EM U.S. Department of Energy
Office Of Environmental Management

Technology Development & Deployment: A History of Successful Investments

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Introduction

- Much progress made in Environmental Management cleanup mission, e.g., completion at Fernald and Rocky Flats; more expected over next few years
- Major uncertainties/risks across the Complex must be addressed through innovative technologies and approaches
- Technologies have been inserted to reduce risk through accelerated schedules, cost savings, reduction in worker risk, and solving intractable problems
- Solutions have made a difference in waste processing, soils and groundwater treatment, and deactivation and decommissioning
- Presenting some examples of success over last 5 years

Advanced Remediation Technologies (ART)

- Congressional line-item of $10M in 2005
- DOE issued competitive solicitation for Advanced Remediation Technologies
- Awarded 12 Phase I contracts in 2006 to industry for proof-of-principle investigation of a variety of technologies to address high-risk waste-processing and subsurface remediation issues
- Awarded 5 Phase II contracts in 2007 to perform large-scale demonstrations of the innovative technologies at the Hanford and Savannah River Sites

ART: Cold Crucible Induction Melter

Challenge

Joule-heated melter at the Savannah River Defense Waste Processing Facility (DWPF) may not vitrify waste to meet the Site Treatment Plan date of 2028, due to higher volumes of sludge than originally predicted

Solution

The Cold Crucible Induction Melter (CCIM) can accommodate higher waste loading and throughput

Accomplishments

Completed testing on Idaho, Hanford, Savannah River, and Marcoule simulants

Demonstrated high waste loading on Savannah River-type waste at Radon Institute in Russia

Completed pre-conceptual design study for a Defense Waste Processing Facility retrofit

ART Phase II initiated to extend testing with representative conditions and conduct initial engineering tasks

Potential Impact

Cold Crucible Induction Melter technology advantages:

- Increased waste loading (50+ vs 34-38 wt%)
- Higher waste throughput and melt rate
- Possible extended melter service life
- Higher tolerance for noble metals

Cold Crucible Induction Melter may result in life-cycle cost and schedule reduction, while meeting regulatory agreements and closure dates

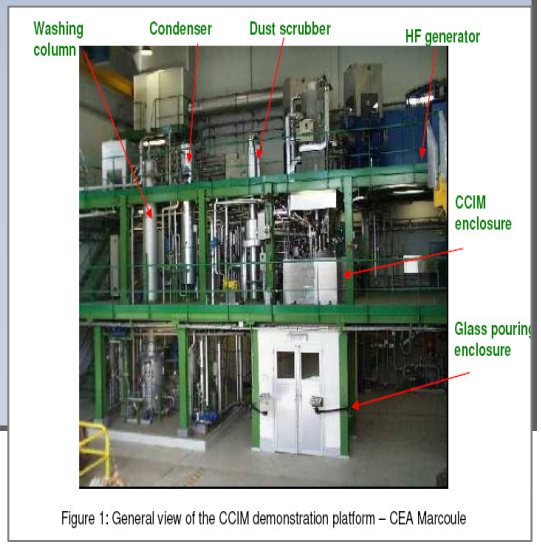


Figure 1: General view of the CCIM demonstration platform – CEA Marcoule

ART: Fluidized Bed Steam Reforming

Challenge

The Hanford Waste Treatment Plant (WTP) will separate high-level waste (HLW) into a small-volume HLW and large-volume low-activity waste (LAW) fractions, which cannot be treated in time to meet proposed schedule. Supplemental treatment is necessary.

The WTP recycle stream, planned for treatment at the Effluent Treatment Facility (ETF), must be pretreated, because concentrations of some constituents are problematic

Solution

THOR Treatment Technologies, LLC proprietary Fluidized Bed Steam Reforming (FBSR) technology could be used for low activity waste supplemental treatment and WTP recycle treatment

Accomplishments

Completed ART Phase I feasibility study for Hanford waste

ART Phase II pilot-scale real-waste testing to start in April

Potential Impact

Fluidized Bed Steam Reforming may reduce overall Waste Treatment Plant mission length by up to 30% at a lower cost than other options and could eliminate all issues with Effluent Treatment Facility recycle

ART: Near-Tank Cesium Removal

Challenge

Current Tri-Party Agreement milestones require that all high-level waste (HLW) be removed from the Single Shell Tanks (SST) by 2018, but Double Shell Tank (DST) space is not available

Solution

Near-Tank Cesium Removal (NTCR): If cesium can be removed at the Double Shell Tanks, the low activity waste (LAW) stream could go directly to supplemental treatment, allowing Single Shell Tanks to be emptied into Double Shell Tanks

Accomplishments

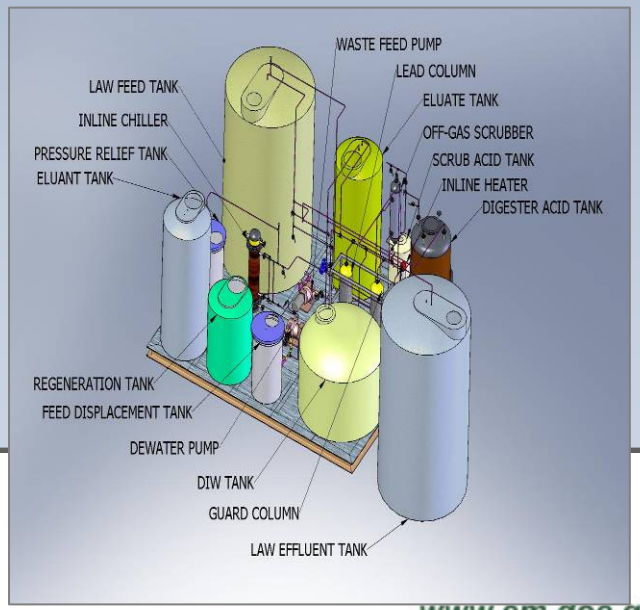
Completed system description, risk review, preliminary field design, and cost and schedule estimates for the ART Phase II demonstration unit

Completed proof of principle experiments to test resin destruction and dissolution in nitric acid

Potential Impact

Near-Tank Cesium Removal could accelerate WTP Low activity waste start date by up to 6 years and will supply feed to Low activity waste supplemental treatment

Early Double Shell Tank waste processing will allow Single Shell Tank retrieval to proceed, will demonstrate progress on tank waste treatment, and will accelerate Tank Farm Closure



ART: Continuous Sludge Leaching

Challenge

Removal of large quantities of aluminum from high-level waste (HLW) tank sludge at both Savannah River and Hanford could significantly reduce the volume of high-level waste to be vitrified, reducing the number of glass canisters to be produced, and enabling the planned high-level waste treatment schedules to be met

Solution

Continuous Sludge Leaching (CSL) can remove boehmite aluminum from the high-level waste sludge

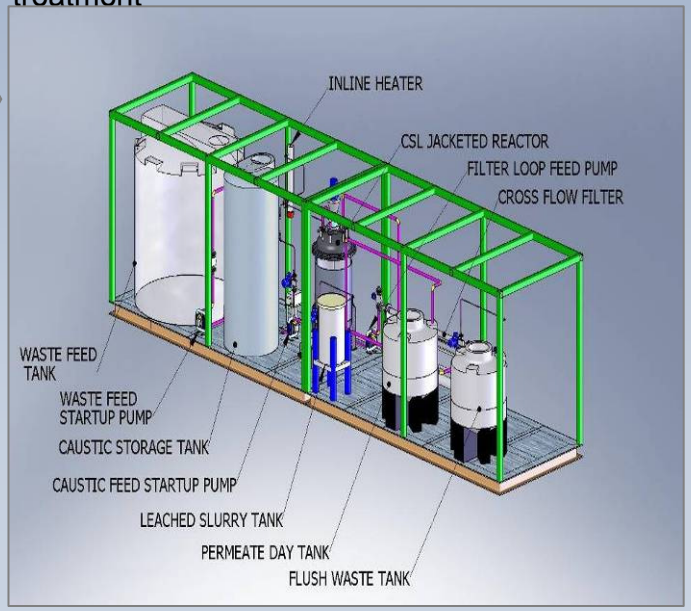
Accomplishments

ART Phase I evaluated feasibility of Continuous Sludge Leaching to remove boehmite from high-level waste tank sludge

ART Phase II lab-scale testing will begin in Spring 2008

Potential Impact

Continuous Sludge Leaching can dramatically reduce the number of high-level waste canisters produced at both Savannah River (up to 35%) and Hanford (up to 55%) by removing aluminum from HLW tank sludge, thus potentially saving billions of dollars in life-cycle cost for HLW treatment



Pilot Scale Facility

ART: Enhanced Anaerobic Reductive Precipitation/Dechlorination

Challenge

No technologies are currently available to treat technetium-99 (Tc-99) contaminated groundwater *in situ*, yet Tc-99 is a high risk because it is long-lived and mobile in the environment

Solution

Identify and optimize commercially available in-situ remediation treatment technology to treat metals, radionuclides, and organics in groundwater

Accomplishments

Enhanced Reductive Precipitation/Dechlorination (EARP/D) has been used at 190 sites, including 21 federal government sites; lab- and pilot-scale tests have shown that Enhanced Reductive Precipitation/Dechlorination can be applied to technetium-99 and other key radionuclides

ART Phase II will demonstrate an in situ field-scale application at an area where technetium-99 is present in the groundwater

Potential Impact

Enhanced Reductive Precipitation/Dechlorination may provide a solution for *in situ* treatment of radionuclides in groundwater where no current solution exists, thus significantly reducing risk to human health and the environment

Mobile Batch Injection Trailer

Columbia River Projects

- HR 2419, Energy and Water Development Appropriations Act passed by Congress in 2006 where conferees expressed concern about preventing contaminants from reaching the Columbia River
- Allocated $10M to analyze contaminant migration to the river and to introduce new technologies to solve contaminant migration issues
- 12 Projects awarded to Pacific Northwest National Laboratory and Fluor after independent review of proposals
- 11 projects address contamination in the 100 Areas near the river (uranium, chromium, and strontium) and one in the 200 Areas (carbon tetrachloride)

Columbia River Projects: Remediation of Hexavalent Chromium in Groundwater

Challenge

Migration of groundwater contaminated with hexavalent chromium entering the Columbia River at the Hanford Site; high environmental risk

Solution

Understand where chromium is present as a source and how it moves through soils above the water table; test a variety of technologies to treat groundwater using a systems approach

Accomplishments

Lab and field studies improve understanding of fate and transport of chromium in soils above the water table and where chromium may be present as a continuing source to the aquifer

Lab test and modeling ongoing to mend the In Situ Redox Manipulation Barrier; 2008 field demo planned. A 50-gpm test of Electrocoagulation technology was completed. Further pilot-scale tests and monitoring of *in situ* bioremediation show promise, with additional tests in 2008.

Impact

A systems approach using innovative technologies potentially can significantly reduce human health and environmental risks adjacent to the Columbia River, while expediting cleanup with lower life-cycle cost than current baseline technologies

Electrocoagulation Unit

Columbia River Projects: Treatment of Groundwater Containing Strontium-90

Challenge

Pump and treat remedy for strontium-90 in groundwater in 100-N Area adjacent to the Columbia River specified in the Record of Decision is not effective in preventing migration of the radionuclide into the river

Solution

A reactive barrier created by injecting phosphate solutions into wells can stabilize the strontium-90

Both groundwater and the source zone above the water table must be treated

Accomplishments

A 300-ft barrier was installed to treat groundwater, but a continuing source of radionuclides in the soils above the water table remained

Columbia River Project funded lab tests to treat the source zone above the water table and excellent results were obtained; field testing is needed

Impact

This passive barrier technology could potentially replace the pump and treat system, significantly reducing annual operating costs, saving millions in life-cycle costs and preventing strontium-90 from entering the river

100-N Area Location
for Reactive Barrier

Columbia River Projects: Treatment of Uranium in Groundwater

Challenge

The Natural Attenuation remedy for uranium in groundwater specified in the Record of Decision is not effective; an alternative groundwater treatment system should be deployed

Solution

A reactive barrier created by injection of polyphosphate solutions into wells to stabilize uranium

Both the groundwater and the soils above the water table where uranium exists as a continuing source to the aquifer must be treated

Accomplishments

A pilot-scale field test demonstrated proof-of-principle for creating a barrier, but high groundwater flow rate was problematic

Laboratory tests to treat uranium source material above the water table are ongoing

Impact

Passive barrier technology has the potential to save millions in life-cycle costs as compared to an active pump and treat system, which would be the primary alternative considered

Polyphosphate Injection Pilot Test

Columbia River Projects: Carbon Tetrachloride and Chloroform

Challenge

Large uncertainty in abiotic degradation rates limits the ability to predict fate and transport and to develop cost-effective remediation plans for carbon tetrachloride and chloroform in the 200 West Area at Hanford

Solution

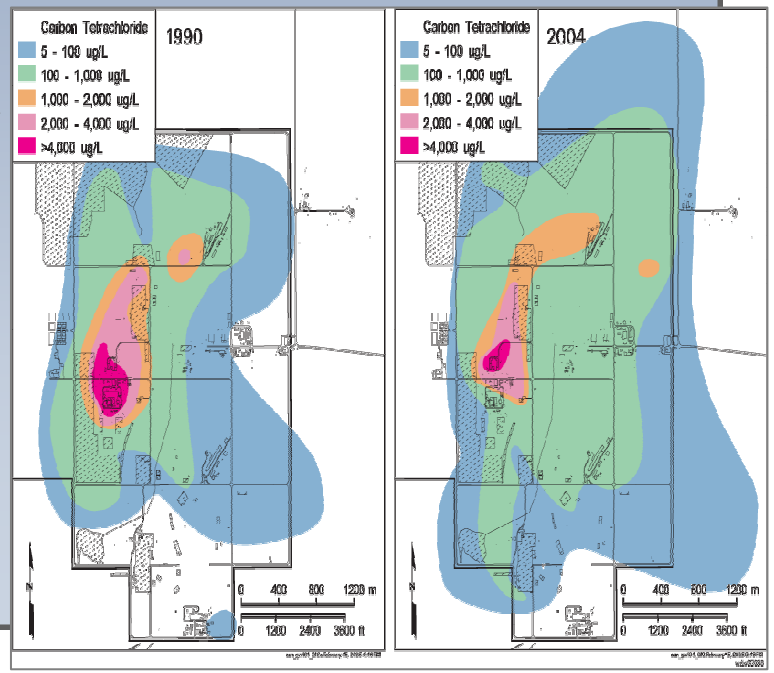
Laboratory studies will provide fundamental understanding of the fate and transport of these compounds at Hanford

Accomplishments

Critical physical-chemical data for carbon tetrachloride and chloroform hydrolysis reactions under Hanford groundwater conditions are being collected

Impact

The technical basis for decisions regarding remediation of these large organic contaminant groundwater plumes at Hanford will be substantially improved, resulting in potentially significant cost savings and schedule acceleration



Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

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Waste Processing

Fernald Silos Waste Retrieval and Processing

Challenge

240,000 cubic feet of K-65 waste from the processing of uranium ore must be removed from two 80-foot diameter silos, treated by addition of grout and fly ash, and packaged using a remote-handling system for transportation to a licensed, offsite disposal facility

Solution

Technical support and testing of technologies to support retrieval and processing of silos waste was provided by a team of experts from Oak Ridge National Laboratory, Mississippi State University, and industry

Accomplishments

Laboratory- and bench-scale testing of retrieval system components ensured system performance and maintainability

Grout formulations to maximize waste loading and real-time performance monitoring technologies were tested to enable system optimization; optimized performance of the integrated retrieval system

Impact

Selection and testing of innovative technologies as system components for the silos waste retrieval and treatment systems significantly reduced project risks and ensured that Fernald closure was accomplished 12 years ahead of schedule and $7.8B less than originally projected

Fluidized Bed Steam Reforming-SRS

Challenge

240,000 gallons of highly radioactive liquid waste that contains 22,000 kgs of organic compounds, posing a flammability hazard, in Savannah River Tank 48, must be treated to destroy the organics, so it can be converted to service as a Salt Waste Processing feed preparation tank

Solution

Fluidized Bed Steam Reforming (FBSR) met all test requirements for organic destruction, the only alternative to do so after several were evaluated and tested

Accomplishments

3,300 gallons of waste simulant were treated on a 75% scale pilot plant to produce 6,900 pounds of granular solid

>99.9% of organics destroyed and all test conditions met

Off-gas samples were obtained for future testing

Impact

FBSR has been selected as the baseline technology for Savannah River Tank 48 Treatment

Fluidized Bed Steam Reforming-INL

Challenge

~1 million gallons of liquid sodium-bearing waste at Idaho National Laboratory must be solidified and packaged for shipment to the Waste Isolation Pilot Project or the High Level Waste (HLW) Repository, depending on results of waste determination

Solution

Fluidized Bed Steam Reforming can satisfy high level waste disposal performance requirements

Accomplishments

Fluidized Bed Steam Reforming bench-scale test at Savannah River National Laboratory demonstrated waste form resistant to leaching

Fluidized Bed Steam Reforming pilot-scale demonstration met system objectives, including environmental compliant off-gas component

Testing at Hazen Research Center in 2007 validated flowsheet as viable for Integrated Waste Treatment Unit at Idaho

Impact

Fluidized Bed Steam Reforming is currently under construction for treatment of sodium-bearing waste at Idaho National Laboratory

Fluidized Bed Steam Reforming test facility at Hazen Research in Colorado

Glass Formulation and Processing Challenges for High Level Waste (HLW)

Challenge

Improvements in glass formulations and processing could significantly reduce the number of canisters of vitrified glass to be produced

Solution

Improve glass formulation and processing targets by improving melting rates for high aluminum-containing wastes, determining effect of increasing the melter temperature, and determining effect of trace crystalline products on melter operations

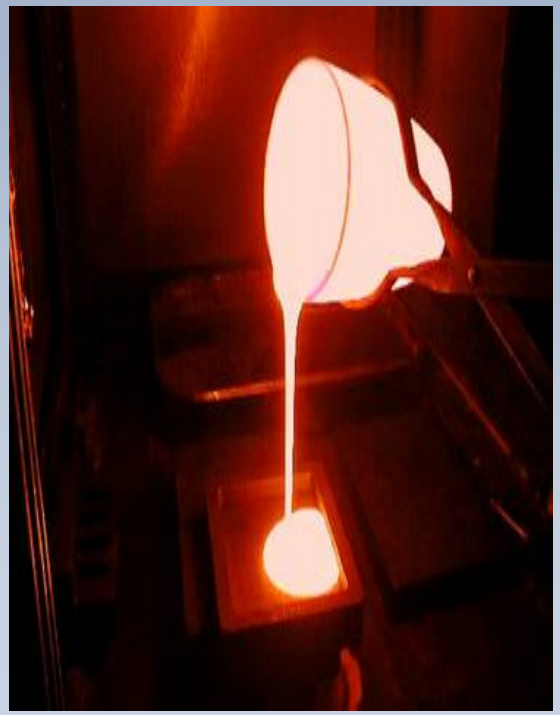
Accomplishments

Testing program initiated to develop and characterize High Level Waste glasses with higher waste loadings

Risks identified for High Level Waste production rate shortfall

Potential Impact

Increasing waste loading from 25 wt % to >33 wt % will potentially reduce the High Level Waste canister production requirement by 25% or more



Low-Temperature Caustic Leaching

Challenge

The mass of sludge in the Savannah River high-level waste (HLW) tanks is currently estimated to fill ~7,900 canisters when treated, which is more than previously estimated and likely will impact the Site Treatment Plan commitment to treat all high-level waste by 2028

Solution

In-tank, low-temperature caustic leaching to remove the aluminum in the sludge could significantly reduce the volume of waste required for vitrification

Accomplishments

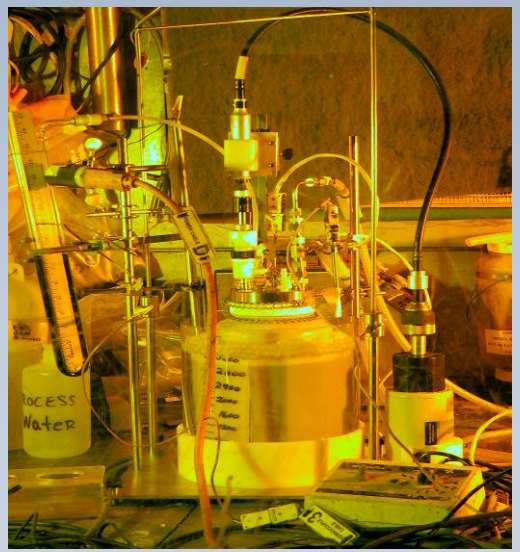
Low-temperature caustic leaching was recently demonstrated at full scale in Tank 51 at Savannah River

- 65% of the insoluble aluminum was removed
- No new equipment was required and dissolution was complete after 80 days
- The aluminum-rich decant stream is staged for feed to the Salt Waste Processing Facility

Impact

The aluminum removed reduced the sludge volume by the equivalent of 100 canisters, reducing the life-cycle cost of the Savannah River high-level waste mission by $40 million

This process may potentially reduce sludge mass by the equivalent of 900 canisters with a $900 million life-cycle cost reduction



Caustic Leach Test System

Small Column Ion Exchange (SCIX)

Challenge

To accelerate the processing of high-level (HLW) at Savannah River and Hanford, methods are needed to remove cesium, thus enabling appropriate separation

Solution

Small Column Ion Exchange (SCIX) deployed to augment the Savannah River Salt Waste Processing Facility, with resins developed and optimized for the SCIX process

Accomplishments

Crystalline silicotitanate: tested with Savannah River simulant and real waste in small-scale column; 30,000 gallons real waste processed at Oak Ridge National Laboratory in 10-gallon column

Resorcinol formaldehyde: 53 bed volumes tested with Hanford simulant; tested with Hanford real waste at Pacific Northwest National Laboratory; being adopted as the Baseline for Hanford Waste Treatment Plant

Decontaminated salt solution processed through either resin easily met Class A limits

Potential Impact

Small Column Ion Exchange may accelerate tank closure by decreasing the life-cycle associated with salt waste processing

The Small Column Ion Exchange equipment can be mounted in existing waste tank risers, reducing the shielding and construction costs, as well as disposal costs

Small Column Ion Exchange Test System

Fractional Crystallization

Challenge

Separation of high-level waste into a low-volume high-level waste stream and a high-volume low-activity waste stream could reduce the number of high-level waste glass canisters to be produced by the Hanford Waste Treatment Plant for offsite disposal

Solution

Fractional crystallization uses an evaporation and crystallization process to separate most of the radioactive isotopes (e.g., cesium, technetium, and iodine) from the nitrate and nitrite salts that make up a large part of the waste in Hanford's high-level waste tanks

Accomplishments

The technology is well proven in industrial applications, generates very little secondary waste, and has been demonstrated to produce the required separation results

After successful lab- and engineering-scale testing, a pilot plant, currently under construction at Savannah River National Laboratory, will be operated in 2008 to test Hanford waste

Potential Impact

Fractional crystallization, as a pretreatment technology, may support an early low activity waste vitrification start-up or other supplemental treatment, such as Bulk Vitrification, thus potentially reducing the Waste Treatment Plant schedule by up to 20-30 years and potentially saving >$1B

Rotary Microfilter

Challenge

During processing of high-level waste (HLW) at Savannah River and Hanford, solid-liquid separation, requiring a large footprint, is often rate limiting, thus impacting the overall high-level waste treatment schedule

Solution

A rotary microfilter is being developed and tested to perform the solid-liquid separation step needed for these treatment processes

Accomplishments

A 3-disk commercial unit was tested for 4,000 hours with Savannah River simulated sludge

A full-scale, 25-disk prototype was tested with Savannah River simulated sludge

A smaller commercial unit was demonstrated with Savannah River real waste sludge

Design drawings for deployment in Savannah River tank risers were completed

Additional testing underway for Hanford application

Potential Impact

Rotary microfilter potentially will allow Savannah River and Hanford to treat additional radioactive liquid waste for processes such as Small Column Ion Exchange, Supplemental Pretreatment, Bulk Vitrification, and Sludge Washing, accelerating tank closure

The rotary microfilter can be placed in a waste tank riser, thus reducing shielding and construction costs, as well as lower disposal cost after operations completed

Fluidic Systems for Waste Retrieval and Sampling

Challenge

Improved tank waste retrieval technologies are necessary to enable schedule acceleration and reduced costs, while minimizing worker safety risk

Solution

Power Fluidics Technology

- Maintenance-free with no moving parts in contact with the radioactive waste
- Single system deployment for waste retrieval and tank closure
- Water recycle to reduce secondary wastes

Accomplishments

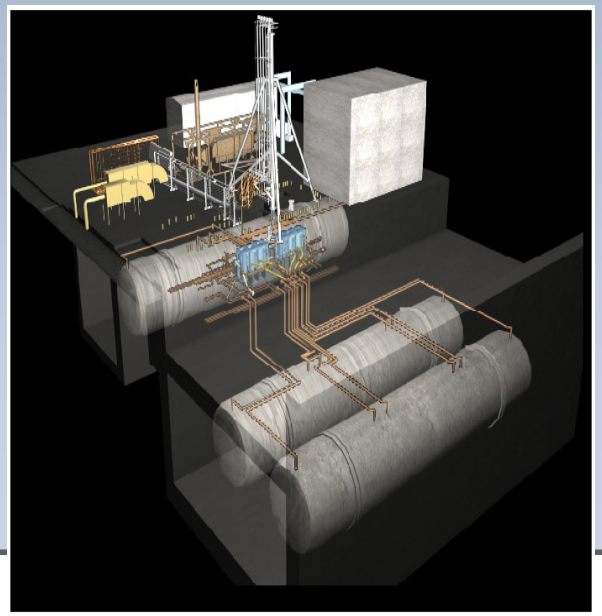
Proven technology from the United Kingdom

Multiple (>25) full-scale deployments at Department of Energy sites since 1997

Impact

DOE deployments have solved intractable problems, shown improvements to worker safety and schedule acceleration, and realized significant cost savings

More opportunities for deployments and future benefits at the Hanford and Savannah River tank farms



Soils and Groundwater

Electrical Resistance Heating (ERH)

Challenge

The slow release of industrial solvents trapped in clay layers can extend the timeframe for cleanup by 10s or even 100s of years

Solution

The DOE Environmental Management program funded development of electrical resistance heating (ERH) to speed up the release and removal of solvent contamination from clay layers

Technology developers included researchers from Pacific Northwest National Laboratory and scientists with backgrounds in enhanced oil recovery

Accomplishments

Electrical resistance heating first field demonstrated at the Savannah River Site

Electrical resistance heating patented and commercialized and now being applied by multiple vendors

Applications are now supported by regulatory guidance documents, multiple case studies, and support of multiple federal agencies

Impact

The DOE-developed technology is seeing widespread application within the private sector and for government projects, saving money and significantly accelerating cleanup schedules

Paducah Gaseous Diffusion Plant (KY) – electrical resistance heating being designed to treat subsurface

Carbon Tetrachloride Conceptual Model

Challenge

Remediation of carbon tetrachloride present in groundwater over an area of 11 square kilometers In the 200 Area at Hanford must address contaminant sources above the water table

Solution

A conceptual model of carbon tetrachloride sources was developed and tested to provide an improved understanding of the location and extent of the source material

Accomplishments

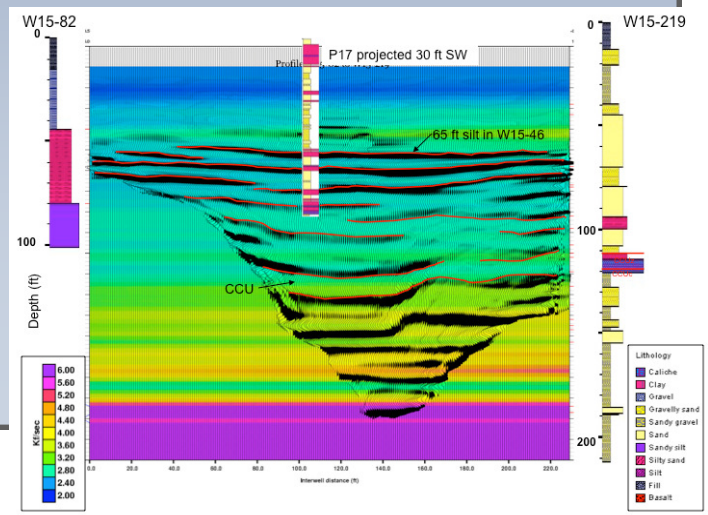
A prompt evaporation model provided key insight into disposal practices

The lateral extent of the source region was confirmed using geophysical (seismic) methods

Updated source inventory calculations, based upon field vapor-phase measurements, reduced the unaccounted for inventory to between 21 and 40%

Potential Impact

Refinements to the understanding of the quantity of source material present in the unsaturated zone near the Z-9 Trench at Hanford may enable a more effective and efficient remedial approach, thus accelerating cleanup schedules and reducing costs



Monitored Natural Attenuation/Enhanced Attenuation for Chlorinated Solvents

Challenge

Address fundamental challenges in reaching final closure for many DOE sites with contaminated soils and groundwater: transitioning costly source treatments and developing regulatory support

Solution

Technical guidance, tools, and collaboration with state regulators to promote acceptance of natural attenuation/enhanced attenuation

Accomplishments

New technologies and tools were developed and demonstrated to promote acceptance of attenuation-based remedies for chlorinated solvents

Developed guidance with state and federal regulators for implementing technical products within regulatory frameworks and implemented web-based training on technical advances

Impact

Technical developments enable transition from active, energy-intensive treatments to "green" treatments, minimizing our energy footprint on a national scale, while also saving money

Publicly available training is resulting in technical advancements in the public/private sectors

Retrieval of Passive Flux Monitor

Push-Pull Test

Attenuation-based Remedies for Metals and Radionuclides

Challenge

Environmental clean-up strategies at sites with metals and radionuclides often leave the contaminants in place, but they can pose a risk for 1000s of years

Solution

Attenuation-based remedies can be implemented to demonstrate reduced risk through development of technical guidance and tools

Accomplishments

Research to further understand natural attenuation processes in the subsurface is being conducted collaboratively by Savannah River and Lawrence Berkeley National Laboratories with extensive communications with the Environmental Protection Agency and state regulators

Impact

Sustainable, low-energy approaches to cleaning up metals and rad-contaminated sites will minimize risk receptors

Training in new technical developments and approaches will be made available first to DOE and to the broad stakeholder community

Lawrence Berkeley researcher viewing soil samples from site

Savannah River scientist collecting water samples from wetlands

Decontamination and Decommissioning

New Non-Destructive Assay and Examination Technologies

Challenge

Transuranic (TRU) contaminated materials must be characterized before they can be shipped for long-term disposal at the Waste Isolation Pilot Plant (WIPP) in New Mexico; containers must be opened, examined, and repackaged, resulting in radiation exposure, and adds significant cost and schedule

Solution

Innovative non-destructive assay and evaluation technologies that meet WIPP criteria:

Non-Destructive Assay: Gamma Assay Module directly determines mass of gamma-emitting contaminants, and isotopic composition of the waste

Non-Destructive Examination: a robotic-controlled heavy-material handling system to detect presence of liquid and aerosol containers

Accomplishments

These new Non-destructive Assay and Examination technologies have demonstrated effective waste characterization without opening of transuranic waste containers

Impact

The new **Non-Destructive Assay and Examination Technologies** will enable shipment of large transuranic waste containers without repackaging, greatly reducing hazards to workers, while reducing shipping costs of $600M-$900M and saving 8-12 years in schedule

Grouting Fernald Silos 1 and 2

Challenge

Residual material on the floor of the Fernald Silos remaining after waste was retrieved complicated the demolition and disposal of the silos, because of the high concentrations of radium, lead, and radon gas

Solution

Concrete pumping trucks were modified to tie into the retrieval nozzle system to jet blast a non-settling grout into the silos; the grout stabilized the radon gas, lead, and radium and enabled removal of the grout-residual mixture prior to disposal of the silos

Accomplishments

50,000 gallons of grout were injected in each silo in only a few hours; the cured grout/sludge mixture was broken up and co-disposed with the concrete walls of the silos

Impact

Significantly reduced worker dose during demolition of silos and enabled job to be completed on time, safely, and under budget; work was performed remotely from outside contaminated areas

Chemical Decontamination of Glove Boxes and Tanks

Challenge

The glove boxes and tanks at Rocky Flats had to be size-reduced to meet the waste acceptance criteria for transportation and disposal of transuranic (TRU) waste at the Waste Isolation Pilot Plant (WIPP), but size reduction is a labor-intensive, hazardous activity for site workers

Solution

Cerium nitrate can be used to decontaminate the interior surfaces of glove boxes and tanks to remove virtually all the plutonium contamination and enable classification as low–level waste

Accomplishments

Cerium nitrate was used to clean the contaminated surfaces of glove boxes and tanks so they could be disposed of as low level waste at the Nevada Test Site or commercial disposal sites

Impact

Due to the cerium nitrate decontamination technology, Rocky Flats reduced the amount of transuranic waste that was shipped to the Waste Isolation Pilot Plant by 30% or 5,000 cubic meters

Worker exposure to high airborne radioactivity was significantly reduced and industrial hazards associated with size reduction of glove boxes and tanks was eliminated

Disposal costs for an average size glove box were reduced from approximately $140K to $6.5K

Foam Encapsulation of Leaded Glove Boxes

Challenge

More than 1,300 glove boxes that contained leaded gloves, glass, and flashing and were contaminated with plutonium, uranium, and americium needed be disposed of to successfully close the Rocky Flats Site. To meet waste disposal criteria required for shipment of the glove boxes as low level waste, workers were required to conduct high-hazard and labor-intensive activities.

Solution

DOE worked with the Instacote™ Company to develop a spray foam, called BASF Autofroth™, for stabilizing contamination inside the glove boxes and macro-encapsulating lead-bearing materials to meet the requirements of the nuclear regulation 1608

Accomplishments

Rocky Flats was able to dispose of all glove boxes without manually removing all leaded components

Impact

Foam encapsulation enabled all the Rocky Flats glove boxes to be disposed of at the Envirocare facility in Utah

Without foam encapsulation, significant delays would have occurred in site closure, with attendant cost increases

Foam encapsulation also reduced risk to workers who would have had to remove all lead prior to disposal

Robotic Technology

Challenge

Deactivation and Decommissioning activities require remote handling due to high doses of radiation that workers would be subjected to perform the required tasks

Solution

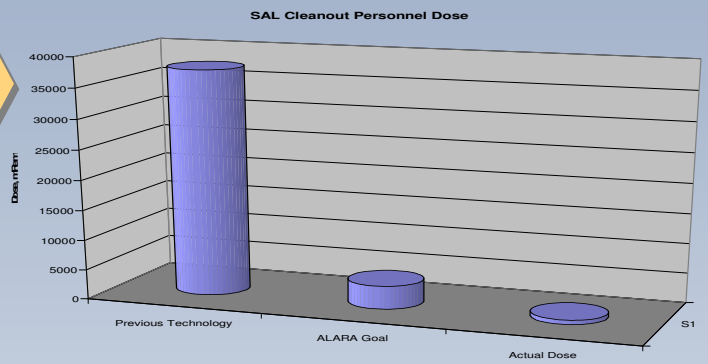
Transfer of previously developed robotic platforms built for glove box size-reduction

Accomplishments

A robotic platform built for glove box size-reduction at Rocky Flats was used to clean out a hot cell in the Shielded Analytical Laboratory in the 325 building at Hanford, after coordination between staff at Hanford, Rocky Flats, Pacific Northwest National Laboratory, and Environmental Management Headquarters

Impact

Overall dose to staff performing the various cleanup tasks was significantly reduced from an estimated 37,550 milli-rem (m-r) down to a little more than 715 m-r



Dose Reduction