Kmetz (Bechtel - SRS) - Tel. 803-952-6494

OST Program POC:

Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

SVS Environmental Systems Inc., Albuquerque, NM

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$350

Other Deployments:

This technology has not been applied anywhere else.

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: Inhalation Toxicology Research Institute, Albuquerque, NM

Project Name: No Project Name information has been defined

Date of Deployment: November 1996 **Technology User:** Lovelace Biomedical and Environmental Research Institute

Deployment Value/Impact: Surveyed 300 ft of drain lines.

Point of Contact:

User Program POC:
Doug Denham (DOE-AL) - Tel. (505) 845-4846

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

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

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

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,224

Other Deployments:

- Deployed (type: DOE) in FY 1995 at FUSRAP (General Motors Adrian Plant) in Adrian, MI
- Deployed (type: DOE) in FY 1996 at Grand Junction Project Office (Grand Junction Site) in Grand Junction, CO
- Deployed (type: DOE) in FY 1997 at Mound (Mound Site) in Miamisburg, OH
- Deployed (type: Non-DOE) in FY 1998 at Portland Gas and Electric Trojan Nuclear Plant (Portland Gas and Electric Trojan Nuclear Plant) in Portland, OR
- Deployed (type: DOE) in FY 1997 at Argonne National laboratory (CP-5 Reactor) in Chicago, IL
- Deployed (type: Non-DOE) in FY 1998 at Crystal River (Crystal River Nuclear Power Plant) in Crystal River, FL
- Deployed (type: DOE) in FY 1998 at Los Alamos National Laboratory (Buried waste pits) in Los Alamos, NM

Pipe Explorer (TM) System

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DESCRIPTION OF THE DEPLOYMENT

Location: Grand Junction Project Office, Grand Junction, CO

Project Name: No Project Name information has been defined

Date of Deployment: February 1996

Technology User: N/A

Deployment Value/Impact: Radiological data obtained in 800 ft of drain line, and videotape of 400 ft was obtained.

Point of Contact:

User Program POC:

Doug Denham (DOE-AL) - Tel. (505) 845-4846

OST Program POC:

Robert Bedick (DOE-FETC) - Tel. (304) 285-4505

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

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

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,224

Other Deployments:

- Applied in FY 1995 at FUSRAP (General Motors Adrian Plant) in Adrian, MI
- 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: Portsmouth Gaseous Diffusion Plant, Portsmouth, OH

Project Name: Mapping support to the Groundwater Remediation Program

Date of Deployment: August 1996

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
- FY95 - Oak Ridge National Laboratory (SWSA 4,5,6 and others) in Oak Ridge, TN
- FY94 - Oak Ridge National Laboratory in Oak Ridge, TN

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 (K-25), Uranium Cylinder Yards

Project Name: Mapping Support to the Uranium Storage Program

Date of Deployment: 1996

Technology User: Portsmouth GDP

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 - Portsmouth Gaseous Diffusion Plant, TN
- FY95 - Oak Ridge National Laboratory (SWSA 4,5,6 and others) in Oak Ridge, 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: Savannah River Site

Project Name: D Area Oil Seepage Basin Investigation

Date of Deployment: November 1995 **Technology User:** Westinghouse
Savannah River
Company

Deployment Value/Impact: Saved seven months on characterization schedule. Tracked thirteen chemical of concern plumes in groundwater with on-site laboratory after hydrogeologic investigation with ground penetrating radar, EM31, EM34, and direct push conductivity probes and SCAPS truck investigation had revealed two controlling aquitards above green-clay confining aquitard. Field sampling effort lasted twelve days. ESC officially adopted by SRS for all subsequent site assessments. Given 30% typical savings, it is estimated there will be \$100 million in savings with 1996 BMER estimated site assessment budget of \$650 million over 30 years.

Point of Contact:

User Program POC:
Tom Gaughan, DOE-SR, 803 952-6848

OST Program POC:
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:

- 1995 - St. Louis Airport Site (a FUSRAP site)
- 1996 - Zone 12 Site Characterization at Pantex
- 1997 - Central Nevada Test Site

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DESCRIPTION OF THE DEPLOYMENT

Location: PANTEX, TX

Project Name: PANTEX Groundwater Characterization Project (Zone 12)

Date of Deployment: January 1995 **Technology User:** Mason Hanger

Deployment Value/Impact: ESC was deployed as part of an effort to characterize the nature, location, and extent of groundwater contamination under the entire Pantex site. The ESC deployment saved over \$4 M dollars over the baseline characterization plan for the site. Improved characterization identified new contaminant transport pathways which were confirmed to have transported contaminants to the site boundary.

Point of Contact:

User Program POC:

Helen Belencan, DOE-HQ/EM-35, 301-903-8549

OST Program POC:

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:

- 1995 - St. Louis Airport Site (a FUSRAP site)
- 1996 - Savannah River D-Area Oil Seepage Basin
- 1997 - Central Nevada Test Area

Light Duty Utility Arm

(OST Ref. No. 85)

The light duty utility arm (LDUA) enables remote deployment and operation of in situ surveillance, confined sluicing, inspection, and waste analysis tools, called end-effectors, to multiple, in-tank positions using a robotic manipulator arm mounted on a telescoping mast. The arm can access radioactive waste storage tanks through existing 12-inch or larger diameter risers in tank domes.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, Tank 106-T

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: September 1996 **Technology User:** Westinghouse Hanford Company

Deployment Value/Impact: The LDUA is the core of a suite of technologies; it provides a mobile, multi-axis positioning system that will access DOE's radioactive waste tanks through existing openings in the tank domes. The system is operated remotely, reducing exposure to operators and provides significant advantages over prior methods that limited deployment of tools to positions directly below tank access risers.

Point of Contact:

User Program POC:

Catherine Louie (DOE-RL)-tel. 509-376-9234

OST Program POC:

Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Westinghouse Hanford Company, SPAR Aerospace, Pacific Northwest National Laboratory, Sandia National Laboratory, Idaho National Engineering and Environmental Laboratory, Oak Ridge National Laboratory

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$25,940

Other Deployments:

No Related Deployments information has been defined

Near Infrared (NIR) Spectroscopy

(OST Ref. No. 86)

In a hot cell, a sample of tank waste is exposed to infrared light. Water in the sample absorbs some of the infrared energy and produces strong overtone bands in the near infrared optical region. These bands are detected with conventional fiber optic and optical components. Numerical analysis techniques are then applied to the near infrared spectra to derive a moisture value and these sample spectra are compared to a model of known water concentration. This near infrared technique evaluates moisture content without consuming any part of the sample while reducing the time to perform the analysis.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, 222S Hot Cell

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: January - March
1996

Technology User: Westinghouse Hanford
Company

Deployment Value/Impact: Thermogravimetric analysis has been routinely used to measure the amount of water in a sample of radioactive tank waste, but is not the most effective method. Near infrared spectroscopy can improve the quality of results and reduce the time required to perform the analysis. This technology determines the amount of water in waste samples by measuring the optical absorption caused by water in tank wastes. While directly applicable to several Hanford Site tanks, this technology may be useful at other tank sites.

Point of Contact:

User Program POC:

Catherine Louie (DOE-RL)-tel. 509-376-9234

OST Program POC:

Jeff Frey (DOE-RL)-tel. 509-372-4546

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Westinghouse Hanford Company, Lawrence Livermore National Lab

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,685

Other Deployments:

No Related Deployments information has been defined

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: Port Hueneme Naval Base, Port Hueneme, California

Project Name: Port Hueneme (non-DOE)

Date of Deployment: September 1996 **Technology User:** United States Navy

Deployment Value/Impact: This technology detects the three-dimensional flow pattern in a subsurface aquifer and is applicable at various DOE sites (e.g., Hanford, Savannah River Site). Cost benefits may be expected since less sensing labor is utilized and no sample disposal is required. For regions with tritium or other radionuclides in ground water, the flow sensor is expected to significantly lower risk to field personnel.

Point of Contact:

User Program POC:

Mike Simmons (DOE-SR) - Tel. 803-725-1627

OST Program POC:

James Wright (DOE-SR) Tel. (803) 725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Sandia National Laboratories
- Texas A&M University (owner of rights)
- Licensed to SIE, Inc.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$2,528

Other Deployments:

- Deployed (type: DOE) in FY 1995 at Savannah River Site (M-Area; TNX) in Aiken, SC
- Deployed (type: DOE) in FY 1995 at Hanford (Columbia River at site boundary) in Richland, WA

Laser Ablation/Mass Spectroscopy (LA/MS)

(OST Ref. No. 127)

The laser ablation/mass spectrometer system provides elemental and/or isotopic detection and quantification of most elements in the periodic table. In this system, a pulse laser beam is used to remove very small amounts of material from a tank waste sample; this process is called laser ablation. An inert carrier gas (argon) transfers the ablated sample to the inductively coupled plasma torch. Here, the sample plume is disassociated into atomic species and the atoms are ionized. The ionized atoms enter a mass spectrometer and are analyzed to determine the elemental and isotopic species and their populations in the sample.

DESCRIPTION OF THE DEPLOYMENT

Location: DOE-RL, Hanford Building, 222-S Hot Cell

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: September 1996 **Technology User:** Westinghouse Hanford Company

Deployment Value/Impact: The laser ablation/mass spectrometer system is a chemical analysis method that can determine the amount of most elemental/isotopic constituents in tank waste samples with no sample preparation. This technology has the potential to provide rapid analytical results while lowering production times and worker exposure.

Point of Contact:

User Program POC:

Catherine Louie (DOE-RL) - tel. 509-376-9234

OST Program POC:

Jeff Frey (DOE-RL) - tel. 509-372-4546

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Pacific Northwest National Laboratory

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,364

Other Deployments:

No Related Deployments information has been defined

Smart Sampling

(OST Ref. No. 162)

With Smart Sampling, geostatistical simulation techniques are applied to existing site data and maps are generated which model the probability of contamination exceeding a regulatory threshold across a site. This probabilistic approach requires stakeholders and regulators to agree on the level of risk they are willing to accept in determining both an action level for the contamination and the probability of failing to meet that level. The acceptable probability of leaving behind contaminated soil is applied to the probability map. Every location on the map exceeding the acceptable probability is targeted for remediation. Together these locations comprise the remediation map and can be displayed as a computerized mapping system commonly referred to as a Geographic Information System (GIS). Integrating site data with the chosen action levels and range of probabilities, the maps and their corresponding cost curves allow regulators and stakeholders to see clearly the economic consequences of their decisions. If the uncertainty, or cost, of achieving an acceptable clean-up level is too high, it may be possible to reduce these factors by taking additional soil samples. The maps can be used to determine optimal locations for the collection of additional samples.

DESCRIPTION OF THE DEPLOYMENT

Location: Mound, OH

Project Name: Miamisburg Erie Canal Project

Date of Deployment: July, 1996

Technology User: Oak Ridge National Lab (ORNL)

Deployment Value/Impact: Approximately 28 thousand cubic yards of soil was characterized and removed. This saved roughly one-quarter to one-third soil volume that didn't have to be dug up and removed.

Point of Contact:

User Program POC:
Arthur Kleinrath (DOE-OH) - Tel. 937-865-3597

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

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Laboratory

Funding Information: (\$ in Thousands):
Total Estimated Funding: \$1,832

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

In Situ Chemical Oxidation Using Potassium Permanganate

(OST Ref. No. 167)

The In Situ Chemical Oxidation of Soils system used strong oxidizing agents (hydrogen peroxide [Fenton's chemistry], iron, or potassium permanganate [KMnO₄]) to treat soils or groundwater contaminated with a range of organic chemicals, including trichlorethylene. Potential application to metal and radionuclide contaminants, including oxidation/immobilization of uranium, is being investigated. This technology is designed for use with efficient delivery systems, such as the Multi-Point Injection System and Deep Soil Mixing, to treat contaminants in low permeability soils.

DESCRIPTION OF THE DEPLOYMENT

Location: Kansas City Plant, Northeast Area, Former Ponds

Project Name: AL/KCP/ER; In Situ Soil Mixing Demonstration

Date of Deployment: July, 1996

Technology User: AlliedSignal Federal Manufacturing & Technologies

Deployment Value/Impact: The technology was applied to treat a 60'x140', 25' to 47' deep cell comprising low-permeability clay soils, contaminated with TCE and 1,2-DCE. Access was enabled using an 8'-diameter mixing tool. TCE mass reductions of up to 69% in saturated soil and 83% in unsaturated soil were achieved using an average loading of 6g KMnO₄/Kg soil. Following treatment, the physical and biological properties of the soil remained essentially intact. Treatment costs were estimated at \$128/Cubic yd of soil.

Point of Contact:

User Program POC:

Phil Keary (DOE-KCAO), Tel. 816-997-7288

OST Program POC:

Jim Wright, Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Westinghouse Savannah River Company (WSRC)/Oak Ridge National Laboratory (ORNL)

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,829

Other Deployments:

- In FY 1997, at Argonne National Lab (RS 395; 317 French drain), Argonne, IL
- In FY 1997, at Portsmouth Gaseous Diffusion Plant (X-701B site), Piketon, OH
- In FY 1997, at Savannah River Site (A/M Area), Aiken, SC

Membrane-Supported Particle-Bound Ligands for Cesium Removal

(OST Ref. No. 179)

Molecular recognition agents engineered into flow-through membranes have been developed for selective removal of cesium, strontium and technetium from aqueous wastes. Agents provided by IBC Advanced Technologies have been attached to 3M Empore (TM) membranes and tested with a variety of DOE waste streams. Capacity, selectivity, and stability of the system have been evaluated.

DESCRIPTION OF THE DEPLOYMENT

Location: INEEL, Test Area North (TAN)

Project Name: Cesium Removal at INEEL, Test Area North (TAN) using Particle-Bound Ligands

Date of Deployment: Fiscal Year 1996 **Technology User:** INEEL

Deployment Value/Impact: The Empore™ cartridges were used to remove cesium and strontium from the treated effluent of the Groundwater Treatment Facility (GWTF) near the TSF-05 injection well at TAN. The system was effective in completely removing the strontium and cesium that passed through the existing system.

Point of Contact:

User Program POC:
Terry Todd, (208) 526-3365

OST Program POC:
Jerry Harness, (DOE-OR) (423) 576-6008

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

3M, and IBC Advanced Technologies

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$5,544

(Outside Funding: \$25)

Other Deployments:

- FY 1996 at Hanford (N-Springs, N-Basin) in Richland, WA
- FY 1998 at Savannah River Site (R-Basin) in Aiken, SC
- FY 1996 at Argonne National Laboratory (CP-5 Test Reactor Facility Fuel Pool) in Chicago, IL

Membrane-Supported Particle-Bound Ligands for Cesium Removal

(OST Ref. No. 179)

Molecular recognition agents engineered into flow-through membranes have been developed for selective removal of cesium, strontium and technetium from aqueous wastes. Agents provided by IBC Advanced Technologies have been attached to 3M Empore(TM) membranes and tested with a variety of DOE waste streams. Capacity, selectivity, and stability of the system have been evaluated.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, N-Springs, N-Basin, 105-N-Reactor Basin

Project Name: Cesium Removal at Hanford, N-Springs, N-Basin, and 105-N-Reactor Basins using Particle-Bound Ligands

Date of Deployment: March 1996

Technology User: Bechtel Hanford Inc. (BHI)

Deployment Value/Impact: The Empore™ cartridges were used to remove cesium and strontium from 105-N-Reactor Basin water. This small-scale reactor removed cesium at 1 gallon per minute (gpm) and strontium at 2 gpm with no observable breakthrough of contaminants after 7200 adsorber bed volumes.

Point of Contact:

User Program POC:
Bill Bonner, (509) 372-6263

OST Program POC:
Jerry Harness, (423) 576-6008

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

3M, and IBC Advanced Technologies

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$5,544

(Outside Funding: \$25)

Other Deployments:

- FY 1996 at INEEL (Test Area North (TAN)) in Idaho Falls, ID
- FY 1998 at Savannah River Site (R-Basin) in Aiken, SC

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, Denver, CO

Project Name: Polymer Encapsulation of Low Level Mixed Waste

Date of Deployment: April - May 1995

Technology User: RFETS/EG&G, Kaiser-Hill

Deployment Value/Impact: The TIRS system enabled the determination of the composition of salts in a molten polymer stream as the mixture came out of the extruder. The system provided an essentially continuous record of the composition of the polymer-waste solid mixture formed by the process. The on-line monitor not only provided quality assurance without expensive post-production sampling, but it also enabled correction of the mix fed to the extruder if the composition varied outside of the optimal range.

Point of Contact:

User Program POC:
Gary Huffman, DOE-RF, 303-966-7490

OST Program POC:
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 - Rocky Flats
- 1994 - Brookhaven National Laboratory

Thermal Conversion of Asbestos

(OST Ref. No. 224)

The Asbestos Conversion System thermally converts the asbestos in asbestos-containing material (ACM) into a totally nonhazardous substance. The ACM is introduced to the process via a mechanical conveyor system. The asbestos drops from the conveyor into a shredder for size reduction to 1-inch diameter or less. From the shredder, the asbestos is introduced into a soak tank of heated, 7 percent borax solution (nonhazardous) and is fed via a dewatering screw press into the rotary hearth furnace. In the furnace, the asbestos is subjected to temperatures of 2,200 degrees Fahrenheit for a period of one hour. The converted asbestos-free material is then removed from the furnace by means of a discharge system where the material drops by gravity into a solids quench tank filled with clean water.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford

Project Name: RL-ER06, Decontamination & Decommissioning

Date of Deployment: September 1996 **Technology User:** Bechtel Hanford, Inc.

Deployment Value/Impact: Hanford used the system to thermally convert asbestos containing material (ACM) into a non-hazardous material suitable for onsite disposal. The system was used to melt and volume reduce bulk insulation from facility deactivation activities at Hanford.

Point of Contact:

User Program POC:

Shannon Saget (DOE-RL) - 509-372-4029

OST Program POC:

Steve Bossart (DOE-FETC) - 304-285-4643

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Asbestos Recycling, Inc. (ARI)

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$678

Other Deployments:

No other deployments in FY 1996

Biomass Remediation System

(OST Ref. No. 251)

This technology addresses the remediation of soils contaminated with radionuclides and heavy metals. Two processes will be evaluated: (1) Phytoextraction, the removal of contaminants by plants, and (2) phytostabilization, the inhibition of contaminant mobility. Both are emerging technologies with potential use in the clean-up of soils contaminated with radionuclides and heavy metals.

DESCRIPTION OF THE DEPLOYMENT

Location: Reactive Metals Inc. , RMI Decommissioning Site Ashtabula, OH

Project Name: OH-AB-01 Remediation

Date of Deployment: March 1996

Technology User: Reactive Metals Inc.

Deployment Value/Impact: Rhizofiltration is less expensive than selective ion exchange media. Over 90% of uranium was removed from wastewater, which was achieved during initial testing of the rhizofiltration, at the Ashtabula Site.

Point of Contact:

User Program POC:

Doug Maynor (DOE-OH) Tel. 937-865-3986

OST Program POC:

Jim Wright (DOE-SR) SCFA Manager - 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Phytotech, Inc.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$4,025

Other Deployments:

Demonstrated (type: Small-Scale) in FY 1998 at Chicago (Landscape Soils OU) in Upton, NY

Miniature Pumps in the Cone Penetrometer Tip for Groundwater and Soil Sampling (Cone Sipper)

(OST Ref. No. 381)

Miniature pumps have been developed by the Savannah River Technology Center (SRTC) for use with Cone Penetrometer Technology (CPT) probes to obtain groundwater and soil gas samples. The technology provides fast, cost-effective analysis of groundwater to characterize waste sites. Several analytical techniques are available for field use if samples could be obtained without well drilling and conventional sample removal. In this technology small pumps are coupled with a cone penetrometer to obtain real-time measurement of analytes as the cone is pushed, or for collection of liquid and gas samples at discrete subsurface depths.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River's Metallurgical Manufacturing Facility in Area M

Project Name: Characterization of Area M MetLab Facility

Date of Deployment: April 1996

Technology User: Westinghouse
Savannah River
Company

Deployment Value/Impact: The ConeSipper was found to be more reliable and less expensive than bailer systems and much less expensive than drilling and installing wells to collect groundwater and soil gas samples. 60 groundwater samples and 20 soil samples from ~150 ft underground were analyzed and the contaminants TCE and PCE, were found.

Point of Contact:

User Program POC:
Sharon Robinson, DOE-SR, 803-725-2378

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

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Savannah River Technology Center, Applied Research Associates

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$162

Other Deployments:

None

Cross-Well Seismic Imaging

(OST Ref. No. 588)

The objective of this task is to determine the applicability of high frequency seismic crosswell imaging for characterization contaminated subsurface sites. The technology utilizes seismic sources (high-frequency piezoelectric) and receivers (accelerometers) clamped to the borehole walls. A high-voltage signal energizes the piezoelectric crystal and causes an acoustic signal to be transmitted through the earth, where it is picked up by the receiver. The time of flight of the signal and amplitude of the signal are measured, as well as the details of the effect and the propagation path. These signals are then processed for information on the mechanical properties of the earth. A primary goal is to demonstrate the frequency range, resolution, and sensitivity of borehole seismic methods in boreholes that cannot be filled with water (arid sites), or in which conventional clamping devices cannot be used for coupling the seismic sources and receivers to the borehole walls. An equally important goal is to demonstrate that high-resolution seismic imaging can be used to characterize structure and lithology related to transport properties in a routine and cost-effective manner. The scope of this project is to start with existing technology that uses piezoelectric transducers for transmitting and receiving high-frequency seismic energy in water-filled boreholes, and adapting this technology to boreholes which are often only partially filled with water or completely dry. In addition, boreholes in contaminated sites are generally lined with a relatively fragile material, so conventional clamping devices cannot be used. The approach is staged to first evaluate different mechanisms for borehole coupling, which will affect frequency content and amplitude of the seismic signals. If successful, the sources and clamping mechanisms will be improved to allow shear wave transmission in addition to compressional wave transmission. An equally important task is to demonstrate in-field collection and imaging methods, such that the imaging results can be obtained in an efficient and cost-effective fashion. The latter phases of the project will use this technology at an arid site that will be remediated. The last phase will be to transfer as much technology as possible to private industry.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, H Area Tank Farm

Project Name: Tank Farm Seismic Imaging Project

Date of Deployment: Oct. - March, 1996 **Technology User:** Site Technical Services, Westinghouse Savannah River Corp.

Deployment Value/Impact: The Cross-Well Seismic Imaging technology enables users to see beneath a building or tank for remediation purposes. Additionally, it can be used to determine the hydrologic properties of groundwater.

Point of Contact:

User Program POC:

Randy Cumbest (WSRC-SRS) - Tel. 803-952-6936

OST Program POC:

Jim Wright (DOE-SRS) - Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Lawrence Berkeley National Lab, Berkeley, CA
- Southwest Research Institute, San Antonio, TX

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$416

Other Deployments:

- Applied in FY 1992 at Lawrence Livermore National Laboratory (Main Site) in Livermore, CA

Cross-Well Seismic Imaging

(OST Ref. No. 588)

- Applied in FY 1997 at LLNL (Livermore Site) in Livermore, CA

Directional Drilling

(OST Ref. No. 650)

Directional drilling allows access to sites beneath installations and supports the deployment of instruments, sensors, and other devices to the subsurface for characterization, remediation (including barrier placement), and monitoring purposes. Accurate placement of these boreholes and their spatial control is also an important factor. Several directional drilling systems have been tested at different DOE sites, including the (1) short radius drilling, (2) mud rotary system, (3) hybrid system of Eastman Cherrington Environmental, (4) slant compaction rig (Ditchwitch), and (5) river crossing system.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site, M-Area

Project Name: F-Retention Basin

Date of Deployment: January, 1996

Technology User: WSRC

Deployment Value/Impact: Deployed in conjunction with Measurement While Drilling (TMS #8), to delineate distribution of Cs-137, Sr-90 and other radionuclides, using alpha radiation detector and Geiger Mueller Tube. In general, directional wells minimize secondary waste generation and reduce costs for drilling by minimizing operational and contamination exposure hazards to personnel.

Point of Contact:

User Program POC:

Les Germany (DOE-SRS), Tel. 803-725-8033

OST Program POC:

Jim Wright, Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Eastman Cherrington Environmental Corp.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$10,309

Other Deployments:

- In FY 1989, at Lawrence Livermore National Laboratory (Main Site), Livermore, CA
- In FY 1993, at Sandia National Laboratories, Albuquerque, NM
- In FY 1994, at FEMP (SILOS), Fernald, OH
- In FY 1996, at Lawrence Berkeley National Laboratory, Oakland, CA
- In FY 1997, at Brookhaven National Laboratory (HFBR Tritium Project-No release site), Upton, NY

Directional Drilling

(OST Ref. No. 650)

Directional drilling allows access to sites beneath installations and supports the deployment of instruments, sensors, and other devices to the subsurface for characterization, remediation (including barrier placement), and monitoring purposes. Accurate placement of these boreholes and their spatial control is also an important factor. Several directional drilling systems have been tested at different DOE sites, including the (1) short radius drilling, (2) mud rotary system, (3) hybrid system of Eastman Cherrington Environmental, (4) slant compaction rig (Ditchwitch), and (5) river crossing system.

DESCRIPTION OF THE DEPLOYMENT

Location: Lawrence Berkeley National Laboratory, Berkeley, CA

Project Name: Old Hazardous Waste Handling Facility, Bldg. 75A

Date of Deployment: September, 1996 **Technology User:** Environmental Restoration Program, LBNL

Deployment Value/Impact: The actual drilling technology employed -- cryogenic inclined drilling -- enabled to collect soil samples from different depths underneath a building through unconsolidated materials.

Point of Contact:

User Program POC:
Iraj Javandel (LBNL), Tel. 510-486-6106

OST Program POC:
Terry Hazen, Tel. 510-486-6223

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Eastman Cherrington Environmental Corp.; George Cooper, Lawrence Berkeley National Laboratory

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$10,309

Other Deployments:

- In FY 1989, at Lawrence Livermore National Laboratory (Main Site), Livermore, CA
- In FY 1993, at Sandia National Laboratories, Albuquerque, NM
- In FY 1994, at FEMP (SILOS), Fernald, OH
- In FY 1996, at Savannah River Site (F Basin), Aiken, SC
- In FY 1997, at Brookhaven National Laboratory (HFBR Tritium Project-No release site), Upton, NY

LDUA - Supervisory Data Acquisition and Supervisory Control System

(OST Ref. No. 810)

The Light Duty Utility Arm (LDUA) Supervisory Data Acquisition and Supervisory Control System provides integrated data acquisition and remote control capability for LDUA operations. The system is operated from three stations: the Operations Workstation, the LDUA Console, and the Data Acquisition Workstation. The system is designed for two operators to control in-tank operations from a remotely located control trailer. One operator controls the LDUA operations, and a second operator controls end effectors and data manipulation.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, Tank T-106

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: September 1996 **Technology User:** Westinghouse Hanford Company

Deployment Value/Impact: The Operations Workstation allows operators to preview motion of the LDUA in simulation, avoiding potential collisions. The Data Acquisition Workstation provides the primary user interface for operating end effectors, collecting data, and for monitoring and controlling the Tank Riser Interface and Containment (TRIC) environment subsystems.

Point of Contact:

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

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Sandia National Laboratory

Funding Information: (\$ in Thousands):
Total Estimated Funding: \$4,239

Other Deployments:
No Related Deployments information has been defined

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 T-106

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: September 1996 **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:
Catherine Louie, DOE-RL, Tel. (509) 376-9234

OST Program POC:
Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Westinghouse Hanford Company, SPAR Aerospace, 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:

FY 1995 at Hanford (Tank TX-115) in Richland, WA

Cyanide Destruction/Immobilization of Residual Sludge

(OST Ref. No. 1425)

This technology involves the use of electrolytic chlorination to destroy cyanides in situ for certain mixed waste streams. After the cyanide oxidation, the process residuals including RCRA metals and radionuclides as hydroxides are stabilized using a polymer encapsulation process.

DESCRIPTION OF THE DEPLOYMENT

Location: DOE-RF/RFETS Waste streams RF-W054, RF-W083, RF-W085, and RF-W086

Project Name: RF-02 Method to Reduce Volume of Mixed Waste

Date of Deployment: June - September, 1996 **Technology User:** EG&G Rocky Flats

Deployment Value/Impact: In this deployment, 1130 litres (about 6 drums) of spent cyanide plating waste was treated out of existence, eliminating the known inventory of this waste at RFETS. Similar waste streams exist at Lawrence Berkley and Oak Ridge National Laboratories, the Paducah and Portsmouth Gaseous Diffusion plants, and the Oak Ridge Y-12 plant.

Point of Contact:

User Program POC:
Gary Huffman, DOE-RF, (303)966-7490

OST Program POC:
William Owca, DOE-ID, (208) 526-1983

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

- Joe Lucerna, Kaiser-Hill Company, (303)966-7229
- Commercially available equipment was used in this work.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$75

Other Deployments:

None

Electrolytic Treatment of Mixed Waste

(OST Ref. No. 1427)

This process oxidizes organics using a strong oxidant which is generated electrochemically. The oxidant is generally Cerium IV. The process is applicable to aqueous and organic liquids, and some (non-debris) organic residues such as spent ion exchange resins.

DESCRIPTION OF THE DEPLOYMENT

Location: Los Alamos National Laboratory (LANL). Waste streams treated were LA-W913 (Aqueous Waste with Heavy Metals), LA-W914 (Corrosive Solutions), and LA-W915 (Aqueous Cyanides).

Project Name: AL-07-01-06-MW Cost-Effective Treatment of Low-Level Mixed Waste

Date of Deployment: May - September 1996 **Technology User:** University of California

Deployment Value/Impact: Eliminated 90 drums or 5.5 cubic meters of mixed waste at Los Alamos National Laboratory (LANL).

Point of Contact:

User Program POC:
Mr. Doug Denham, Tel. (505) 845-4846

OST Program POC:
William Owca, DOE-ID, (208)526-1983

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Los Alamos National Laboratory

Funding Information: (\$ in Thousands):
Total Estimated Funding: \$941

Other Deployments:
None

Stabilization of Beryllium and Reactive Metals

(OST Ref. No. 1467)

This technology used a grout process with fly ash and furnace slag to immobilize three waste streams containing beryllium under a RCRA treatability study. In this project, waste streams DP-W176, OR-W075 and YP-W214 were treated using a cement-based grout stabilization process.

DESCRIPTION OF THE DEPLOYMENT

Location: Oak Ridge, K-25

Project Name: OR-38111 Mixed Waste Storage, Treatment, and Disposal (waste streams DP-W176, OR-W075 and YP-W214)

Date of Deployment: May 1996

Technology User: Oak Ridge National Laboratory

Deployment Value/Impact: This deployment eliminated three waste streams (DP-W176, OR-W075, and YP-W214) from the Oak Ridge site inventory. The total amount of waste grouted and disposed was 314.7 lb. The long term stability of reactive metals using grout technology is limited. This technology is expected to accelerate the cleanup schedule for waste containing reactive metals and also fill a technology gap for stabilization of reactive metals.

Point of Contact:

User Program POC:

Mr. Johnny Moore, DOE-Oak Ridge, (423) 576-3536

OST Program POC:

- Mr. Bill Owca, DOE-ID, (208)526-1983
- Dr. Tom Connoly, ORNL, (423) 574-6792
- Dr. Mike Gilliam, ORNL, (423) 574-6820

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Oak Ridge National Laboratory

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$241

Other Deployments:

None

In Situ Bioremediation for Hanford Carbon Tetra Plumes

(OST Ref. No. 1742)

This technology involves innovative in situ methods for delivering nutrients to the subsurface -- stimulating microflora to destroy groundwater contaminants. Specifically, it results in simultaneous destruction of CCl₄ and NO₃ by indigenous microorganisms. Acetate is used as an energy and carbon source by indigenous bacteria that employ nitrate as a terminal electron acceptor. While the primary cellular metabolism is directed at acetate utilization through denitrification, CCl₄ is concurrently dechlorinated. This dechlorination results primarily in the formation of carbon dioxide and chloride ions, while biomass, water, carbon dioxide, and nitrogen gas are produced from acetate utilization and denitrification.

DESCRIPTION OF THE DEPLOYMENT

Location: INEEL, TAN

Project Name: In Situ Bioremediation of TCE at the INEEL-TAN Site

Date of Deployment: August 1996-97,
(Ongoing). **Technology User:** LIMITCO

Deployment Value/Impact: In situ bioremediation, as applied in this project, is based on the principle of biostimulation, supplying nutrients to indigenous microbes to stimulate their metabolic activity and subsequent degradation of contaminants. The in situ bioremediation process does not require extraction of the contaminants. Typically, a network of injection and extraction wells are used to recirculate groundwater into which amendments are added for distribution within the aquifer. The objective is to create a microbially active zone that maximizes contaminant destruction within the aquifer while controlling the distribution of microbial growth. Technology screening conducted prior to the application of Anaerobic In Situ Bioremediation coupled to Natural attenuation demonstrated its advantage upon Pump-and-Treat (requires longer application and is costlier), and Aerobic ISB and Natural Attenuation (ineffective as a result of insufficient oxygen that can be delivered to sustain aerobic co-metabolism).

Point of Contact:

User Program POC:

Lance Peterson (LIMITCO), Tel. 208-526-9738

OST Program POC:

Jim Wright, Tel. 803-725-5608

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Pacific Northwest National Laboratory

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$6,991

Other Deployments:

In FY 96-97, at Point Mugu Naval Air Weapons Station, CA

In Situ Bioremediation for Hanford Carbon Tetra Plumes

(OST Ref. No. 1742)

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DESCRIPTION OF THE DEPLOYMENT

Location: Naval Air Weapons Station, Point Mugu, CA

Project Name: Ground Water Cleanup at IRP Site 24

Date of Deployment: November 1996-97, (ongoing) **Technology User:** United States Navy

Deployment Value/Impact: Two sites were addressed: UST Site 23, and UST Site 55. When compared to Pump-and-Treat, Anaerobic ISB combined with Natural Attenuation is predicted to be faster (20 and 11 years for sites 23 and 55, respectively, vs. 30 and 16 years, respectively). Cost savings with respect to Pump-and-Treat predicted for Sites 23 and 55 are \$0.5 million and \$0.9 million, respectively.

Point of Contact:

User Program POC:
Steve Granade (DoD), Tel. 805-989-3806

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

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Pacific Northwest National Laboratory

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$6,991

Other Deployments:

In FY 96-97, at INEEL (TAN), Idaho Falls, ID

Steam Vacuum Cleaning

(OST Ref. No. 1780)

The Kelly Steam Vacuum Cleaning Decontamination System is a steam/vacuum cleaning system owned by Container Products Corporation of Wilmington, North Carolina. The system uses the kinetic energy of superheated pressurized water to dislodge surface contaminants from debris. The superheated water is directed through a hand-held spray wand, or any of a series of steam/vacuum cleaning heads that integrate spray nozzles within a hooded vacuum recovery sub-system. The superheated liquid flashes to steam upon contact with the debris. The hood is attached to a powerful vacuum cleaner which effectively picks up the steam and contaminants dislodged by the steam jet. The vacuum is most effective on flat surfaces but hoods with different contours can be used to conform to many surfaces. The waste stream passes through a liquid separator, a demister, and a high efficiency particulate air filter that that removes contaminants and discharges clean air to the atmosphere. A detergent may be added to the pressurized water stream to improve washing effectiveness.

DESCRIPTION OF THE DEPLOYMENT

Location: Savannah River Site 105-L Decontamination Facility

Project Name: SR-FA20; Reactor Monitoring Project

Date of Deployment: Fiscal Year 1996 **Technology User:** Facility
Decommissioning
Division

Deployment Value/Impact: The Kelly Decontamination System is one of many decontamination tools used by the SRS Decon Facility, housed in the 105-C reactor facility, to decontaminate equipment from other SRS facilities. Most of the equipment is portable and can be taken to other SRS facilities for application. Using a shrouded head, the system was used to remove transferable and some fixed contamination from both the concrete floors and walls in the contaminated area (CA) rollback. Thirteen thousand sq. ft. of concrete floor in the CA rollback have been decontaminated to free release. The system was also used with a spray wand to remove gross transferable contamination from metal surfaces (stainless steel rods) in the disassembly basin. Contaminated area rollbacks reduce PPE requirements and lower S&M costs of shutdown SRS facilities.

Point of Contact:

User Program POC:

- Mr. Martin Salazar (DOE-SR) - Tel. 803-557-3617
- Ms. Heatherly Dukes (Westinghouse Savannah River Company) - Tel. 803-557-9205

OST Program POC:

Mr. Steve Bossart (DOE/FETC) - Tel. 304-285-4643

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Container Products Corporation

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$160

Other Deployments:

No other deployments identified in FY1996

VecLoader HEPA Vacuum Insulation Removal

(OST Ref. No. 1784)

The technology is a self-contained, trailer mounted, vacuum unit that evacuates asbestos fibers. The HEPA VAC operates at a rate of six to nine tons per hour to transport the asbestos fibers through a flexible, 5-inch diameter, smooth bore suction hose up to distances of 1,000 feet. The fibers are captured in this fully enclosed, negative pressure system and sent into a cyclone separator, where it is bagged directly from the vacuum.

DESCRIPTION OF THE DEPLOYMENT

Location: DOE-OH, Fernald, Plant 1

Project Name: OH-FN-02, Facility D&D

Date of Deployment: August 1996

Technology User: Fluor Daniel Fernald

Deployment Value/Impact: Fluor Daniel used the VecLoader to remove insulation from walls during the decommissioning of the Plant 1 Complex at Fernald. The system provides increase productivity, minimize airborne contaminants, reduce the need for personal protective clothing, and avoid direct handling of mineral wool during the removal of insulation. The vacuum system removed 1,500 sq. ft. of wall insulation at a rate of 220 sq. ft. per hour compared to the direct handling baseline method of 182 sq. ft. per hour.

Point of Contact:

User Program POC:

Bob Danner (DOE-FN) - Tel. 513-648-3167

OST Program POC:

Steve Bossart (DOE-FETC) - 304-285-4643

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Vector Technologies, Ltd.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$160

Other Deployments:

No other deployments in FY1996

Swing-Reduced Crane Control

(OST Ref. No. 1815)

The swing-reduced control and remote crane upgrade project provided improvements to existing polar cranes. The crane improvements and upgrades included a radio control system for remote operation of the crane, a motorized rotating block, an onboard remotely-operated video camera, and load cells with remote load displays.

DESCRIPTION OF THE DEPLOYMENT

Location: Gulfport , MS

Project Name: NA - Non-DOE deployment

Date of Deployment: 1996

Technology User: DAMAS Corp

Deployment Value/Impact: Gulf Port modified an existing overhead crane system by reducing the naturally induced crane swing, to allow for more precision operations during cargo transport and loading operations.

Point of Contact:

User Program POC:

Mr. Steve Simpkin (DAMAS Corp) - Tel. 205-290-9000

OST Program POC:

Steve Bossart (DOE-FETC) 304-285-4643

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Savannah River, Los Alamos and MIT. System was licensed to Convolv and DAMAS Corp.

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$1,665

Other Deployments:

No other deployments identified for this Fiscal Year

Gamma Cam (TM) Radiation Imaging System

(OST Ref. No. 1840)

The GammaCamTM System displays the relative strength and location of gamma radiation as a two-dimensional image superimposed on the corresponding visual image. GammaCamTM consists of a portable sensor head that contains a gamma-ray imaging system and a TV camera. The superimposed radiation and visual images are displayed on a standard portable PC computer screen located several hundred feet from the radiation area. The PC controls the data acquisition time, the field of view, and the image display.

DESCRIPTION OF THE DEPLOYMENT

Location: Los Alamos National Laboratory

Project Name: AL-LANL-01, ER Decommissioning and Closure

Date of Deployment: September 1996 **Technology User:** Los Alamos National Laboratory

Deployment Value/Impact: The GammaCam was used at Los Alamos for imaging radiological spills and for detecting radiological sources during facility characterization. GammaCam has shown the ability to perform remote, real-time, radiological surveys in highly radioactive D&D environments to avoid worker exposure.

Point of Contact:

User Program POC:
Doug Denham (DOE-AL) - 505-845-4846

OST Program POC:
Steve Bossart (DOE-FETC) - 304-285-4643

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

AIL Systems

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$71 (Outside Funding: \$6)

Other Deployments:

No additional deployments in FY 1996

Remote Viewing System

(OST Ref. No. 1988)

The Remote Viewing System includes a radiation hardened camera and light, zoom lenses, camera positioner, vertical deployment system, and a positional feedback system. During tank remediation activities, the entire system is positioned over a minimum four inch riser and the cameras are lowered into the tank using a simple cable interface. The remote viewing system provides a 'first in, last out' role in underground storage tank operations, providing reliable, high-quality, continuous viewing during tank remediation operations.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, High Level Waste Tank A-101 Pump Pit

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: January-March 1996 **Technology User:** Westinghouse Hanford Company

Deployment Value/Impact: The Remote Viewing System provides an extensive observation capability that minimizes collisions of characterization and retrieval equipment during deployments. This system is used to monitor all equipment entries and exists, allowing workers to control operations from a remote location. Potential applications include Light Duty Utility Arm deployment operations inside waste tanks at Oak Ridge Reservation, Hanford Site, and Idaho National Engineering and Environmental Laboratory.

Point of Contact:

User Program POC:
Catherine Louie, DOE-RL, Tel. (509) 376-9234

OST Program POC:
Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:
Savannah River Technology Center

Funding Information: (\$ in Thousands):
Total Estimated Funding: \$380

Other Deployments:
FY 1996 at Hanford (Hanford Tank T-103) in Richland, WA

Remote Viewing System

(OST Ref. No. 1988)

The Remote Viewing System includes a radiation hardened camera and light, zoom lenses, camera positioner, vertical deployment system, and a positional feedback system. During tank remediation activities, the entire system is positioned over a minimum four inch riser and the cameras are lowered into the tank using a simple cable interface. The remote viewing system provides a 'first in, last out' role in underground storage tank operations, providing reliable, high-quality, continuous viewing during tank remediation operations.

DESCRIPTION OF THE DEPLOYMENT

Location: Hanford, Hanford Tank T-103

Project Name: RL-TW01 Tank Waste Characterization Project

Date of Deployment: January-March 1996 **Technology User:** Westinghouse Hanford Company

Deployment Value/Impact: The Remote Viewing System provides an extensive observation capability that minimizes collisions of characterization and retrieval equipment during deployments. This system is used to monitor all equipment entries and exists, allowing workers to control operations from a remote location. Potential applications include Light Duty Utility Arm deployment operations inside waste tanks at Oak Ridge Reservation, Hanford Site, and Idaho National Engineering and Environmental Laboratory.

Point of Contact:

User Program POC:

Catherine Louie, DOE-RL, Tel. 509-376-9234

OST Program POC:

Billie Mauss, DOE-RL, Tel: 509-372-4512

TECHNOLOGY DEVELOPMENT INFORMATION

Major Developers:

Savannah River Technology Center

Funding Information: (\$ in Thousands):

Total Estimated Funding: \$380

Other Deployments:

FY 1996 at Hanford (High Level Waste Tank A-101 Pump Pit)in Richland, WA