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HEMISPHERIC CENTER FOR ENVIRONMENTAL TECHNOLOGY

FINAL MONTHLY PROGRESS REPORT
FOR
FISCAL YEAR 1999

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Program Officers John Wengle
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http://www.hcet.fiu.edu

SUMMARY

This month has been devoted to preparing year-end and final reports on all projects.

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MONTHLY PROGRESS REPORT

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Deactivation and Decommissioning Technology Assessment Program

Project Number: HCET-1996-D038

Project objectives

The Deactivation and Decommissioning (D&D) Technology Assessment Program (TAP) was developed to provide detailed, comparable data for environmental technologies and to disseminate this data to D&D professionals in a manner that will facilitate the review and selection of technologies to perform decontamination and decommissioning. The objectives for this project include the following:

- Determine technology needs through review of the Site Technology Coordination Group (STCG) information and other applicable websites and needs databases.
- Perform a detailed review of industries that perform similar activities as those required in D&D operations to identify additional technologies.
- Define the technology assessment program for characterization and waste management problem sets.
- Define the data management program for characterization, dismantlement, and waste management problem sets.
- Evaluate baseline and innovative technologies under standard test conditions at Florida International University's Hemispheric Center for Environmental Technology (FIU-HCET) and other locations and collect data in the areas of performance, cost, health and safety, operations and maintenance, and primary and secondary waste generation.
- Continue to locate, verify, and incorporate technology performance data from other sources into the multimedia information system.
- Develop the conceptual design for a dismantlement technology decision analysis tool for dismantlement technologies.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M1	Publication of the Technology Assessment Reports	Completion of 16 technology demonstrations and each summarized in monthly reports within 60 days after the demonstration.	Ten technologies evaluated for various applications for a total of thirteen demonstrations.
D038-M2	Test Plan for Characterization Technologies Assessment Program	Characterization Technology Test Plan Approved	Completed 5/24/99

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M3	Test Plan for Waste Management Technologies Assessment Program	Waste Management Technology Test Plan Approved	Scheduled completion 6/30/99. On hold (see issues section below)
D038-M4	Access to the multimedia information system web-based user interface for dismantlement	Assignment of user name and passwords to DDFA provided distribution list.	Completed 10/1/99. On schedule.
D038-M5	Access to the information system characterization database	Assignment of user name and passwords to DDFA provided distribution list.	Completed 10/15/99. Ahead of scheduled date of 10/29/99.
D038-M6	Report on the information system waste management design	Final copy of report sent to DDFA.	Scheduled start 10/1/99. Scheduled completion 10/29/99. On hold (see issues section below)
D038-M7	Report on the decision analysis tool for dismantlement design	Final copy of report sent to DDFA.	Started 7/6/99. Scheduled completion 10/29/99. To be included in the FY99 Year-End Report.

Significant events for this reporting period

- Demonstration of the modified Laser Coating Removal System by General Lasertronics has been confirmed and scheduled to begin on October 22, 1999.
- Data from the Princeton Plasma Physics Laboratory (PPPL) demonstration of the diamond wire saw has been compiled, and FIU-HCET is working closely with PPPL to write the Innovative Technology Summary Report (ITSR) describing the demonstration. The draft of the ITSR is expected in the next few weeks.
- The Scope of Work for the assessment of size reduction of glove boxes and tanks technologies was sent to 15 vendors on 10/18/99 with vendor proposals expected in mid-November. The construction of the hydraulic system for standing and supporting the tanks inside the testing facility is nearly complete and will be ready for testing within the next week.
- The Technology Summary Reports are attached for the following demonstrations that occurred in August 1999:

- Diamond Wire Saw at Princeton Plasma Physics Laboratory
- VitalSense™ Telemetric Monitoring System from Mini Mitter Co., Inc.
- Kool-Vest from MicroClimate Systems, Inc.
- MTR Chemical Protective Suit.

- Design of the test mockup for evaluating non-intrusive location of buried items technologies is ongoing. A draft of the test area mockup is expected to be completed in the next few weeks. This draft will be sent to Fluor Daniel Fernald (FDF) and the International Union of Operating Engineers (IUOE) for review.

- The Multimedia Information Dismantlement Database and the web-based search engine were completed on October 1, 1999. Users will be able to access the Dismantlement search engine through the Internet on the GET website <www.DandD.org>.

- The Characterization Database was completed on October 15, 1999. This database is for data entry only. At this time, no TAP data is available for entry into this database.

Accomplishments and technical progress to date

- Under this grant project and earlier technology assessment projects funded from other sources, FIU-HCET assessed over 60 innovative/improved and baseline technologies for decontamination and equipment dismantlement under standardized, non-nuclear testing conditions. Many of the technologies identified for demonstration at FIU-HCET are selected to address the needs identified in the EM-50 Needs Management System <http://EM-Needs.em.doe.gov/Home/>. As a result of these assessments, directly comparable performance data related to operations and maintenance, primary and secondary waste generation, and health and safety has been compiled. This data has been valuable in assessing whether a technology meets the screening criteria for those DDFA LSDDPs where these technologies are being considered, as well as assisting EM-40 project managers in making decisions on the deployment of innovative technologies. Technology assessment data is managed using a Microsoft Windows-based multimedia information system.
- In FY99, 10 technologies have been evaluated to date in multiple applications giving a total of 13 demonstrations. The technologies evaluated include
    - Bartlett Robotic Climber - Bartlett Services, Inc.
    - Fourier Transform Profilometry – Mississippi State University, DIAL
    - ElectroStrip™ - EMEC Consultants
    - Ice Blast with Chemical Softner – Ice Blast, Inc.
    - En-Vac Robot Blasting System – MHI Marine Engineering, Ltd.
    - VitalSense™ Telemetric Monitoring System - Mini Mitter Co., Inc.
    - MTR Chemical Protective Suit – Kimberly Clark
    - Kool-Vest – MicroClimate Systems, Inc.
    - Diamond wire saw – Bluegrass Concrete Cutting, Inc.
    - Laser Coating Removal Technology – General Lasertronics (upcoming)

Assessment of current status and issues

The project schedule for the completion of 16 demonstrations was not met. Ten technologies have been assessed for a total of 13 demonstrations (including the upcoming Lasertronics demonstration). The cancellation of two health & safety demonstrations by the IUOE and the greater than estimated time required to design and build the annular and kynar tank lifting mechanism precluded FY99 goal achievement.

Test plans for assessing Facility Dismantlement, Facility Characterization, and Glove Box and Tank Size Reduction technologies have been completed. The mockup test facilities for characterization and glove box and tank size reduction are in process and expected to be completed by the end of this fiscal year. Assessments in these areas should begin in early FY00.

The generation of a test plan for Waste Management Technology Assessment and the report on the information system, waste management design, have been placed on hold pending a reassessment of the complex-wide needs and ongoing development programs to allow for an optimized assessment strategy.

Plans for the next two months

Activities for the next two months include the following:

- Demonstrate the Laser Coating Removal System by General Lasertronics by the end of October 1999.
- Complete mockup for the Glove Box and Tank Size Reduction technology assessments.
- Review incoming vendor proposals for the Glove Box and Tank Size Reduction technology assessments, select technologies for demonstration, and develop a schedule.
- Work with the Operating Engineers National Hazmat Program (OENHP) to design the test facility for Non-Intrusive Location of Buried Items Technologies and write a test plan for this project.
- Write the FY99 Year-end Report for this project.

FIU-HCET collaborators

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Susan C. Madaris, (305) 348-3727

TECHNOLOGY ASSESSMENT PROGRAM (TAP)
Technology Evaluation and Assessment Summary

Diamond Wire Cutting

DEMONSTRATION OBJECTIVE

A diamond wire saw was demonstrated by Bluegrass Concrete Cutting, Inc. to cut a mockup of the Tokamak Fusion Test Reactor (TFTR) at Princeton Plasma Physics Laboratory (PPPL) in Princeton, NJ. The dates of the demonstration were August 23 to September 3, 1999. This demonstration was a joint venture between FIU-HCET, PPPL, and AEAT. Various void fills and different coolant types were also demonstrated to find the optimum conditions for the diamond wire saw.

TECHNOLOGY DESCRIPTION

The diamond wire system consists of a diamond matrix wire made to length for each individual cut and a hydraulic drive system. The plated diamond wire consists of aeronautic type wire rope, springs, and synthetic diamonds plated to the outside of a steel bead. The wire is strung through the inside of the beads and springs. Every third bead, a brass ring is compressed around the wire to isolate the cutting beads in groups.

To perform a cutting operation with the saw, the wire is wrapped around the object to be cut and then coupled together to envelope the cut area. Then the wire is guided back to a drive wheel and around idler wheels that guide the wire. The wheel rotates and pulls the wire through the cut area. Water is typically used to cool the wire and to wash away the slurry created by the cutting operation. Wire tension is maintained via a rack and pinion drive motor and gear that pulls the main drive-wheel along its carriage assembly. The main drive assembly is a simple flywheel that is either hydraulically or electrically driven.

RESULTS

The diamond wire saw successfully cut through stainless steel (1/2-in.), inconel, graphite, and the concrete void fill. The low-density cellular concrete void fill, Rheocell-15, proved to be the optimum product for this project. This is because it was strong enough to support and clean the diamond wire, yet weighed significantly less than the regular mortar void fill (12.9 tons with mortar vs. 6.9 tons with Rheocell-15).

The use of liquid nitrogen (LN) as a coolant was a success. The LN was applied at a rate of 375 L/m^2 (9.19 gal/ft^2), which proved to be sufficient to cool the wire during cutting. The use of air as a coolant was demonstrated; however, the airflow was not sufficient to keep the wire cool, causing the stainless steel to melt more than cut cleanly.

Cutting rates for the diamond wire saw, of 0.32 m^2/h (3.42 ft^2/h), did not differ significantly using either the water or the LN as coolants. However, production rates increased using the LN due to having to wait for the proper flow of LN before proceeding to cut and waiting for oxygen to replace the LN within the containment prior to entry.

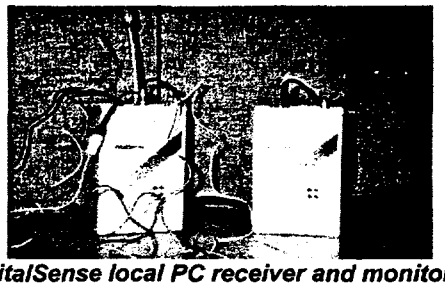
For additional information about this Technology Assessment, contact Susan C. Madaris, D&D Project Manager, FIU-HCET, (305) 348-3727.

TECHNOLOGY ASSESSMENT PROGRAM (TAP)
Technology Evaluation and Assessment Summary
VitalSense Telemetric Monitoring System

DEMONSTRATION OBJECTIVE

The VitalSense Telemetric Monitoring System from MiniMitter Co., Inc., was demonstrated in August 1999 by the International Union of Operating Engineers (IUOE) and FIU-HCET at the International Environmental Technology and Training Center at Beaver, West Virginia. The objective of the VitalSense demonstration was to determine the accuracy of the heat stress monitoring system in measuring human vital signs while the subjects performed different work tasks in simulated hazardous environments.

TECHNOLOGY DESCRIPTION



VitalSense local PC receiver and monitor.

Heat Stress Monitors.

The VitalSense Telemetric Monitoring System is a heat stress device that monitors core temperature and heart rate subjects in real time by telemetry. The transmission range for MiniMitter is 1500 feet between receiver and monitor.

The system consists of a small plastic case to enclose the electronics and wireless radio components; a laptop computer and software; a rechargeable battery supply; and a series of temperature and heart rate probes that measure vital signs of workers while they are performing work activities. Skin temperature is measured using a taped-on probe. Heart rate is monitored with a chest band. If incipient heat stress or high heart rate is detected, the system will automatically activate the light-emitting diode warning device mounted near the worker's eyes. Warning levels are factory set.

RESULTS

The VitalSense MiniMitter was tested at the Operating Engineers National Hazmat Program (OENHP) as part of the human factors assessment of environmental technologies, Type I, which evaluates innovations for worker protection. The equipment used for the test was Level B ensemble(s) including self-contained breathing apparatus (SCBA). These tasks include horizontal confined space entry (pipe), vertical confined space entry (pit), and wheelbarrow push (loading and unloading material). Each test had a fixed duration period of 20 minutes.

A user satisfaction questionnaire was completed before and after each task, and physiological measurements were collected throughout the assessments. This information is being processed and analyzed for final conclusions by the OENHP personnel at Beaver, WV, Barbara McCabe (304-253-8674). Final results from MiniMitter will be compared with results obtained from physiological measurements. The test subjects wore two different suits, impervious and chemical suits normally used on hazardous environments cleanup.

The overall test was satisfactory, and test subjects' pulses and core temperatures were considered normal for the tasks performed.

For additional information about this Heat Stress Technology Assessment, contact Carmen Alicia Aponte, D&D Project Manager, FIU-HCET, (305) 348-6556.

TECHNOLOGY ASSESSMENT PROGRAM (TAP)
Technology Evaluation and Assessment Summary
KoolVest™

DEMONSTRATION OBJECTIVE

The KoolVest™ from MicroClimate System, Inc. was demonstrated in August 1999 by the International Union of Operating Engineers (IUOE) and Florida International University, Hemispheric Center for Environmental Technology (FIU-HCET) at the International Environmental Technology and Training Center at Beaver, West Virginia. The objective of the KoolVest™ demonstration was to evaluate its effectiveness (heat stress mitigation) and performance of workers while using the KoolVest during performance of D&D activities.

TECHNOLOGY DESCRIPTION

Test subject donning the KoolVest™ to perform one of the three tasks assigned (low, mid, and high energy level task).

The KoolVest™ is a light-cooling garment, weighing approximately 4 pounds. Its design allows it to fit inconspicuously underneath clothing. The KoolVest carrier has adjustable straps on both sides for a perfect body fit. The vest is ideal for temperatures up to 100 °F. The front side of the vest has 2 KoolPacks™, which provide a typical cooling time of approximately 1.75 to 2.0 hours at 100 °F. These packs can be recharged in approximately 20 minutes by submersing them in ice and water.

RESULTS

The KoolVest™ was tested at the Operating Engineers National Hazmat Program (OENHP) as part of the human factors assessment of environmental technologies, Type I, which evaluates innovations for worker protection. The KoolVest™ is an innovative personal body-cooling garment, which was demonstrated to evaluate its effectiveness during regular simulated tasks as if test subjects were operating in hazardous environments. The equipment used for the test was Level B ensemble(s) including self-contained breathing apparatus (SCBA). These tasks include horizontal confined space entry (pipe), vertical confined space entry (pit), and wheelbarrow push (loading and unloading material). Each test had a fixed duration period of 20 minutes.

A user satisfaction questionnaire was completed before and after each task, and physiological measurements were collected throughout the assessments. This information is being processed and analyzed for final conclusions by the OENHP personnel at Beaver, WV, Barbara McCabe (304-253-8674). Final results will be compared with results obtained from task performance without the cooling vest.

Even though the KoolVest™ added extra weight to the workers, they performed the tests with ease. The suit fits easily over the outer cooling garment, and according to the test subjects, it stayed comfortably cool while tasks were performed.

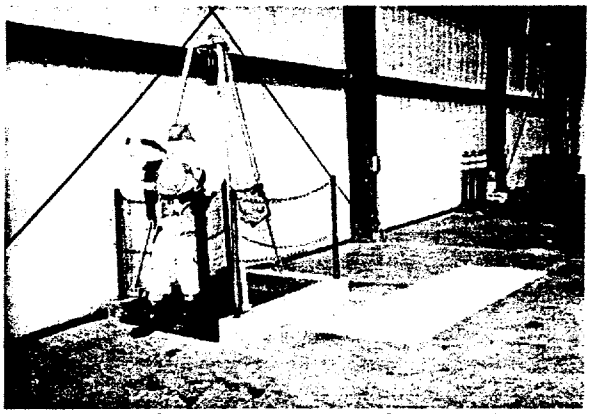
For additional information about this Heat Stress Technology Assessment, contact Carmen Alicia Aponte, D&D Project Manager, FIU-HCET, (305) 348-6556.

TECHNOLOGY ASSESSMENT PROGRAM (TAP)
Technology Evaluation and Assessment Summary
MTR Chemical Protective Suit

DEMONSTRATION OBJECTIVE

The MTR Chemical Protective Prototype Suit was demonstrated in August 1999 by the International Union of Operating Engineers (IUOE) and Florida International University, Hemispheric Center for Environmental Technology (FIU-HCET) at the International Environmental Technology and Training Center at Beaver, West Virginia. The objective of the MTR Chemical Protective Suit demonstration was to evaluate the effectiveness of the protective suit to minimize heat stress injury and illnesses while workers are performing simulated D&D activities. Quantitative and qualitative data were collected.

TECHNOLOGY DESCRIPTION



Vertical confined space test performed with the MTR Chemical Protective Suit.

The MTR chemical prototype suit consists of an innovative fabric that combines an ultrathin, permselective outer membrane with a sorptive inner layer. Innovative features of the suit include that the outer layer is extremely permeable to water vapor escaping from the wearer, but highly impermeable to hazardous compounds. The sorptive inner layer captures any hazardous compounds that may breach the outer membrane. The suit is lightweight for improved comfort and is breathable to allow water vapor to escape, thus reducing heat stress.

RESULTS

The MTR chemical prototype suit was tested by the Operating Engineers National Hazmat Program (OENHP) as part of the human factors assessment of environmental technologies, Type I, which evaluates new innovations for worker protection. The MTR is an innovative heat stress technology (prototype), which was evaluated for the first time following regular task protocols as if test subjects were operating in hazardous environments. The equipment used for the test was Level B ensemble(s) including self-contained breathing apparatus (SCBA). These tasks include horizontal confined space entry (pipe), vertical confined space entry (pit), and wheelbarrow push (loading and unloading material). Each test had a fixed duration period of 20 minutes.

A user satisfaction questionnaire was completed before and after each task, and physiological measurements were collected throughout the assessments. This information is being processed and analyzed for final conclusions by the OENHP personnel at Beaver, WV, Barbara McCabe (304-253-8674). Final results will be compared with results obtained from impervious and chemical suits normally used for cleanup activities in hazardous environments.

The overall test was satisfactory, and test subjects' pulses and core temperatures were considered normal for the tasks performed.

For additional information about this Heat Stress Technology Assessment, contact Carmen Alicia Aponte, D&D Project Manager, FIU-HCET, (305) 348-6556.

Integrated Vertical and Overhead Decontamination System

Project Number: HCET-1998-D023

Project objectives

The overall objective of this project is to fabricate and test an innovative technology for the purpose of characterizing and decontaminating vertical and overhead structures and to transfer this technology to industry for use in reducing the cost to perform decontamination operations. The sub-objectives required to meet the overall objective include the following:

- Design and fabricate a characterization system for overhead and vertical applications.
- Design and fabricate a decontamination system for overhead and vertical applications.
- Integrate and assess the system for commercial application.
- Transfer the system to industry for use throughout the DOE complex.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D023-M1	Selection of Industrial Partnerto design and manufacture decontamination and deployment systems	Selection of a responsible and qualified vendor	Completed. Contract placed with selected vendor on 6/14/99.
D023-M2	Approved Design Specifications for the Decontamination System	Approval of final design specifications for the decontamination system	Scheduled completion 4/6/99. This date had been revised to 8/6/99. Completed.
D023-M3	Fabrication of Decontamination System	Complete fabrication of decontamination system unit	Scheduled completion 7/30/99. This date has been revised to 11/5/99.
D023-M4	Field Testing of Decontamination System	Completion of testing of decontamination unit at FIU-HCET Test Site	Scheduled completion 8/16/99. This date has been revised to 11/24/99.
D023-M5	Design Drawings for the Characterization System	Approval of final design specifications for the characterization system	Scheduled completion 6/1/99. In progress, see "Assessment of current status and issues" for explanation. This date has been revised to 10/29/99.
D023-M6	Fabrication of Characterization System	Complete fabrication of characterization system	Scheduled completion 9/30/99. Deferred to FY00. See "Assessment of current status and issues" for explanation.
D023-M7	Testing the Characterization System	Completion of characterization system testing at FIU-HCET	Scheduled completion 10/15/99. Deferred to FY00. See "Assessment of current status and issues".
D023-M8	Final report on the	Deliver final report to DDFA-	Scheduled completion

Milestone No.	Milestone Description	Completion Criteria	Status
	Decontamination and Characterization System.	determined distribution list	11/30/99

Significant events for this reporting period

- Title II design of the decontamination/deployment system has been reviewed by FIU-HCET technical personnel. A meeting was held at Redzone Robotics facilities in Pittsburgh on October 20, 1999, to discuss Title II design.
- A list of Title II design comments were generated by FIU-HCET technical personnel and provided to Redzone on 10/14/99. This list contained technical issues/concerns on the Redzone design. This list was discussed during the face-to-face meeting, discussed above, in Pittsburgh. Redzone Robotics developed a list of responses to FIU-HCET technical comments, and it was delivered to FIU-HCET during this meeting.

Accomplishments and technical progress to date

- For details on accomplishments and technical progress on this project during FY98, please refer to the *Integrated Vertical and Overhead Decontamination System FY98 Year-End Report.*
- Performance Specification documents that include conceptual designs of the decontamination and deployment systems were sent for review to the FIU-HCET D&D Program Manager and FIU-HCET Senior Program Manager. Comments received were implemented by the end of January 1999. The reviewed documents and comments have been documented and are available.
- Bid Opening was conducted on April 2, 1999. Two bids were received and reviewed. Bid proposals were reviewed for technical content and responsiveness to bid specifications. A letter was sent to one of the vendors on 4/13/99 seeking clarification on issues in their bid response. A letter was received from the vendor on 4/16/99 containing answers to FIU-HCET questions.
- The Invitation to Bid was sent out to vendors on March 8, 1999. The original Bid Opening date was scheduled for March 19, 1999. All qualified vendors requested additional time to adequately respond to the bid. Based on this request, FIU-HCET issued an extension of the Bid Opening date until April 2, 1999.
- All issues were resolved between the vendor and FIU-HCET. The bid was awarded to a team composed of Redzone Robotics and Bartlett Services.
- Design review documentation for development of a test site for the characterization unit was submitted for review and approval by FIU-HCET QA Manager.
- A kick-off meeting was held at Redzone Robotics headquarters in Pittsburgh, PA. This meeting took place on July 1, 1999, and was attended by representatives from Bartlett Nuclear Services and FIU-HCET.
- Title I design for the development of the decontamination and deployment mechanism was completed by Redzone and submitted to FIU-HCET. The design has been reviewed and approved by FIU-HCET.

- A design review team was convened for the design of the FIU-HCET test site, and design documentation was distributed to the team members on August 25, 1999. Approval was obtained for the design for the development of a test site for the characterization module.
- The Title II design of the decontamination/deployment system was submitted on September 23, 1999.
- A list of Title II design technical comments was developed by FIU-HCET and provided to Redzone on 10/14/99.

Assessment of current status and issues

The Title II design of the decontamination/deployment system was submitted on September 23, 1999. FIU-HCET has completed formal review of this submittal and provided comments to Redzone Robotics on 10/14/99.

A Title II interface meeting was conducted at Redzone Robotics headquarters in Pittsburgh on 10/20/99.

Title I design has been completed by Redzone Robotics and approved by FIU-HCET.

Based on the current schedule, the construction and testing of the decontamination and deployment platform systems will be completed by January 2000. A Project Technical Plan (PTP) for FY00 has been developed indicating cost and schedule for completion of this project during FY00.

M2, M3, and M4 have been revised based on the new schedule for completion of the project provided by Redzone Robotics. These new-revised dates are reflected in the milestone table above.

Based on completion of Title I design and submittal of Title II design, M5 is in progress. It is anticipated that M5 will be completed by October 29, 1999. Based on the revised schedule, milestones M6 and M7 have been deferred to FY00 and have been incorporated into the FY00 PTP.

Plans for the next two months

Activities for the next two months include the following:

- Completion of FY99 Year-end Report.
- Resolution to any outstanding issues for Title II design and Title II approval.
- Start fabrication of deployment/decontamination unit.

FIU-HCET collaborators

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Large-Scale Demonstration and Deployment Project—Technology Information System (LSDDP-TIS)

Project Number: HCET-1998-D039

Project objectives

Within the DOE complex, there are some 10,000 buildings that require deactivation and decommissioning (D&D). These facilities present an immense array of problems and challenges for D&D project managers who must investigate and screen scores of candidate technologies to select the most appropriate one(s) for their specific remediation problems. The search for candidate technologies can be arduous and involve several sources of varying reliability. The Large-Scale Technology Demonstration and Deployment Project Technology Information System (LSDDP-TIS) will facilitate the search and selection process by providing D&D managers with ready access to an extensive information base of DOE-screened environmental technologies.

The objectives of this project include the following:

- Collect technology information from LSDDP technology screenings and other reliable sources.
- Compile a searchable database to serve as an aid to decision-makers for identifying candidate technologies for future LSDDPs or for addressing specific problems.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D039-M1	Release 1 of the TIS	User Access to the functional LSDDP-TIS via the Internet	Completed on schedule on 1/4/99.
D039-M2	Information from new LSDDPs incorporated	Screening data from new LSDDPs accessible through TIS	Completed, as of 5/30/99 – additional data will be incorporated into the TIS as new evaluations are done.
D039-M3	Information on DOE's baseline technologies and FIU-HCET's Technology Assessment Program incorporated	Information on DOE baseline and FIU-HCET-assessed technologies accessible through TIS	Completed, as of 5/30/99 – additional data will be incorporated into the TIS as new evaluations are done.
D039-M4	Information from DOE databases incorporated	Data from DOE designated databases accessible through TIS	Completed on schedule on 4/30/99.
D039-M5	TIS Linked to other D&D Technology Web Sites	Users of TIS provided with hyperlinks to other technology web sites	Completed on schedule on 5/21/99.
D039-M6	Final Report	Final report on results of the project delivered to DOE.	Originally scheduled for 10/29/99. The report will be written by end October 1999 and will be published at the end of 1999.
D039-M7	DDFA decision on other Media to Access TIS	Users able to access TIS information via other media such as telephone and return fax.	Deferred to FY00 as per client's request.

Significant events for this reporting period

- On October 19, 1999, the brochure announcing the new Gateway to Environmental Technology (GET) website was distributed to the D&D community by FETC-DDFA.

Accomplishments and technical progress to date

- The TIS was completed on May 21, 1999, and is accessible through the Internet GET website <http://www.DandD.org>. Through this website users may also access two other recently completed environmental technology information systems that were developed for OST at FIU-HCET, namely
  - The Multimedia Information System (MIS), which allows users to find technological solutions based on parameters such as cost, performance, schedule, and health and safety requirements. Users are also able to view pictures and videos of the technologies in action.
  - The Decision Support System (DSS), which is a decision support tool that prompts users to enter their project-specific problem sets, preferences, and constraints and, through algorithms developed at FIU-HCET, provides a scored and ranked list of possible solutions. Users may also fine-tune their selection by having the system perform multivariable "what-if" scenarios to arrive at solutions that best fit their needs and resources.
- In June 1999, prototypes of the FIU-HCET-developed information systems were demonstrated for the Associate Deputy Assistant Secretary for Science and Technology who recommended that a link to the FIU-HCET technology website be provided through the OST home page. A formal request to implement the link was sent to OST on August 18, 1999.
- The brochure announcing the new Gateway to Environmental Technology (GET) website was produced by FIU-HCET and was distributed to the D&D community by FETC-DDFA on October 19, 1999.
- Technology screening datasheets from the four new LSDDPs have been collected. All datasheets received to date have been entered into the database.

New LSDDP Sites	# of Technologies Evaluated at LSDDP to Date	# of Datasheets Received at FIU-HCET to Date	# of Datasheets Entered into TIS to Date
Mound Environmental Management Project (MEMP)	63	63	63
Savannah River Site (SRS)	46	46	46
Idaho National Environmental Engineering Laboratory (INEEL) *	55	55	55
Los Alamos National Laboratory (LANL)	34	34	34

* INEEL screened 123 technologies but produced evaluation forms on only 55 of these. The remaining 68 technologies were verbally screened and evaluation forms will not be produced for these.

Assessment of current status and issues

The system development phase of the project is complete. The final copies of all FY99 final and year-end reports will be distributed in January 2000.

Plans for the next two months

The project is complete.

FIU-HCET collaborators

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Robert Tucker, (305) 348-6181

Ex-Situ Large-Bore Pipe Decontamination and Characterization System

Project Number: HCET-1997-D017

Project objectives

The deactivation and decommissioning of 10,000 buildings in the U.S. Department of Energy (DOE) complex will require the disposition of miles of pipe. In particular, the disposition of large-bore pipe presents difficulties in the areas of decontamination and characterization. This pipe is potentially contaminated internally as well as externally. This situation requires a system capable of decontaminating and characterizing both the internal and external surfaces of the pipe. Current decontamination and characterization systems are not designed for application to this geometry, necessitating, in many cases, direct disposal of the piping systems. Once disposed of, the pipe often creates voids in the disposal cell, requiring the pipe to be cut in half or filled with a grout material. These methods are labor-intensive and costly to perform on large volumes of pipe. Direct disposal does not take advantage of recycling, which would provide monetary dividends as a result of the disposition of large-bore pipe.

To facilitate the decontamination and characterization of large-bore piping and thereby reduce the volume of piping required for disposal, the following objectives have been established:

- Conduct detailed analysis to document the pipe remediation problem set. (completed FY97)
- Determine potential technologies to solve this remediation problem set. (completed FY97)
- Design and laboratory test potential decontamination and characterization technologies. (completed FY97)
- Fabricate a prototype system. (FY98 and FY99)
- Provide a cost-benefit analysis of the proposed system. (preliminary completed FY98)
- Deploy the system. (FY99 and beyond)

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D017-M1	Title III of the decontamination system complete	The completion of Title III provides for a complete decontamination system ready for a field assessment.	Completed
D017-M2	Field testing of the decontamination system	The decontamination system will be tested to ensure the performance specifications are met. This will be accomplished by witnessing the cleaning of five tons of pipe of various diameters.	Completed

Milestone No.	Milestone Description	Completion Criteria	Status
D017-M3	Close-out of decontamination system	This milestone requires the completion of all required activities, including operation/maintenance procedures. Five people from FIU-HCET will be trained on the operation and maintenance of the system. The completed system will be turned over to FIU-HCET for operation and integration with the characterization system.	Ongoing. Scheduled for completion 7/30/99. Completed on 10/15/99.
D017-M4	Title I of the characterization system complete	FIU-HCET will approve initial design details of the characterization system and the costs associated with the characterization system.	Completed 11/30/98.
D017-M5	Title II of the characterization system complete	FIU-HCET will approve initial design details of the characterization system and the costs associated with the characterization system.	Scheduled completion 2/16/99. Actual completion date 2/18/99. Completed.
D017-M6	Title III of the characterization system complete	The completion of Title III provides for a complete characterization system ready for a field assessment.	Scheduled completion 7/28/99. This date has been revised to 8/9/99. Completed.
D017-M7	Field testing the characterization system	The characterization system will be tested to verify that it meets performance requirements by characterizing five tons of pipes of various sizes and contaminant types.	Scheduled completion 9/14/99. Completed.
D017-M8	Close-out of characterization system	This milestone requires the completion of all required activities, including operation/maintenance procedures. Five people from FIU-HCET will be trained on the operation and maintenance of the system. The completed system will be turned over to FIU-HCET for operation and integration with the decontamination system.	Scheduled completion 11/30/99. Completed on 10/15/99.
D017-M9	Final Report on the decontamination and characterization system	Final report detailing the technology assessment process and the design, fabrication, and testing of the system will be completed and issued. The final report will be distributed through the Remedial Action Program Information Center (RAPIC) and the DDFA mailing list database and will be available on the FIU-HCET Home Page.	Scheduled completion 11/30/99.
D017-M10	Large-scale field deployment of ex-situ large-bore pipe characterization and decontamination system.	The integrated characterization and decontamination system will be deployed at an environmental restoration site.	Scheduled completion 1/19/00.*

* A large-scale field deployment of the entire system has been scheduled at Big Rock Point Nuclear Power Plant starting December 6, 1999.

Significant events for this reporting period

- Close-out of characterization system was conducted in Miami from 10/4/99 through 10/15/99. The characterization trailer arrived in Miami on 10/4/99, and two Canberra technical personnel assisted FIU-HCET technical staff in setting up and running the system. Operations and maintenance training was provided by Canberra as well as operation and maintenance manuals. In addition, two FIU-HCET technical personnel attended a five day training course on the Jennie 2000 at Canberras headquaters in Meriden, CT.
- Close-out of decontamination system was conducted in Miami from 10/11/99 through 10/14/99. The decontamination trailer arrived in Miami on 10/11/99, and three Delong Equipment technical personnel assisted FIU-HCET technical staff in setting up the system. The setup operations were not completed due to weather conditions. In addition, problems were encountered during setup operations, which were resolved at schedule expense. Operations and maintenance training was provided by Delong during setup, but the system was not run. A complete operation and maintenance manual was delivered by Delong Equipment. A cold test has been planned for the week of November 15, 1999.
- The off-loading unit was delivered and installed at FIU-HCET by Delong Equipment. This unit was set up and run during the week of October 11, 1999. An operations and maintenance manual for this was also provided by Delong Equipment.
- Three Consumers Energy's technical representatives visited FIU-HCET during the week of October 18, 1999. The purpose of this trip was for CE staff to inspect the FIU-HCET LBP system and discuss deployment of this system at CE's Big Rock Point facility in Charlevoix, MI.
- Purchase Order for a weather barrier structure was approved and processed. Vendor will begin construction of this enclosure upon receipt of authorization documents.
- Purchase Order for paving of road at Big Rock Point was approved and processed. Vendor will begin work at Big Rock Point facility upon receipt of authorization documents.
- Pipes of various size diameter and length were painted and delivered to FIU-HCET. These pipes were painted bright yellow to track the migration of paint chips during the blasting process.

Accomplishments and technical progress to date

Literature Search to Determine Pipe Remediation Problem Set

Rough order-of-magnitude quantities were obtained from Hanford and Fernald, including 150,000 m^3 of pipe at Hanford and 5,880 m^3 of pipe at Fernald. Obtaining quantities from other DOE operations offices would require a significant level of effort; therefore, FIU-HCET and the Deactivation and Decommissioning Focus Area (DDFA) decided that acquiring the additional information would not be cost-effective and concluded that significant volumes of pipe exist to warrant the continuation of the project.

Determine Applicable Regulatory Policies and Procedures

The list of regulations that govern the fabrication and operation of the pipe decontamination and characterization system was compiled. This list was given to the potential technology vendors to aid in proposal development, design, equipment fabrication, and system evaluation.

Review of Decontamination and Characterization Technologies

The review and collection of data for possible decontamination and characterization options for large-bore pipe are complete. Based on the information reviewed, an initial screening method used for pipe decontamination technologies was developed and implemented. The initial criteria include the technology's ability to meet the required clean, near-white metal surface finish[1] on the interior or exterior of a pipe and the system's potential to be developed into a field mobile system. Seventeen decontamination technologies were evaluated as part of the initial screening process. Of the technologies screened, six technologies were selected for further evaluation; these six were then narrowed to one technology: grit blasting.

The literature survey of technologies capable of characterizing the interior and exterior of large-bore pipe is complete, and the resulting list detailing 21 technologies was prepared.

Design and Fabricate Decontamination System

Delong Equipment Company was selected to design, fabricate, and perform proof of principle testing of the decontamination module. The primary design difficulties involved laying out the system to fit into transportation containers. All critical issues have been resolved, and the system design indicates the performance specifications will be met.

Title I, Title II and Title III designs have been completed. The entire decontamination system is currently being installed inside a specially designed strong tight container. Once this is accomplished, the entire assembled unit will be put in place on a flatbed trailer for transportation. The system was delivered to FIU-HCET on 10/11/99.

Design and Fabricate Characterization System

Title I, Title II and Title III designs have been completed. The entire characterization system was shipped to FIU-HCET on 10/04/99.

Assessment of current status and issues

The purchase order for a weather barrier structure was approved and processed. The vendor will start construction of this structure upon receipt of authorization documents. The construction and installation of this structure is on the critical path for deployment of this system at the Big Rock Point facility on December 6, 1999. Progress of construction will be monitored closely during the upcoming weeks.

1 "A cleaned, near-white surface, when viewed without magnifications, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint and oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of the surface area and may consist of light shadows, slight streaks, or minor discoloration caused by rust stains, mill scale stains, or previously applied paint stains." (Structural Steel Painting Council, 1991, *Surface Preparation Specifications*, Structural Steel Painting Council, Pittsburgh, PA, pp. 53-56.)

The purchase order for paving of road at the Big Rock Point facility was approved and processed. Vendor will start construction upon receipt of authorization documents. The construction of this road is on the critical path for deployment of this system at the Big Rock Point facility on December 6, 1999. Progress of construction will be monitored closely during the upcoming weeks.

Canberra delivered the entire characterization unit to FIU-HCET on 10/04/99. A two-week installation and operations and maintenance training was conducted at FIU-HCET. The system is running, and during the upcoming weeks, several test runs will be performed before deploying the system at the Big Rock Point facility.

The decontamination, ventilation, and off-loading equipment were delivered to FIU-HCET on 10/11/99. Delong Equipment personnel were onsite to install and conduct one-week operations and maintenance training. Due to weather conditions and problems encountered during setup, the system was not completely installed during this week. The system will be tested before shipping to Big Rock Point.

MOTA Corporation was selected as the service provider company to assist FIU-HCET during the deployment of the LBP system at Big Rock Point facility. A scope of work was sent to MOTA Corporation, and a contract will be put in place.

Plans for the next two months

- Complete final report or year-end report.
- Transport the entire assembled system to Big Rock Point facility by November 15, 1999.
- Conduct cold test and hot test at Big Rock Point starting December 6, 1999.
- Place contract with MOTA Corporation.

FIU-HCET collaborator

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In-Situ Pipe Decontamination System

Project Number: HCET-1999-D041

Project objectives

The deactivation of radiologically contaminated facilities in many cases requires the characterization and decontamination of piping systems. There exists within the Department of Energy (DOE) inventory several thousand miles of piping and ductwork from facilities throughout the United States. The pipelines were used to move several types of contaminated fluids from one area to another within these facilities. The ductwork moved air within the facilities through ventilation systems. In-situ pipe decontamination options are limited; most commercial systems use high-pressure water to clean the pipe internals. High-pressure water generates large volumes of wastewater, which requires treatment, and in many cases is not aggressive enough to remove heavy scale and contaminants.

The goal of this project is to develop a low-cost and efficient system for in-situ decontamination of pipes, which does not release contaminants into the environment or generate secondary waste.

The objectives of the project are the following:

- Determine performance factors for the decontamination system.
- Select the most capable technology for decontaminating in-situ pipes.
- Incorporate an efficient filtration system to prevent release of contaminants or generation of waste.
- Perform technology enhancement/integration to accommodate horizontal, straight, circular, and rectangular piping and ducting sections.
- Perform a cost-benefit analysis.
- Fabricate a prototype system and assess its performance.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D041-M1	Technology selection complete	Determine optimum technology to deploy considering production rate, decontamination factor, and safety factors	Completed 2/1/99
D041-M2	Design plan complete	Peer review of design plan complete and approved	Scheduled completion 2/23/99. Completed 3/31/99. Delay due to revisions in approval requirements.
D041-M3	Approved design drawings and cost-benefit analysis	Peer review of final design drawings and the cost to complete approved	Scheduled completion 6/11/99. Peer review of the design performed on June 8, 1999. Cost analysis completed on September 10, 1999. Delay in

Milestone No.	Milestone Description	Completion Criteria	Status
			M3 due to delays in M2 and completion of market study. See Assessment of current status and issues.
D041-M4	Prototype system complete and demonstration test plan developed	Fabricated prototype system ready for tests and demonstration test plan approved	Scheduled completion 10/15/99. Cascading delay caused by initial delay in M2. Because this is a two-year project, this milestone has been pushed into the FY00 scope.

Significant events for this reporting period

- Fabrication drawings of the manual Plan B design were completed and presented to design review committee. Review committee suggestions were incorporated into design drawings and submitted to the FIU-HCET machine shop for assembly.
- The demonstration test plan is in development.

Accomplishments and technical progress to date

- Candidate technologies for in-situ decontamination of pipes were screened, and grit blasting was selected for further development.
- In-situ Pipe Decontamination System (IPDS) concept drawings were prepared and approved by the design review committee.
- Modifications were made to the grit blasting and recovery system to optimize performance.
- Research into the South Florida Building Code (Revised 1994), which establishes specifications for the positioning of clean-out openings for pipes of various diameters and lengths, was completed. This information is required for the design of the cleaning and grit recovery system.
- Cost estimates of the modification in the existing system for horizontal pipes and pipes with a smooth bend were made for a manual and crawler-driven system.
- A review of the pipe cleaning systems was performed. Discussions held with various vendors showed that grit blasting technology is a simple and easy-to-use technology that generates less secondary waste than the other technologies considered and produces a near-white metal finish. In combination with the grit blasting technology, two drive systems were considered and are discussed below: Plan A-a motor-driven system and Plan B-a manually driven system. Cost estimates of these systems were developed.
    - Plan A utilizes the ISL Microtrac Crawler™ , the motor-driven system that can be used for transporting a grit-blasting nozzle to any part of the horizontal or vertical pipe. It can also negotiate smooth bends. It is commercially available and can be adapted to the existing FIU-HCET Vertical Pipe Decontamination System (VPDS), which is a grit blasting system. The crawler does have some limitations:
        - Two sets are required for carrying the blast head through bend pipe.

  - Each one of these crawlers costs approximately $32K. Other components cost approximately $4K. Thus, the total cost of the crawler-driven system will be about $68K.
  - They can carry a maximum 50-pound load. That limits the length of the compressed air hose and hence the length of the pipe that can be cleaned.
  - The minimum pipe bore, which can accommodate the crawler, will be 8-inch. This limits its applicability to pipes with inner diameters of 8 inches and above, which does not adequately fulfill the scope of this project.
- Plan B incorporates the existing Vertical Pipe Decontamination System (VPDS) into a manually deployed system with a winch extraction for both horizontal and vertical pipe.
  - The improved system, which will be fabricated in-house, costs approximately $3K.
  - The minimum pipe bore will be about 5 inches, and with a smaller nozzle, which can be purchased off the shelf, it may be possible to clean bore sizes as small as 2 inches.
  - The maximum length of the pipe will be determined by experimentation.
  - Its limitation for bends in pipe also needs to be determined.
- FIU-HCET plans to proceed with Plan B and build and test this system first. Most of the components used in this system can be disassembled and used in the Plan A system, if a decision to use the prior system is made.

Assessment of current status and issues

This is the first year of a two-year project. The milestone 3 concept design for the enhanced capability unit was completed. The fabrication drawing was completed at the end of July 1999. Cost estimates for the new manual and pipe crawler driven systems were developed. No issues impacting design or deployment have been identified to date.

Plans for the next two months

- Complete final fabrication drawings, obtain approval from the design review committee, and fabricate the manually deployed enhanced-capability system.
- Perform tests to determine functional capabilities of the pipe decontamination system.

FIU-HCET collaborators

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Deactivation and Decommissioning Technology Opportunities for Non-Power NRC-Licensed Sites

Project Number: HCET-1999-D042

Project objectives

The Nuclear Regulatory Commission's (NRC) Operator Licensing Tracking System (OLTS) lists approximately 5,000 NRC-licensed operators of nuclear facilities in the United States. At the end of their useful life, power and non-power nuclear facilities must be deactivated and decommissioned. The use of appropriate deactivation and decommissioning (D&D) technologies can enhance the safety, efficiency, and cost-effectiveness of cleanup operations.

Over the next 10 years, approximately 34 NRC-licensed non-power reactors (NPR) will begin the process of deactivation and decommissioning. Project managers at these sites will be faced with the challenge of selecting safe, cost-effective environmental technologies for achieving their remediation goals. FIU-HCET, with its knowledge and expertise in environmental technologies and the D&D process, will accomplish the following:

- Assess the needs of these NRC-licensed non-power reactor sites.
- Identify opportunities for the fielding of technologies that have been proven safe and effective through research, development, and testing sponsored by the DOE's Office of Science and Technology.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D042-M1	Report on site licensing, decommissioning, and participation information	List of NPRs indicating nature of operation, license expiration date, decommissioning schedule, and willingness of the site to participate in the study.	Originally scheduled for completion February 28, 1999. Delayed due to slow responses to survey. Recommendation to proceed sent to FETC on April 26, 1999.
D042-M2	DOE-FIU-HCET decision to proceed and NPR sites to be studied	Based on level of participation, a decision by DOE and FIU-HCET on whether to proceed with the project.	Recommendation to proceed to Phase II approved by FETC June 18, 1999.
D042-M3	Site needs assessment	Identification of key problem sets facing each NPR scheduled for decommissioning.	Needs assessment survey was sent to NPR managers on June 25, 1999. The July 31 completion date has been rescheduled to August 30. Nine responses received as of September 15, 1999, are now being analyzed and solutions identified.
D042-M4	Technological solutions	Identification of candidate technologies for addressing problem sets identified in milestone 3.	August completion date rescheduled to October due to delays in M1 and M2.

Milestone No.	Milestone Description	Completion Criteria	Status
D042-M5	Final report production and distribution	Report summarizing problem sets and potential technological solutions submitted to DOE and upon approval distributed to NPR sites and candidate technology providers.	Originally scheduled for completion October 30, 1999. The report will be written by end October 1999 and will be published in January 2000.

Significant events for this reporting period

- To date, nine of 25 participating NPRs have responded to the needs assessment survey. The responses have been analyzed to identify problem sets that are likely to be of concern to NPRs undergoing decommissioning. Technological solutions are being identified and the results are being compiled into a ***D&D Problem Sets and Solutions Matrix***. Solutions identified within the matrix are being cross-referenced to technology fact sheets that will accompany the matrix.

Accomplishments and technical progress to date

The project is being executed in two phases.

In Phase I, FIU-HCET contacted site managers at NRC-licensed NPRs to ascertain the nature of their operations, the duration of their operating licenses, and whether they had plans for decommissioning or intended to renew their licenses. In addition, site managers were asked to participate in a follow-up study to assess and identify current and/or future D&D needs at their facilities. Forty-four NPRs were surveyed, of which 36 responded. Among the 36 respondents:

- Eleven were unable to participate in the study.
- Twenty-three have already filed, or plan to file, for extension of their licenses when they expire.
- Twenty-five agreed to participate in the follow-up needs assessment survey. Five of these had immediate needs for D&D technologies. The remaining 20 responded that they would not be undergoing decommissioning in the near future but were interested in participating in the study.
- Based on this high level of interest and participation, on April 26, 1999, FIU-HCET recommended to DOE that Phase II of the project be undertaken. On June 18, 1999, DOE concurred.

In Phase II, FIU-HCET researched and compiled a checklist of potential D&D problems which NPR facilities may face during decommissioning. This list formed the basis of a follow-up survey that was sent to 25 participating NPR site managers on June 26, 1999, to more accurately assess their current and future D&D needs.

- Four participating NPRs responded before the July 31, 1999, deadline, and an additional five responded by the end of August 1999. Follow-up calls were placed to the remaining participants during September, but no additional responses have been received.

Assessment of current status and issues

- Responses to surveys have been slow. However, sufficient data has been collected to identify the most common problem sets that facilities undergoing decommissioning might face, i.e. the basis of the Solutions Matrix. FIU-HCET is therefore proceeding with the compilation of the ***D&D Problem Sets and Solutions Matrix*** and supporting technology fact sheets. No further issues are foreseen that would hinder completion of this project.

Plans for the next two months

- During the week of October 25, 1999, FIU-HCET personnel will visit three NPR sites to share with them the Solutions Matrix developed from the needs assessment survey responses. These visits will allow FIU-HCET personnel to better assess the site-specific decommissioning needs of research reactors and will also serve the purpose of assessing the effectiveness of the ***D&D Problem Sets and Solutions Matrix*** as a decision tool for identifying technological solutions. Feedback from these facilities will be incorporated into the ***D&D Problem Sets and Solutions Matrix***.
- A final report on the project will be prepared and submitted for publication.

FIU-HCET collaborators

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Life-Cycle Cost Analysis for Radioactively Contaminated Scrap Metal

Project Number: HCET-1999-D043

Project objectives

In September 1996, the Assistant Secretary of the U.S. Department of Energy's Office of Environmental Management (U.S. DOE-EM) issued a challenge to the DOE community that, to the degree that recycling is economically advantageous and protective of worker and public health, radioactively contaminated scrap metal (RSM) presently in storage, or projected to be generated by future EM activities, should be recycled.

Future deactivation and decommissioning (D&D) of the DOE's surplus facilities is expected to generate more than 600,000 tons of metal and 23 million cubic meters of concrete. Already there are more than 400,000 tons of RSM from past D&D activities temporarily stockpiled at DOE sites and pending disposition. There are also large quantities of RSM permanently buried at commercial and DOE-managed low-level waste (LLW) disposal facilities across the country. In total, it is estimated that more than 1,000,000 tons of RSM will be generated from the deactivation and decommissioning of radioactively contaminated facilities at the DOE and in the private sector.

Current waste disposal costing methodologies at DOE-managed waste disposal sites favor direct disposal in landfills over recycling of RSM. Studies commissioned by the DOE have shown that current rates for direct disposal of RSM may be understated. It is perhaps because they do not reflect the total costs associated with the full life cycle of LLW land disposal. The long-term maintenance and surveillance cost of disposal sites once they have been closed is one issue. A complete life cycle cost analysis (LCCA) could reflect higher costs for direct disposal and could lead to increased material recycling, resource recovery, and waste minimization, which are key goals of the DOE.

DOE-managed LLW land disposal sites are limited in their capacity. It has been stated that to think that additional sites could be available to contain the projected generation of RSM from D&D activities is unrealistic. This complicates the issue of a "true" cost analysis. Because the issue of capacity is so relevant, insofar as obtaining a comparable "true" cost analysis, this study will take a zero-based approach that should be able to identify all initial costs, operating costs, direct costs, variable costs, closure costs, and value added. The objectives of this project are

- To conduct a DOE-wide survey to collect existing information on the quantities and characteristics of RSM currently in DOE stockpiles, as well as quantities likely to be generated from future D&D of DOE's surplus facilities and buildings.
- To estimate the range of the real costs for direct disposal of DOE-generated RSM. The study is limited to designated low-level waste (LLW) direct disposal facilities selected by FIU-HCET and DOE.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D043-M1	RSM inventory	A compilation of existing estimates of current and future RSM inventories generated by D&D activities.	Completed: June 15, 1999
D043-M2	Committed waste site managers	A list of waste site managers willing to provide information necessary for developing LCCAs.	Completed: June 15, 1999
D043-M3	Report to DOE on Phase 1 (milestones 1 and 2)	Summary of results of milestones 1 and 2 and recommendation to DOE on RSM disposal facilities to be surveyed.	Completed: June 15, 1999
D043-M4	Decision on RSM disposal sites to be assessed	FIU-HCET and DOE-FETC shall consult and decide whether to proceed to Phase II and select sites to be surveyed.	Due date: July 15, 1999 Draft report sent to DOE-FETC on July 21, 1999. Delay in completion due to slow response to survey. Decision on sites reached July 30, 1999.
D043-M5 (deleted)	Documentation of NRC and commercial means of costing RSM disposition	Comparative analysis of costing methodology and factors used by selected sites.	This task has been deleted by FETC.
D043-M6 (deleted)	Documentation of DOE means of costing RSM disposition	Procedural outline of DOE's costing methodology, indicating variances with other sites surveyed.	This task has been deleted by FETC.
D043-M7	LCCA for direct disposal of RSM	Develop LCCA for direct disposal of RSM at selected disposal sites. LCCAs will be submitted to DOE for review.	Scheduled for completion August 31, 1999. First draft sent to reviewers on August 23, 1999.
D043-M8 (deleted)	Finalize LCCAs and update DOE handbook	Revised LCCAs incorporating DOE's comments and procedures for LCCA incorporated in DOE handbook.	This task has been deleted by FETC.
D043-M9	Final Report	Review comments provided to FIU-HCET by DOE to be incorporated into LCCAs and resubmitted to DOE with final project report	Scheduled for completion October 31, 1999. The final report will be published by January 2000.

Significant events for this reporting period

- Discussions between FIU-HCET and FETC included the exploration of the possibility of including the pre-disposal cost element modules. These would include waste handling, packaging, characterization, and transportation. Direction was provided to FIU-HCET, from FETC, to inquire from NMR the status of information they had collected for their "tool box." To further assist with this information, FETC recommended that FIU-HCET ask NMR if Dr. K. Yuracko's office could provide information on these various cost element modules. In the event that data is not forthcoming or unavailable, FETC recommended that it might be necessary to go to the field for the required information. No decision was made as to how to proceed with the items discussed. The project scope remains the life cycle for the disposal only, of low level radioactively contaminated scrap metal.

Accomplishments and technical progress to date

- In December 1998, FIU-HCET in consultation with Dr. Katherine Yuracko, an expert in life-cycle analysis at the ORNL, identified and defined tasks to complement the life-cycle decision methodology developed by Dr. Yuracko.
- In March 1999, representatives from FIU-HCET, DOE-FETC and NMR reviewed the project's scope of work and objectives. The outcome of the review was that FIU-HCET would focus exclusively on collecting existing information to estimate current and future RSM inventories and on developing an LCCA for estimating the true costs associated with direct disposal of DOE-generated RSM at selected disposal sites. Costs associated with other means of RSM disposal would not be investigated. These changes were endorsed by DOE-FETC and reflected in the Major Milestones table above.
- In April 1999, FIU-HCET prepared and issued a survey questionnaire to 11 DOE sites requesting data on current and future RSM inventories. The survey provided the sites with their specific Internet address for the Accelerating Cleanup: Paths to Closure Baseline Disposition Maps. An Excel spreadsheet was included to facilitate data reporting.
- The Nevada Test Site and Envirocare of Utah, Inc., waste disposal sites were designated by the DOE for evaluation. These sites were visited in May 1999 and information on cost elements collected. The visit to Envirocare provided information on cost elements for commercial LLW disposal facilities that are different from those at the DOE sites such as NTS.
- FIU-HCET attended DOE's Waste Issues Team Workshop V in Las Vegas, NV, to make a presentation on the LCCA-RSM project goals and objectives. The Nevada Test Site personnel provided information on the disposal costs for the NTS LLW facility.
- As of June 15, 1999, completed RSM survey questionnaires were returned by two of the 11 sites surveyed.
- On July 26, 1999, FIU-HCET met with representatives from NMR and DOE-ORO to brief them on the status of the project and to coordinate efforts regarding the review team.
- Algorithms used to develop the LCCA were submitted to Dr. Yuracko on August 9, 1999, for review as requested by DOE-FETC.

- A meeting scheduled for the week of August 23-27, 1999, to review the first draft of the LCCA final had to be postponed due to other pressing exigencies requiring the NMR participants to travel. The review meeting scheduled for the end of September was postponed indefinitely. A final draft report, incorporating reviewers' comments was completed and is currently undergoing internal FIU-HCET review. A draft for submission to FETC and NMR will be prepared pending completion of this internal review.

Assessment of current status and issues

The project is currently ahead of its original schedule, and no major issues are anticipated that would delay its completion.

Plans for the next two months

- Completion of final report

FIU-HCET collaborators

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Legacy Waste Disposition for the Oak Ridge Reservation

Project Number: HCET-1999-D044

Project objectives

Deactivation and decommissioning (D&D) of the surplus facilities at the Oak Ridge Reservation (ORR) will result in millions of cubic meters of waste of varying degrees of hazard and toxicity, requiring treatment, storage, and disposal (TSD). A large portion of the waste consists of low-level, uncharacterized, heterogeneous mixed-waste streams. Currently, disposition paths do not exist at ORR for much of the mixed low-level waste (MLLW), which has to be sent to commercial waste facilities for disposition.

There are over 60 storage facilities on the ORR where MLLW is stockpiled. It is the goal of the U.S. Department of Energy (DOE) to eliminate this stockpile of legacy MLLW by the year 2006.

Several options exist for the TSD of contaminated waste streams at the ORR. These include neutralization, separation, vitrification, volume reduction by incineration or evaporation, packaging and direct disposal, and decontamination for reuse/recycling. In disposing of waste, the key objectives of the DOE's waste management program include safety, pollution prevention, waste minimization, and resource recovery. A clear understanding of proven TSD alternatives (disposition paths) for particular waste streams is therefore critical to achieving waste management goals and objectives. By their very nature, MLLW streams could potentially require an infinite number of disposition options for characterization, treatment, storage, and disposal, which could prove to be prohibitively costly. The need exists for a systematic means of evaluating MLLW streams and selecting the most appropriate disposition path for each stream from a limited number of options. This would minimize the number of disposition processes that would have to be set up to characterize, treat, store, and dispose of MLLW streams and would reduce costs for waste management.

Under this project, FIU-HCET will

- Perform a series of technical reviews for the DOE to aid in determining TSD options for MLLW streams at the ORR and to support the DOE's goal of eliminating the MLLW inventory by the year 2006.
- Investigate feasible TSD options and technologies for legacy MLLW streams at the ORR for which no disposition paths currently exist.

The original tasks identified in this project were defined by Bechtel-Jacobs, LLC (hereinafter referred to as Bechtel Jacobs), the Management and Integration contractor for the ORR, based on preliminary needs assessments conducted at ORR. These needs have since been reassessed, and Bechtel Jacobs redefined tasks in March 1999 in consultation with FIU-HCET. The new tasks are within the scope and goals of the project and are reflected in the Major Milestones table below.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D044-M1 (deleted)	Report on TSD options for residue from MLLW metal feeds to the TSCA incinerator	A set of feasible disposition paths for the MLLW metal feeds to the TSCA incinerator.	Scheduled for completion 4/30/99. This task was deleted by Bechtel Jacobs (see Note 1).
D044-M2 (deleted)	Report on TSD options for contaminated accelerator lead shielding.	At least 2 feasible options for disposing of the contaminated lead shielding.	Scheduled for completion 3/31/99. This task was deleted by Bechtel Jacobs (see Note 2).
D044-M3 (deleted)	Report on TSD options for contaminated cadmium plates.	At least 2 feasible options for disposing of the contaminated cadmium plates.	Scheduled for completion 4/30/99. This task was deleted by Bechtel Jacobs (see Note 2).
D044-M4 (deleted)	Report on wastewater residue TSD options at Y-12.	A set of feasible disposition paths for the Y-12 wastewater residues.	Scheduled for completion 6/30/99. This task was deleted by Bechtel Jacobs (see Note 1).
D044-M5	Report on performance of PM-CEMs in meeting EPA monitoring guidelines.	Report on Technical Review of PM-CEMs Performance Evaluation Test Plan	Completed on schedule 6/30/99
D044-M6	Final Report summarizing findings, incorporating previous Bechtel Jacobs review comments, and providing guidance on use of the developed decision tool	Final report submitted to Bechtel Jacobs	Due 10/31/99. Final report will be published in January 2000.

The following task milestones were added by Bechtel Jacobs in March 1999 in consultation with FIU-HCET:

Milestone No.	Milestone Description	Completion Criteria	Status
D044-M7 (added)	Regulatory update of the BDAT database	All waste codes in ORR MLLW Balance of Inventory (BOI) database updated to current RCRA/LDR regulations	Completed on schedule 4/15/99
D044-M8 (added)	Report on waste codes in sample populations of the ORR MLLW BOI database	Resolution of problematic waste code assignments and groupings	Completed on schedule 4/30/99
D044-M9 (added)	Report on potential waste disposition conflicts and their resolution	Resolution of potential disposition conflicts; and identification of options	Completed on schedule 5/15/99
D044-M10 (added)	Documentation of effectiveness of systematic approach to ORR MLLW evaluation and disposition	Documentation of reduced treatment effort required	Completed on schedule 6/15/99

Note 1. These tasks were deleted per e-mail received March 31, 1999, from John Patterson, Manager of Planning and Integration at Bechtel Jacobs.

Note 2. These tasks have been deleted per e-mail received May 17, 1999, from John Patterson, Manager of Planning and Integration at Bechtel Jacobs.

Significant events for this reporting period

- FIU-HCET has completed a preliminary draft final report, and it has been reviewed by Bechtel Jacobs.-There were no comments or revisions.

Accomplishments and technical progress to date

Bechtel Jacobs and DOE established an initiative to expedite the treatment of broad-spectrum waste streams. In 1996 and early 1997, analysis of contractors' responses to a Broad Spectrum Invitation for Bid led to the development of five broad MLLW treatment categories, a make/buy study and life-cycle cost analysis to evaluate onsite and offsite treatment options, and an approach for awarding contracts for MLLW treatment. In June 1998, five Broad Spectrum Treatment Contracts (BSTC) were awarded to two commercial mixed-waste TSD vendors and was earmarked an anticipated expenditure of between $40 million and $260 million for TSD services. Through this vehicle, up to 36 million kilograms of MLLW will be processed at the two permitted facilities for ultimate land disposal. The BSTC initiative has also led to the development of a web site that provides tools and information for DOE project personnel and other users to evaluate process knowledge about their specific MLLW streams, determine appropriate treatment vendors, estimate transport and treatment costs, and obtain contract-related information.

Discussions between Bechtel Jacobs and FIU-HCET during March 1999 identified the following needs:

- Review waste codes assigned to waste populations in the ORR MLLW inventory and update them to current RCRA/Best Demonstrated Available Technology (BDAT) treatment regulations and standards.
- Review waste code groups within these waste populations for the correctness of their assignment and to determine the impact of current waste groupings on required treatment type. This latter information can correct potentially costly problems such as the generation of small "orphan" groups requiring special, more costly TSD effort, or by inclusion of such groups in larger populations, causing the entire population to undergo unnecessary treatment.
- These developments have led to a redefinition by Bechtel Jacobs of the scope of technical assistance that FIU-HCET will provide under this project. The overall scope and objectives of the project remain essentially the same; however, some tasks and milestones have been redefined to better address the needs identified above. The revised plan takes a more comprehensive and systematic approach to assessing TSD options and processes for waste streams, rather than simply identifying disposition paths for a limited number of specific streams. Several of the specific streams originally identified by ORNL to be investigated by FIU-HCET (namely, those related to milestones 1 through 4) have been subsumed by the revised scope of work or are no longer of interest to Bechtel Jacobs.
- FIU-HCET is working with Bechtel Jacobs personnel to identify, define, and develop tasks associated with the Broad Spectrum waste disposition effort and the identification of potential orphan MLLW streams, which FIU-HCET can address in this project.
- FIU-HCET completed the assessment of the MLLW Broad Spectrum Treatment Plan (BSTP) developed by Bechtel Jacobs.

- FIU-HCET completed a detailed review of the MLLW database and of waste populations of particular interest to Bechtel Jacobs.
- The systematic approach for evaluating MLLW has been completed, along with the supporting cost analysis decision modules.

Assessment of current status and issues

In March 1999, the original scope of this project was reviewed with Bechtel Jacobs and FETC in light of the redefined needs of Bechtel Jacobs. The review resulted in revised tasks, milestones, and deliverables for the project as reflected in the above milestone table.

The project is on schedule, and no major issues are anticipated that would delay its completion.

Plans for the next two months

FIU-HCET will

- Complete a final report.

FIU-HCET collaborators

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National Contract for Radioactive Scrap Metal Recycle

Project Number: HCET-1999-W002

Project objectives

In September 1996, the Assistant Secretary of the U.S. Department of Energy's Office of Environmental Management (U.S. DOE-EM) issued a challenge to the DOE community that, to the degree that recycling is economically advantageous and protective of worker and public health, radioactively contaminated scrap metal (RSM) presently in storage, or projected to be generated by future EM activities, should be recycled.

Future deactivation and decommissioning (D&D) of the DOE's surplus facilities is expected to generate more than 600,000 tons of metal and 23 million cubic meters of concrete. Already there are more than 400,000 tons of RSM from past D&D activities temporarily stockpiled at DOE sties and pending disposition. There are also large quantities of RSM buried at commercial and DOE-managed low-level waste (LLW) disposal facilities across the country. In total, it is estimated that more than 2 million tons of RSM will be generated from the D&D of radioactively contaminated facilities at the DOE and in the private sector.

Current waste disposal costing methodologies at DOE-managed waste disposal sites favor direct disposal of RSM over recycling. Two primary reasons for this preference include both cost differential perceptions and the difficulty of attaining and managing recycle contracts. The DOE National Center of Excellence for Metals Recycle (NMR) intends to reduce the difficulty of attaining and managing recycle contracts by implementing a national contract that provides low cost and flexibility along with ease of implementation.

FIU-HCET provides the following services to the DOE complex via NMR:

- Supporting accelerated site cleanup and closure in a safe, environmentally protective manner and in compliance with applicable environmental regulation
- Assisting in the mitigation of risks to ensure that site conditions do not pose unacceptable risks to workers or public
- Endorsing the disposition of contamination, waste materials, buildings, facilities, and infrastructure consistent with national goals.

These services are in direct support of the objectives of NMR. Specific tasks associated with these services and identified in this subtask include the following:

- Propose a strategic plan for the development of a national contract for radioactive scrap metal recycle.
- Identify radioactive scrap metal recyclers providing both decontamination and metal melting capabilities.
- Assist in the development of the Statement of Work, Prequalification Criteria, and Selection Criteria for the radioactive scrap metal handling, transportation, processing, and dispositioning.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
W002-M1	Propose a strategic plan for the implementation of a national contract.	Communicate the strategic plan for consideration by the DOE.	Completed 3/02/99.
W002-M2	Identify radioactive scrap metal processors with Metal Melt capabilities.	Provide a list of processors capable of providing decontamination services, metal melting services and dispositioning services.	Completed 3/22/99.
W002-M3	Assist in the development of a draft Statement of Work, Prequalification Criteria and Selection Criteria for consideration and evaluation by the DOE.	Formalize draft documents for the Statement of Work, Prequalification Criteria and Selection Criteria.	Completed 3/22/99.
W002-M4	Assist in the development of an Acquisition Plan utilizing the National Metal Contract strategic plan.	Submit an Acquisition Plan for the National Metal Contract.	Completed 7/01/99.

Note: Additional milestones to be determined by NMR.

Significant events for this reporting period

- All assigned tasks have been completed, and no new tasks have been assigned by DOE during the current reporting period.

Accomplishments and technical progress to date

Milestones W002-M1 through W002-M4 have been completed, and formal reports have been submitted to the NMR. These documents were reviewed and accepted by the NMR.

Assessment of current status and issues

Completion of the assigned tasks has moved FIU-HCET's involvement with the National Contract for Radioactive Scrap Metal Recycle to an inactive status. At this time, FIU-HCET is awaiting opportunities to further support NMR.

Plans for the next two months

- FIU-HCET has completed the assigned objectives of the NMR. As additional assignments are generated by the DOE and assigned, FIU-HCET will further support implementation and optimization of the Strategic Plan for Radioactive Scrap Metal Recycling.

FIU-HCET collaborator

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II. TANKS FOCUS AREA (TFA) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET TFA Program Manager	**F. Mao**
Focus Area Technical Leads	**Kurt Gerdes**
	William Holtzscheiter
	Peter Gibbons
Program Officers	**John Wengle**
	Karl-Heinz Frohne

http://www.hcet.fiu.edu

Waste Conditioning for Tank Slurry Transfer

Project Number: HCET-1998-T004

Project objectives

There are millions of gallons of radioactive waste slurries stored in underground tanks located at different U.S. Department of Energy (DOE) sites. DOE needs information and technologies to treat the wastes and close the tanks. Treatment of these wastes into safe waste forms and closure of these tanks require information of chemical and physical properties of the waste and fundamental data related to tank slurry conditioning, mixing, transport, and processing.

FIU-HCET is conducting research and examination on waste conditioning for tank slurry transfer. In this project, FIU-HCET is performing experimental tests to obtain reliable data in order to understand problems encountered in tank slurry mixing and transfer processes. Based on the data and results obtained from the experiments, FIU-HCET is investigating possible solutions to prevent pipeline plugging during slurry transfer and the problems that occur in slurry mixing. Additionally, this project has reviewed and compared the actual slurry natures at different DOE sites and facilities, such as Fluor Daniel Fernald (FDF), Oak Ridge National Laboratory (ORNL), Savannah River Sites (SRS), and Hanford, and identified the requirements for slurry transfer.

This project should accomplish the following:

- Determine the effect of chemical and physical properties on the tank slurry transfer process.
- Provide information for the transfer equipment design and operation.
- Identify and evaluate the most sensitive parameters that influence the waste conditioning and transfer operations.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T004-M1	Review previous work and adjust experimental setup	Experimental facility must fulfill M2-6 test requirements	Completed by 02/14/99 Due date: 02/26/99
T004-M2	Measure surrogates particle size distribution	Perform six different particle size distribution tests as described in Table 1 in the PTP	Completed by 03/15/99 Due date: 04/12/99
T004-M3	Determine surrogates particle shapes	Perform six particle geometry tests as described in Table 2 in the PTP	Completed by 04/30/99 Due date: 05/17/99
T004-M4	Characterize solid particle solubility and crystallization behavior	Perform nine solubility and crystallization tests as described in Table 3 in the PTP	Completed by 06/30/99 Due date: 07/05/99
T004-M5	Measure particle-settling velocity.	Perform 27 settling tests as described in Table 4 in the PTP	Due date: 08/15/99 Completed 8/12/99
T004-M6	Measure slurry viscosity	Perform 26 viscosity tests as described in Table 5 in the PTP	Due date: 09/30/99 Completed.
T004-M7	Perform data correlation and documentation	Write a project final report	Due date: 10/30/99 On schedule.

Significant events for this reporting period

- Pete Gibbons, TFA Technology Integration Manager, visited FIU-HCET on September 30, 1999. Although the main purpose of his visit was to coordinate the Scope of Work (SOW) for the plugging-and-unplugging large test beds, he was also updated with the accomplishments attained this fiscal year in this project. Following are some highlights of what has been discussed with Pete Gibbons:
  - There exists special interest to develop a gel blockage. Some gelation tests were performed this year, and they will be continued next year.
  - A glass blockage was created at FIU-HCET. Because of its similarity with a real blockage existing in DOE sites, it is very likely that this blockage will be used in the large-scale test beds.
  - In addition, some suggestions were brought to create other blockages. For instance, some kind of clay covered with epoxy so it will be attached to the pipe wall.
- Jackie Noble-Dial from TFA Oak Ridge Operations (ORO) also visited FIU-HCET on October 7, 1999. Her visit's intention was to become familiar with FIU-HCET's TFA projects and discuss specific project plans for FY00. A new TFA project named Feed Stability During Waste Slurry Transport will begin in FY00.
- The development of the project year-end report has been started.

Accomplishments and technical progress to date

- Following is a description of the main tasks performed this year.
  - Waste solubility and crystallization behavior
  - Waste blockage chracterization
  - Particle size and particle shape analyses
  - Rheology testing under different conditions
  - Settling rate
  - Gelation tests
  - Solids formation tests
  - Chemical and physical properties of the waste slurry
  - Plugging-and-unplugging slurries analyses.
- In addition, a PTP (project technical plan) was put together for FY00. Waste conditioning activities will be performed according to each site's needs.
- So far, three cases have been identified: SRS, ORR, and Hanford. Therefore, investigation will focus on these sites' specific problems.

Assessment of current status and issues

Activities performed in fiscal year 99 (FY99) have contributed to a better understanding of the waste

conditioning problems existing at DOE sites. New problems have also been encountered in this process, which serve as a baseline for future research. One of the main issues in FY00 will be to develop an acceptable formula for gel blockage and create a credible gel blockage.

Plan for the next two months

- Write the project's year-end report.
- Verify and publish PTP for FY00. Identify new possible waste conditioning activities.
- Modify and/or build experimental facility to fulfill the new test requirements.
- Work closely with the plugging-and-unplugging TFA project to analyze dip loop samples.

FIU-HCET collaborators

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Plugging and Unplugging of Waste Transfer Pipelines

Project Number: HCET-1998-T005

Project objectives

As the waste tank clean-out and decommissioning program becomes active at the DOE sites, there is an increasing potential that the waste slurry transfer lines will become plugged and unable to transport from one tank to another or from the mixing tank to processing facilities. Whereas some sites, such as Savannah River, Hanford, and Oak Ridge, have already experienced plugged or blocked lines, plugging may occur at additional sites at the onset of waste transfer.

FIU-HCET will continue to investigate pipe plugging and unplugging behaviors of waste slurry transfer lines for a high-level waste (HLW) system on the waste transfer simulation flow loop in FY99. In addition to pipe plugging caused by settling, pipe plugging and unplugging phenomena induced by gelling will also be studied by both experimental and theoretical methods. Key aspects of particle deposition associated with pipe plugging will be addressed. These will include particle agglomeration leading to larger particles that fall out of suspension and particle deposition in the pipe at the end of the transfer as a function of pipe slope or dip depth. The experimental setup used for settling-induced plugging will be modified for the study of gelling-induced plugging and unplugging. The core-annular flow technology, which may be used to unplug the gel-caused blockage, will be examined.

In FY99, activities of industrial equipment tests and demonstrations of plug locating and pipe unplugging technologies will be coordinated by FIU-HCET, Numatec Hanford Corporation (NHC), Pacific Northwest National Laboratory (PNNL), Federal Energy Technology Center (FETC), and DOE sites. FIU-HCET will complete the design and construct the Plug Locating and Removal Demonstration test bed for the industrial equipment test and demonstration to be conducted in FY00. FIU-HCET will also plan additions to the large-scale (full-size) test bed required for pipeline inspection tools testing in the future.

The objectives of this work include the following:

- Further understand the pipeline plugging and unplugging mechanism by particle settling and gel formation.
- Identify and test industrial methods to locate and remove waste transfer pipeline blockage.
- Inspect and verify the condition of those pipelines.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T005-M1	Issue project technical/test plan for pipeline plugging and unplugging activities	Planned activities, tasks, and milestones of slurry transport experiments in a flow loop, and construction of full-size test beds for demonstration of blockage locating and pipe unplugging technologies	Completed 2/15/99; met the schedule

Milestone No.	Milestone Description	Completion Criteria	Status
T005-M2	Develop systematic methods for characterization of slurries for transport experiments	Documentation and application of slurry characterization method for slurry preparation, rheology measurement, and data presentation of slurry transport experiments.	Completed 3/20/99; met the schedule
T005-M3	Modification of flow loop setup for additional slurry transport experiments with horizontal pipeline	Set up the flow loop with a higher capacity pump, improved sampling system, and an additional pressure transducer.	Scheduled completion 3/30/99; met the schedule
T005-M4	Finalize the design of full-size test bed for equipment tests and demonstrations	Detailed design drawings of the pipelines for the three full-size test beds.	Scheduled completion 3/30/99; met the schedule
T005-M5	Perform additional slurry transport experiments in flow loop with horizontal pipeline	Obtain data by data acquisition system and video recording system at one additional slurry concentration. Some critical velocity data will be repeated by varying slurry flow rate from very high level to low level.	Scheduled completion 5/28/99 Test loop was modified and tasks were completed 5/28/99
T005-M6	Plan, design, and modification of flow loop with inclined pipelines	Set up a flow loop with inclined pipelines that have the same geometrical layout as those used at DOE sites.	Scheduled completion 6/25/99. The task is delayed due to task change and system modification. This task is proposed to complete 10/25/99.
T005-M7	Construction of the test beds for equipment tests and demonstrations	Three test beds representing gravity pipeline, long pipeline, and buried pipeline will be fabricated with the specified material and dimensions.	Scheduled completion 9/15/99. Completed 9/10/99
T005-M8	Perform slurry transport experiments in flow loop with two inclined pipelines	Obtain results of pressure drop and critical velocity in the flow loop with two kinds of inclined pipeline	Scheduled completion 9/30/99. What happened here?
T005-M9	Data processing, correlation, and comparison	Present the measured data and data correlation for the slurry transport experiments	Scheduled completion 10/15/99.
T005-M10	Identify and determine industry companies and potential technologies for equipment tests and demonstrations	Create a database with a list of potential companies and technologies with contact information for the large-scale equipment test.	Scheduled completion 11/01/99.
T005-M11	Draft and distribute the year-end report of the plugging and unplugging project	Report covers detailed experimental studies and progress of the full-size test bed in FY99.	Scheduled completion 11/15/99.

Significant events for this reporting period

- The measurements of pressure gradient versus flow velocity have been finished for SRS slurry simulant at 10 wt%, 20 wt%, and 30 wt% in the flow loop with horizontal pipe orientation.
- The pressure gradients for SRS slurry at 10 wt%, 20 wt%, and 30 wt% have been successfully predicted with Wasp's model in the flow loop with horizontal pipe orientation.

- SRS evaporator jumper for the large-scale Test Bed #1 (Gravity Drain Line) has been received at FIU-HCET.
- Scope of Work (SOW) has been revised for the equipment test on the large-scale test beds.

Accomplishments and technical progress to date

Part 1 Flow Loop Research on Pipeline Plugging and Unplugging

1.1 The experimental investigation for SRS slurry simulant at 10 wt%, 20 wt%, and 30 wt% for the flow loop in horizental pipe orientation

Figure 1 shows the experimental results of pressure gradient versus flow velocity for SRS slurry at different weight concentrations. As the flow velocity decreases, the pressure gradients curve initially parallel with each other and then diverge (see Figure 1). The velocity where it diverges from the straight line is the critical velocity, and it is a function of the slurry concentrations. Compared with public literature, these curves are similar to those obtained by other authors for fine settling slurry (Chung et al., 1999; Ni and Matousek, 1999; and Walmsley et al., 1999).

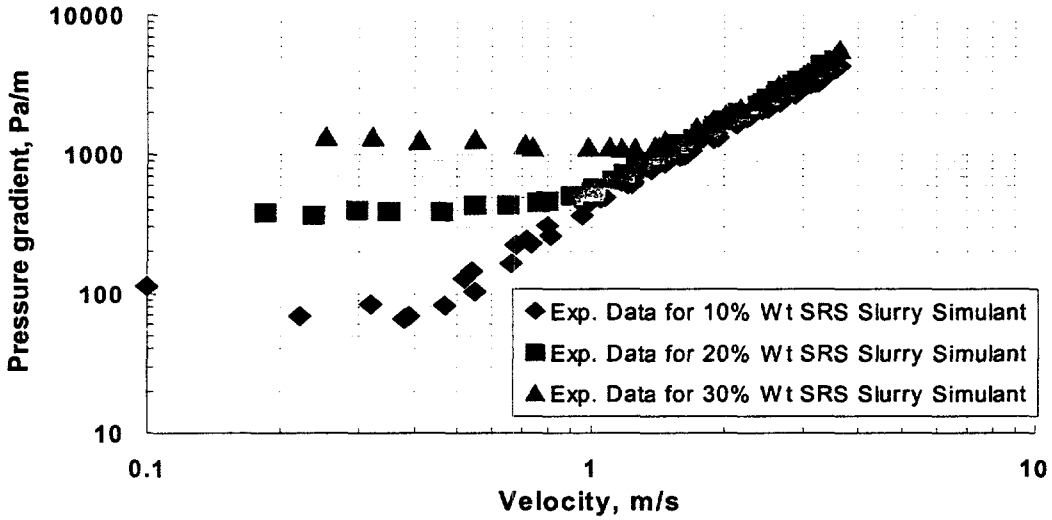

Figure 1. Experimental results of pressure gradient versus flow velocity for SRS slurry simulant at 10, 20, and 30 wt%.

The curves of friction factor versus Reynolds number are shown in Figure 2. The friction factor and Reynolds number are defined as

$$f = \frac{2D(\frac{\Delta p}{L})}{\rho V^2} \qquad (1)$$

$$\mathrm{Re} = \frac{VD}{\upsilon} \tag{2}$$

where ρ is the density of slurry simulant; υ is the viscosity of water.

The friction factors become larger with a decrease in Reynolds number such that the slope of the f-curve of slurry simulant becomes steep. As the slurry concentration increases, the friction loss increases, especially at low flow velocities, and the slope of the f-curve becomes even steeper.

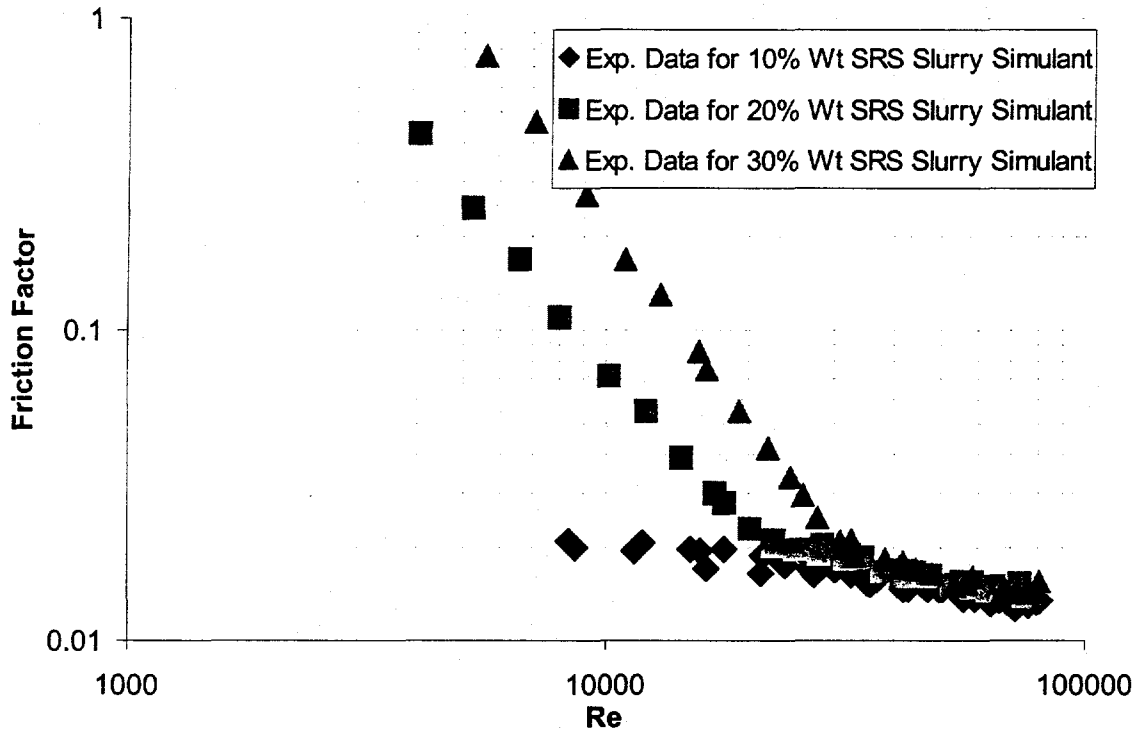

Figure 2. Friction factor versus flow Reynolds number for SRS slurry simulant at 10, 20, and 30 wt%.

Based on Ni and Matousek's (1999) investigation, in the low slurry velocity range, mechanical friction between transported particles and a pipeline wall is a major contributor to the total friction losses in flow if a contact layer is developed at the bottom of a pipeline.

For the slurry flows of five different chemical components, the reduction in friction loss with Reynolds number increase is caused by the fact that a presence of small particles reduces the capability of big particles to establish a contact layer at low mixture velocities. Ni and Matousek (1999) have verified the phenomenon by experimental investigation. Sand was employed in their test with the slurry flow velocities from 1 to 8 m/s. In their paper, this can be seen if the shapes of concentration profiles and the values of local concentration near the bottom of a pipeline are compared with the slurry flow and the flow of big particles alone.

In the high mixture velocity range, viscous friction between a flowing carrier and a pipeline wall is a major contributor to the total friction losses in pipeline flow. The viscous friction effect seems to be the reason for higher friction losses in flurry flows composed of big and small particles when compared with flows of big particles alone at high velocity. At high velocity both mixed components flow and one-size particle flow exhibit no bed. Measurements suggest that both small particles and big particles contribute to viscous friction at high velocity (Ni and Matousek, 1999).

1.2 Comparison of experimental pressure gradient for SRS slurry with Wasp's model predication for the flow in horizontal pipe

Figures 3 and 4 depict the comparison of predicted pressure gradients for SRS slurry at 10 wt%, 20 wt%, and 30 wt% with experimental results for the flow in horizontal pipe. The results predicted by modified Wasp's method (1979), which treats the components as single weighted average solid with different particle sizes, match reasonably well with the data that was measured in the slurry flows.

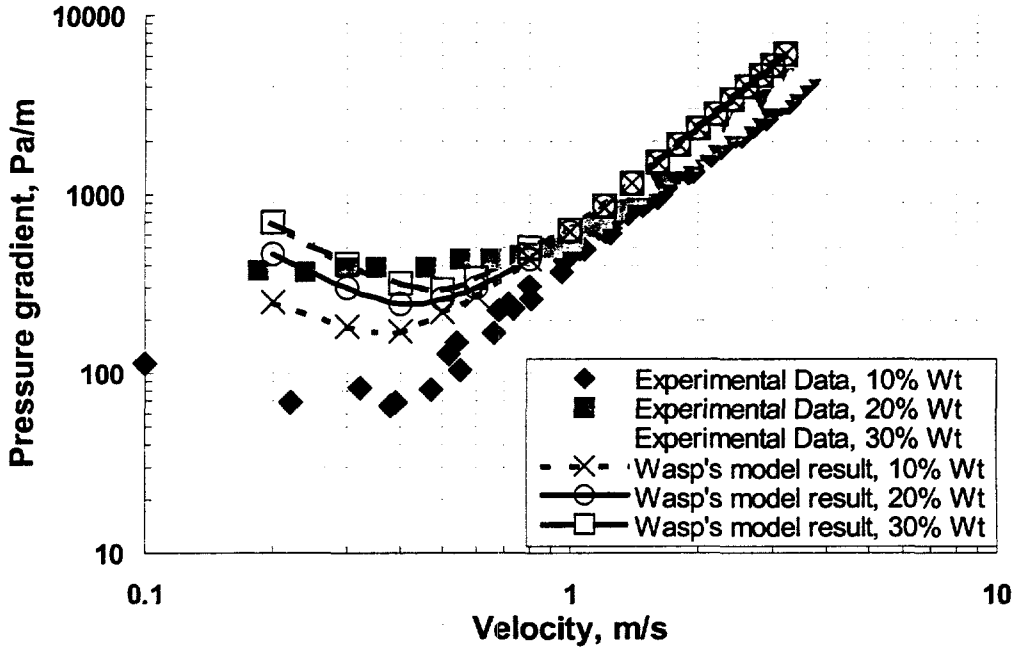

Figure 3. Comparison of experimental pressure gradient with calculated data.

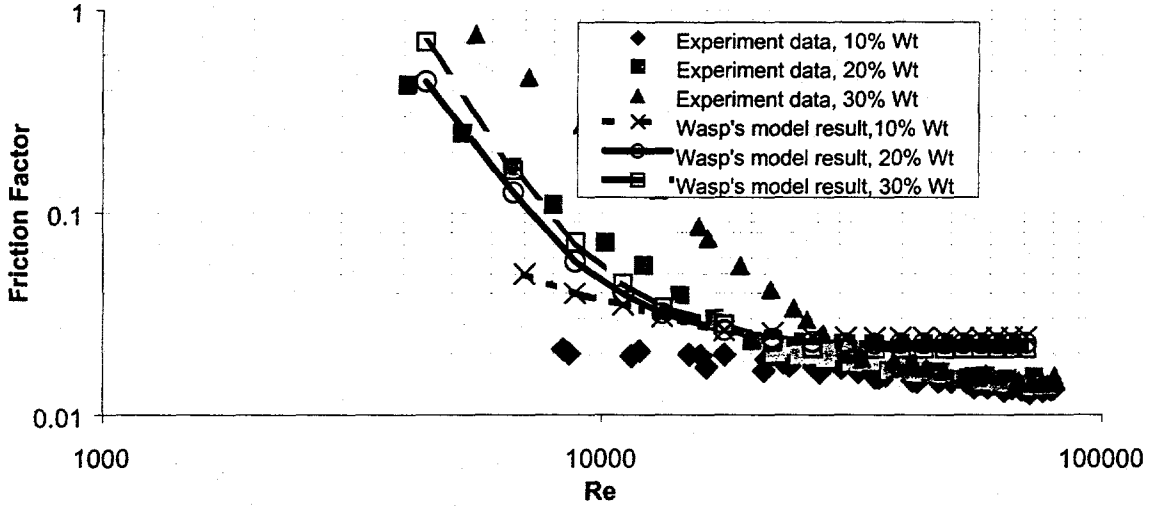

Figure 4. Comparison of experimental friction factors with calculated data.

Part 2 Large-scale Industrial Equipment Test Beds of Plug Locating and Unplugging Technologies

2.1 The Construction of the Test Beds

The SRS jumper has arrived at FIU-HCET, and it will be installed on the ground level to simulate the actual jumper for testing of reaching and unplugging technologies. The access point of the jumper is the 1-inch diameter of clean-out pipe. Another access point for Test Bed #1 is the 1-inch cleaning tool access pipe with a radius of curvature of 10 inches. The free end of the 1-inch pipe will have a 1-inch threaded ball valve attached.

2.2 Blockage material simulation and its location

Borosilicate (B_2O_3-SiO_2 glass) has been successfully used to coat the inner surface of the carbon steel pipe with a nominal inside diameter of 3.1 inches. The purpose for this experiment is to investigate the behavior of the glass to be used for Gravity Drain Line as the blockage. Borosilicate is a glass made from silica and boric oxide. It is highly resistant to chemical corrosion and temperature change, and it is often used when glass has to be bonded to metal. Borosilicate has a glass transition temperature of 900° F, and it took about one hour and a half to produce the result.

The pipe section was first placed in an open container made of ¼-inch-thick steel plate. The container was then filled with charcoal, which helped the heat conduct throughout the container evenly. Then it was heated on a grill at 900° F. The air compressor was placed underneath the pipe, and it blew out the air throughout the charcoal. The pipe was slowly turned in order to have the melted glass coat the inside of the pipe evenly. It produced a hard and adherent coating inside the pipe. The pipe section was cut in half, and one piece was sent to SRS, and the other piece was delivered to FETC by Pete Gibbons of DOE. Borosilicate may be used for the equipment

demonstration of reaching and unplugging technologies to be tested on Test Bed #1.

The bentonite (50wt%) and sand (50wt%) mixture with total solid concentration 60wt% has been tested in a water-submerged condition as a blockage sample. The mixture was placed in a plastic tube with one end filled with water. The water started to seep through the blockage in a couple of hours at a vertical position. The blockage could be used for equipment testing for reaching and unplugging technologies on Test Beds #2 and #3. However, more testing and research are needed in order to investigate the behavior of the material in water.

2.3 Industrial Equipment Test

The Scope of Work (SOW) for blockage locating, reaching, and pipeline unplugging technologies has been revised based on the discussion with Pete Gibbons during his visit to FIU-HCET on 09/30/99. The SOW is based on a sample SOW written by the D&D group of FIU-HCET, and it has been reviewed by the FIU-HCET technical team. It will be finalized before the CBD announcement will be made through FETC. Other documents concerning the description of the Test Beds and blockage materials have been updated and revised, and they are available on the website at <www.hcet.fiu.edu/r&d/tfa/unplugging/default.asp>. Scope of Work will be available on the web as well as soon as it is approved by Pete Gibbons, a technical leader of DOE's Tank Focus Area (TFA).

Plans for the next two months

- The inclined transparent pipe will be manufactured for the flow loop experiment.
- The rate of blockage formation and power consumption on the inclined pipe will be investigated.
- Companies and technologies will be identified and selected for equipment tests on large-scale Test Beds to be performed in FY00.
- Fiberglass epoxy and other materials will be tested as blockage materials.
- FIU-HCET's Scope of Work for the large-scale test beds will be finalized.

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Investigation of Waste Glass Pouring Process Over a Knife Edge

Project Number: HCET-1997-T003

Project objectives

Vitrification is the process of capturing radioactive waste in glass. The Savannah River Site's (SRS) Defense Waste Processing Facility (DWPF) is one of the facilities using the vitrification technology to treat and immobilize radioactive waste since March 1996. However, the operation has been marked by extreme difficulty in maintaining a stable pouring process. There have been flow fluctuations accompanied by an unusual flow phenomenon, termed "wicking." In this situation, the falling glass stream wavers and departs from a normal vertical trajectory. The pour spout and associated hardware connecting it to the canister have been coated and often plugged with glass. The objective of the project is to investigate the pouring behavior of molten glass over a pour spout knife edge.

The work, to be performed at FIU-HCET in support of the Tank Focus Area (TFA) Technology Implementation Manager (EM-50) and the Savannah River Technology Center (SRTC), consists of three phases. Phase 1 involved the assembly, construction, and testing of a melter capable of supplying molten glass at operational flow rates over a break-off point knife edge. Phase 2 evaluated the effect of glass and pour spout temperatures as well as glass flow rates on the glass flow behavior over the knife edge. Phase 3 (current phase) of the project will identify the effects on wicking that result from varying the knife edge diameter and height as well as changes to the back-cut angle of the knife edge.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T003-M1	Installation of an additional heat zone	Achievement of 1150 °C by the knife edge	Completed as scheduled. Due date: 1/31/99
T003-M2	Report the effect of crud deposits on the back side of the knife edge	Experiments ES-1, ES-2, ES-3, and ES-4	Completed as scheduled. Due date: 5/31/99
T003-M3	Report the effect of eroded knife edges	Experiments ES-5, ES-6, ES-7, ES-8, ES-9, ES-10, ES-11, ES-12, ES-13, ES-14, ES-15, and ES-16	Due Date: 8/31/99 Some of these tasks are under-performing. Melter is being modified and redesigned.
T003-M4	Report the effect of glass chemistry	Experiments II-SF-1, II-SF-2, II-SF-3, II-SF-4, II-SF-5, II-TF-1, and II-TF-2	Due Date: 9/30/99 Some of these tasks are under-performing. Melter is being modified and redesigned.

Milestone No.	Milestone Description	Completion Criteria	Status
T003-M5	Final report	Draft the Final report on results of the project to be delivered to DOE	Due Date: 10/31/99. Report will be published by January 2000.

Significant events for this reporting period

- The DOE-TFA visited FIU-HCET on September 13, 1999, for a review of the project. A presentation was made to apprise them of the progress made during the fiscal year, the difficulties that have been encountered, and the lessons learned.
- The melter was reassembled after the replacement of the creeped horizontal section and zero degree cutback angle experiments were carried out.

Accomplishments and technical progress to date

- The horizontal section of the melter was replaced and the melter was reassembled.
- The copper tubing and connectors used for gas feeding and providing the vent to the melter were replaced with stainless steel tubing to ensure leak-free operation at high temperatures of 1150°C.
- A Unistrut structure has been added to the assembly to provide support to the pour spout from the bottom. The pour spout is already supported from the top. It is expected that the additional support will take care of the metal creep problem caused by heating and gravity force.
- As per the DOE-TFA suggestions, a ruler is placed next to the knife edge before the start of the experiment and view recorded on all the cameras. This provides the calibration for the subsequent glass pouring experiment.
- A plumb line was dropped from the top of the pour spout to ensure the vertical orientation of the knife edge.
- The project team tried placing a plumb line permanently on the side of the pour spout in line with the knife edge to help locate the pour spout knife edge in the recorded side view of the experiment. However, the plumb line is blurred in camera view at room temperature as the camera is focussed at the knife edge and the plumb line is outside the furnace close to the camera. At the experiment temperatures of 1050°C, the plumb line is invisible in the camera view.
- The elongation of the pour spout (leading to subsequent bending) remains an issue. A strong support structure at the bottom resulted in the pour spout movement in the upward direction by as much as 1 inch. This upward rise is visible in Figure 1 by the movement of the nuts above the Unistrut surface.
- The breakage of one of the heating element joints in Zone 2 due to heat and corrosion has once again resulted in stoppage of the experiments. The furnace needs to be disassembled for the repairs. This will result in a loss of 3-4 working days.

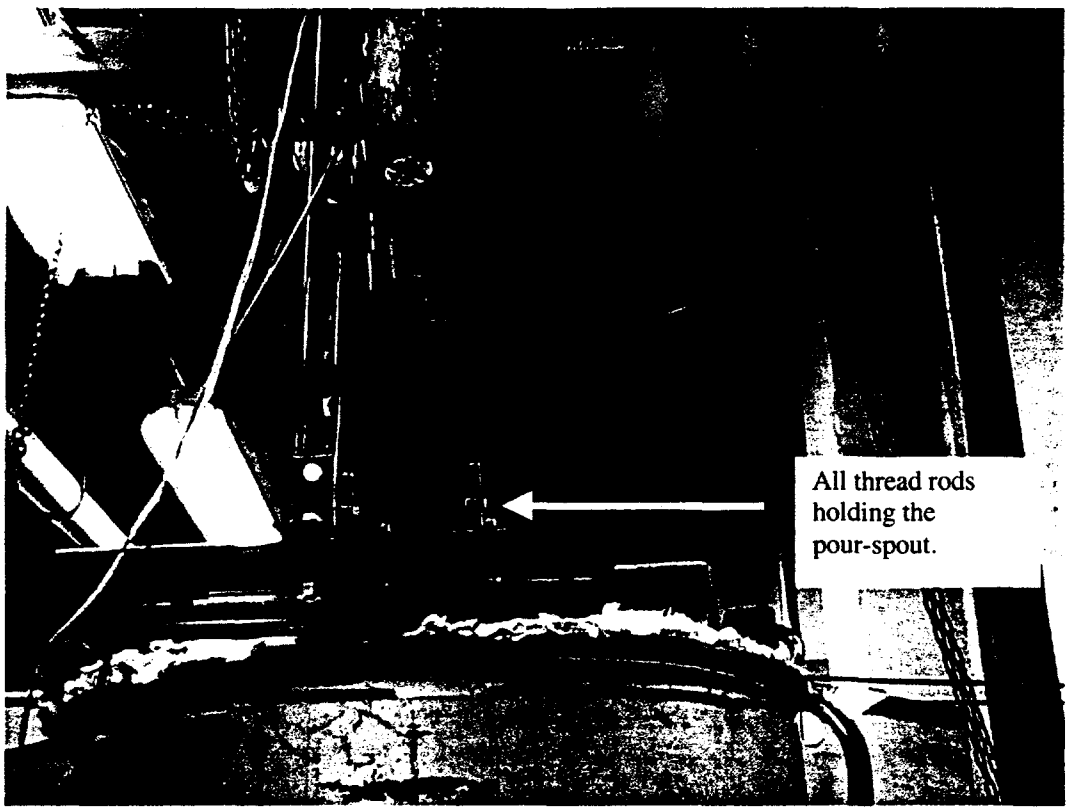

Figure 1. The nuts on the all-thread Inconel rods supporting the pour spout from the top rising by 1" during the process temperature of 1050°C.

Assessment of current status and issues

A new schedule is being worked out that will take into account the experiments that will be carried over to FY00 along with the time required for moving the melter to a more spacious region and fabrication and assembly of the new pouring spout.

Plans for the next two months

- Run alternate glass chemistry experiments using a lower glass temperature with the same surrogate glass and experiments simulating corroded and eroded knife edge by methodical destruction of the knife edge.
- Design and safety review the new pour spout furnace assembly.

FIU-HCET collaborators

Rajiv Srivastava, (305) 348-6621

III. CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY (CMST) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET CMST Program Manager	**David Roelant**
DOE CMST-CP Program Managers	**John Jones**
	Joe Ginanni
Program Officers	**John Wengle**
	Karl-Heinz Frohne

http://www.hcet.fiu.edu

Online Measurement of the Progress of Decontamination

Project Number: HCET-1998-C005

Project objectives

There is a critical need for accurately characterizing contaminants during several phases of deactivation and decommissioning (D&D) operations. Present characterization technologies typically require cessation of decontamination activities to properly assess existing contamination areas using some method of radiological surveying. This project focuses directly on in-process characterization, with specific aims that will include the following:

- Find in-process characterization methods, specifically in radiation sensor systems capable of being integrated with a suitable decontamination technology so as to combine decontamination and characterization activities.
- Implement technology integration data collection, storage, and transmission components on the instrument for remote monitoring and computer downloading functions to allow continuous decontamination activities coupled by real-time assessments of the amount of contamination remaining. The result would be an overall gain in productivity accompanied by cost and time savings. A second important advantage would be a minimum amount of material could be removed with the production of little residual waste.
- Adapt an existing decontamination technology with commercially available characterization technologies to develop a prototype instrument that will be assessed and then commercially deployed. A closed-system decontamination technology will be selected that utilizes a vacuum or contaminant collection system and will be integrated with appropriate radiation sensing devices and data collection components. The integration of technologies will provide an improved instrument that may be continuously operated, removing contaminated materials and simultaneously assessing the removal progress.

Major milestones (rebaselined with DOE approval)

Milestone #	Milestone Description	Completion Criteria	Status
C005-M0	**Complete prototype assembly** Prototype becomes operational	Prototype functional	Due 11/30/99
C005-M1	**Deployment Plan** Develop work plan for deployment at a DOE site	Submission and acceptance of deployment plan	Due 01/15/00
C005-M2	**Deploy Technology** Deploy technology at a DOE site collecting performance data	Initiate deployment at DOE site	Due 3/30/00
C005-M3	**Improved System Operational** Optimize engineering design and build	Submission of design improvements along with results of initial tests of improved system	Due 04/30/00
C005-M4	**Commercialization Plan**	Submission to DOE of commercialization action plan	Due 06/30/00

Additional explanation of rebaselining is provided below in *Assessment of current status and issues*

Significant events for this reporting period

- After a significant procurement delay, most components have been delivered and have undergone some initial testing. Characterization and shot-blast decontamination subsystems have been assembled. Only the spatial positioning system still requires final assembly and testing.
- Sensitivity tests and calibration are nearing completion for the characterization subsystem using standard radioactive sources.

Accomplishments and technical progress to date

- Plans for fiscal year 2000 are complete.
- Initiated integration of the online system into the Idaho LSDP.
- Completed detailed component design of the detector mechanical arrangements:
  - Vibration, shock, and debris isolation suspension for pre- and post-decontamination
  - Replaceable shields (brush) and "tear-off" windows
  - Radiation shielding for background from room and mechanical shields also affecting collimation
  - Shot-blast suspension modifications
  - Low-cost disposable pneumatic tube section for effluent (waste stream) sensor array liner.
- Operator interface and associated components design refined:
  - Simple indication using commercial circular colored indicator light arrays with absolute value indication
  - Simplified limit calibration, either absolute engineering units or placement of the sensors over calibration surfaces
  - Preliminary operational procedures generated for creation of control coding.
- 3D position-determining system preliminary design complete:
  - Combination angulation/lateration relational geometry
  - Single stationary station required
  - No RF links necessary
  - System has added benefit of providing detailed topographic map revealing actual removal depths following decontamination as well as radiological characterization survey maps
- Characterization sensor subsystem has been tested and modifications to optimize sensitivity to obtain final release radioactivity levels are being considered.
- Errors in the commercial compiler were identified with FIU-HCET and the manufacturer rewriting code to fix errors.

Assessment of current status and issues

- With the ability to interface with the microcontroller, the project now shifts to installation of subsystems into the commercial decontamination system in the lab.
- DOE DDFA agree project should be extended into FY00 and approved plans which include rebaselining FY99 milestones.
- FIU-HCET continues to pursue deployment of the system at a DOE site with radioactively-contaminated floors.
- Electric Power Research Institute (EPRI) and the commercial nuclear industry are working to identify a contaminated facility at which to demonstrate the technology. The Sacramento (California) Municipal Utility District (SMUD) Rancho Seco site is a likely selection.

Plans for the next two months

- Finalize and submit year-end report for the project.
- Complete testing of the characterization subsystem on distributed radioactive sources (such as those typically found on contaminated surfaces).
- Complete assembly and testing of remaining subsystem.
- Refine control software.
- Assemble and integrate all tested subsystems of prototype onto concrete decontamination machine at FIU-HCET. This will move the system from a laboratory prototype to an engineered prototype ready for field testing.
- Test and refine prototype assembly.

FIU-HCET collaborator

Richard Musgrove, (305) 348-6622

Remote Surveillance of Facilities Awaiting Deactivation and Decommissioning

Project Number: HCET-1998-C006

Project objectives

FY99 is the second year for this project, which was extended into a three-year project in June by DDFA. Many DOE sites -- Albuquerque Operations Office, Chicago Operations Office, Idaho Operations Office, Ohio Operations Office, Oak Ridge Operations Office, and Savannah Operations Office -- desire remote surveillance of their facilities. These facilities include production areas, structures, utilities, equipment, drums, tanks, and effluent lines. Currently, these facilities awaiting deactivation and decommissioning (D&D) must be periodically surveyed for various criteria including contamination levels, structural deterioration, water intrusion, animal intrusion, integrity of storage containers, atmospheric conditions, and radioactive and hazardous substance releases. The surveys themselves are intrusive, time-consuming, expensive, and expose survey personnel to radioactive contamination and radiation. The purpose of this project is to develop a remote surveillance system that collects data from DOE sites (remote station) and transmits data to a central location (base station).

Following are the objectives of the project:

- Define specific surveillance needs among facilities awaiting D&D.
- Select appropriate sensors for different facilities and test their performance.
- Select components of the measuring system, integrate them, and test performance of sensors and system.
- Select appropriate data collection, storage, transmission, and receiving units.
- Design a central monitoring unit.
- Integrate different units into a prototype surveillance system and test it.
- Test the system at a DOE site.
- Deploy system at a DOE site.
- Design and implement a plan for commercialization.

Major milestones (rebaselined with DOE approval)

Milestone No.	Milestone Description	Completion Criteria	Due Date
C006-M1	**Prepare for testing at a DOE site.** The system will be available for testing at a DOE site for site-specific need parameters.	System complete for testing at a DOE site	12/15/99
C006-M2	**System improvement.** The results of demonstrations will be analyzed. Improvements in the system components or integrated unit will be made if specific functions are required.	Modification completed	01/31/00
C006-M3	**Deployment plan.** Plan for deployment of the system at a DOE site will be completed.	DOE site deployment plan created	12/31/99
C006-M4	**Commercialization plan.** Presentation will be complete for an industrial partner interested in commercialization of the system.	Presentation for an industrial partner	02/20/00
C006-M5	**Performance evaluation.** System and component performance will be evaluated and the effects of environmental conditions determined.	Performance evaluated under ambient environmental conditions	06/30/00

Additional explanation of rebaselining is provided below in *Assessment of current status and issues.*

Significant events for this reporting period

- Commercial intermittent remote data sampling systems have been procured and are under evaluation at FIU-HCET for integration into a remote surveillance system.
- Discussions continue with DOE sites for candidate deployment sites.
- Discussions continue with U.S. companies regarding comercialization and intellectual rights of remote surveillance systems.

Accomplishments and technical progress to date

- Investigation of remote power maintenance subsystems for powering the remote surveillance system underway. Battery and solar units have been analyzed thus far.
- Initiated discussions with representatives of Bechtel Hanford and Pacific Northwest National Laboratory (PNNL) regarding deployment of custom remote surveillance systems at Hanford facilities. Discussions were held in response to an expression of interest by Bechtel Hanford at the DDFA Midyear Review.
- Initiated integration process of the Remote Surveillance system into the Idaho LSDDP. Technology screening forms were received and are being completed.

- Matrix of possible transducers, power sources, and sampling conventions assembled.
- Incorporation with and improvements to existing DOE remote sampling systems investigated.

Assessment of current status and issues

- With selection of Supervisory Control And Data Acquisition (SCADA) standard protocol, the project now shifts to implementation including sensor integration.
- DOE DDFA agree project should be extended into FY00 and approved plans which include rebaselining FY99 milestones.
- FIU-HCET continues to pursue deployment of the system at a DOE site with facilities awaiting D&D.
- Selection of sensors for first remote surveillance system is currently underway. Initial requirements from 5 DOE sites and some international sites were assessed to help determine the best choice of sensors.
- Site visit has been made to Idaho National Engineering and Environmental Laboratory (INEEL) to discuss prospects for system implementation at associated facilities.

Plans for the next two months

- Continue to work on deployment issues at Hanford and begin planning stage with goal of reaching a decision from Bechtel Hanford regarding deployment of a custom system.
- Complete detailed electronic and mechanical design of sensing modules.
- Complete purchase of remaining system components and test at FIU-HCET.
- Continue to provide FIU-HCET's site representatives with detailed design information to aid their site participation solicitation efforts and to clarify the details of system design in light of actual needs expressed.
- Finalize designs to meet FIU-HCET QA standards.

FIU-HCET collaborator

Richard Musgrove, (305) 348-6622

Measurement of Alpha Contamination on Contaminated Surfaces Using an Electret Ion Chamber

Project Number: HCET-1998-C008

Project objectives

In and around nuclear facilities such as vitrification plants, fuel reprocessing plants, uranium plants, thorium plants, waste storage facilities, reactors, and radiological laboratories, surfaces (floors, walls, ceiling, and equipment) and soil may become contaminated with alpha-emitting radionuclides such as uranium, thorium, radium, americium, or plutonium. It is important to measure such contamination and classify it as below or above the permissible levels. The permissible levels of alpha contamination are low and the DOE requires low-cost, reliable methods to measure these low levels of alpha contamination. Current methods for this type of measurement in large facilities are expensive and expose survey personnel to radiation. The goal of this two-year project is to

- Develop a system for reliable, low-cost, low-exposure measurement of surface alpha contamination and deploy it at a DOE site. This involves using commercially available electret ion chambers (EICs) and their calibration using reference alpha sources.
- Determine time required for measurement of alpha contamination at the free release level for six different chamber-electret combinations, their useful range, effect of environmental radon and gamma radiation on alpha contamination measurement, cost comparison with baseline technologies, and demonstration and deployment at a site.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C008-M1	Cost-benefit analysis	Data showing performance of EIC vs. baseline technologies	• Measurements using EICs and baseline technology (alpha probe) completed at a test bed at FIU-HCET. Cost comparison performed. • Comparative assessment with baseline technology performed. Due 12/15/98. Completed 2/26/99. The reason for delay addressed in section "Assessment of current status and issues" of this report.

Milestone No.	Milestone Description	Completion Criteria	Status
C008-M2	Deployment Plan and Demonstration at DOE facilities	Integration with D&D Focus Area's Large-Scale Demonstration and Deployment Program (LSDDP). Commitment for use of EICs for alpha contamination measurement from one or more DOE sites	Due 2/8/99 Completed 7/1/99 Delayed due to slow response from DOE site users. • FIU-HCET supported DDFA for LSDDP at Savannah River. FIU-HCET reviewed the test plan for EIC. LSDDP began in June 1999 and is complete. FIU-HCET will review draft of the ITSR.
C008-M3	Deployment of EICs at DOE site.	Deployment of the EIC system at one or more DOE sites	Due 5/17/99. Completed August 1999 Delay due to non-availability of power at SRS for LSDDP for about a month. • Demonstration performed. DOE-SRS to confirm deployment.
C008-M4	Information flow- FIU-HCET development of work and controlling documents	Transmittal of procedures, instructions, manuals, and information on measuring contaminants on DOE sites	Due 10/30/99, on schedule
C008-M5	Final report	Report completed. Publication follows 1/00.	Due 11/30/99, on schedule

Significant events for this reporting period

- Coordination activities to support DDFA with the SRS LSDDP continued. As a part of the LSDDP, demonstration and deployment of the technology was performed at SRS. A draft of the ITSR on electret ion chamber technology for surface alpha contamination measurement is ready. It is anticipated that FIU-HCET will receive the draft ITSR in late October 1999 for review and will complete review within one week of receipt.
- A representative from the Journal of *Radioactivity & Radiochemistry* expressed interest in publishing our paper entitled "Ceramic Tiles as Inexpensive Large Area Test-beds for Electret Ion Chambers and other Instruments used for Measuring Alpha Contamination on Surfaces" presented at the 44th annual meeting of the Health Physics Society, Philadelphia, PA, June 27-July 1, 1999. A full-length paper for publication in the journal is well underway.
- Work on measurement of alpha particle energy for a mixture of two alpha emitters and identification of the radionuclides was completed. A paper, entitled "Electret Ion Chambers for Measurement of Alpha Particle Energy," is undergoing internal review prior to submission for publication to the *Health Physics* Journal.

Accomplishments and technical progress to date

- Calibrated six configurations of the EIC systems for alpha particles of different energies, radioactivity levels, and source dimensions (localized and distributed).
- Set ceramic test bed with tiles of different alpha particle emission rates at FIU-HCET.
  - Characterizing beds for alpha contamination and comparing with baseline instrumentation.
  - Determining cost-benefit analysis.
  - Establishing capability of the beds as inexpensive, large area uniform alpha contamination sources, for calibration of alpha measuring instruments.
  - Gamma spectrometric analysis of the test-bed tiles at the National Institute for Standards and Technology (NIST) to determine radioactive content of different radionuclides and have better understanding of the attenuation of the alpha-emitting radionuclides.
- Determined alpha particle energy and identified the alpha-emitting radionuclide using 960-mL EIC.
- Extended the alpha-emitting radionuclide identification capability to a mixture of two alpha emitters of different strengths.
- Three papers in journals (one published, two ready for submission) and three presentations in conferences/workshop.

Assessment of current status and issues

- The system has been calibrated and is ready for demonstration and deployment. The LSDDP for demonstration of the EIC technology at SRS was completed. DOE-SRS may confirm it as deployment. FIU-HCET reviewed the test plan of using EICs at the SRS LSDDP. A draft of the ITSR on using electret ion chambers is ready. It will be reviewed by FIU-HCET. FIU-HCET is working with representatives from more sites (e.g, Fernald, Oak Ridge, Rocky Flats) for deployment of the technology. Among these sites test plan for deployment at Decontamination Recovery Services L.L.C. (DRS), Oak Ridge, was prepared. It was reviewed by FIU-HCET, Oak Ridge, and was submitted for DRS approval. DRS reviewed the plan, and discussions were held on its implementation. DRS wants both alpha and beta contamination to be measured by an EIC.

  There are some difficulties with beta measurement. 1) As per scope of the project, the system has been calibrated for alpha sources only. For surfaces with both alpha-beta contamination, we measure beta contamination, which is subtracted from the total reading to obtain alpha contamination. 2) Response of EIC depends on beta energy, which means beta calibration standard should represent surface beta contamination. Procurement time for these calibration standards is more than two months. These sources are expensive and unless DRS commits to testing and deployment of the EIC after calibration for beta is performed, the whole exercise may be futile. In September 1999 an FIU-HCET representative traveled to Knoxville to resolve the issues to enable early deployment. Discussions are in progress. Deployment of EICs in the glovebox size reduction facility that is being established at Rocky Flats is being actively pursued. FIU-HCET is part of the project team.

- Milestone 1 was completed on February 26, 1999. Milestone 2, demonstration and deployment of the EICs for surface alpha contamination measurement as a part of the SRS LSDDP, has been performed. DOE-SRS may confirm this as deployment (Milestone 3). Draft of the ITSR is ready and will be sent to FIU-HCET for review.
- Demonstration and deployment efforts were continued at other DOE sites as well. A field evaluation was performed by Rad Elec, Inc. in building K-1401, Oak Ridge. FIU-HCET has a teaming arrangement with Rad Elec., Inc. and exchanges information on the technology. 125 additional EICs, a charge reader, and a scintillation counter were procured for making simultaneous measurements in building 1420 at DRS. Deployment at DRS was delayed due to slow user response. Deployment at Rocky Flats size reduction facility will be done when the facility becomes operational.
- Tests reveal that FIU-HCET found an important extension of EIC technical performance in developing an inexpensive spectral measurement methodology and identification of alpha emitters.
- Measurements on tiles to determine thickness of the tile material embedding the alpha emitters uranium, thorium, and their decay products completed.

Plans for the next two months

- Continue supporting the SRS-LSDDP and review the draft of the ITSR.
- Submit to *Health Physics* Journal a paper on application of the EIC for determination of alpha particle energy and identification of alpha-emitting radionuclides.
- Submit to *Radioactivity & Radiochemistry* Journal a paper entitled "Ceramic Tiles as Inexpensive Large Area Test-beds for Comparative Assessment of Electret Ion Chambers and Other Instruments Used for Measuring Alpha Emission Rates from Surfaces."
- Prepare final report on the project.

FIU-HCET collaborator

S.K. Dua, (305) 348-1640

Review of Current Characterization and Monitoring Practices at DOE Sites

Project Number: HCET-1998-C009

Project objectives

The goal of this project is to document current practices (baseline technology) for environmental technologies in the areas of site characterization and waste/processing monitoring at DOE sites. Data concerning each technology's cost and performance will be tabulated in a database. This information will assist the Characterization, Monitoring, and Sensor Technology Crosscutting Program (CMST-CP) in evaluating innovative technologies by facilitating the comparison of performance and cost data for the new technologies to the baseline technologies.

This activity, during its previous stages in FY97 and FY98, collected and compiled information from technology users, purchasers, and DOE's Special Technologies Laboratory. This information was published and converted into a database. FY99 is the first year that this project is managed by FIU-HCET. FY99 activities include the following objectives:

- Review the current characterization and monitoring practices and baseline technologies at Hanford (RL) and Oak Ridge (OR).
- Collect and assess cost and performance data for these baseline technologies.
- Update the database to include this new information.

Major milestones

Milestone No.	Description	Completion Criteria	Status
C009-M1	Evaluate Current DOE Characterization and Monitoring Needs at Hanford and Oak Ridge.	Table of the current STCG needs indicating title, description, requirements, regulations, baseline method/technology, and point of contacts	Completed on 1/11/99, before due date of 2/11/99
C009-M2	Identify DOE Baseline Characterization and Monitoring Technologies at Hanford and Oak Ridge.	List of the baseline methods and technologies currently used to meet the STCG needs.	Completed on 3/1/99, before due date of 4/16/99
C009-M3	Describe the baseline technologies and the DOE requirements they meet.	List of the description and performance data of each method/technology identified in milestone #2.	Completed on schedule 5/17/99
C009-M4	Assess costs of use of baseline technologies	Table of the cost data of each method/technology identified in milestone #2.	Completed on 8/6/99, ahead of schedule of 8/27/99
C009-M5	Maintain and describe the CMST-CP current practice database	Incorporation of the data from milestones #1, 2, 3, and 4 into a database	Completed on schedule 10/30/99
C009-M6	Prepare year-end report for FY99	Report summarizing the accomplishments of Fiscal Year 1999 for this project.	To be completed on schedule by 11/30/99

Significant events for this reporting period

- Completed programming activities for developing the database for FY99 (the database will be improved and upgraded in FY00).
- Completed editing the text describing baseline technologies.
- Finished writing the draft Year-End Report.

Accomplishments and technical progress to date

- Transferred the project from former principal investigator and Krell Institute to FIU-HCET.
- Reviewed and tabulated the Site Technology Coordination Group (STCG) characterization and monitoring needs and the baseline technologies currently used or planned to be used to meet these needs for the Oak Ridge and Hanford sites (Milestones 1 and 2).
- Obtained and compiled descriptions, performance data, and cost data concerning 39 baseline technologies and current practices identified in the STCG needs (Milestones 3 and 4). Information was obtained from documents, vendors, contacts from Hanford and Oak Ridge, and from FIU-HCET personnel.
- Continued discussions concerning project and database with CMST-CP personnel. The database was presented at the 1999 CMST-CP Mid-Year Review at Gaithersburg, Maryland, for comments and suggestions
- Designed and developed a database that includes information on the STCG needs and the baseline technologies. It is available on the Internet at <http://131.94.165.121/www/index.htm>.

Assessment of current status and issues

This project is proceeding and no scheduling deadlines have been missed. Milestones 1, 2, 3, 4, and 5 for FY99 have been completed. Currently, no impediments are known that could delay the scheduled completion of the last milestone for FY99.

Plans for the next two months

- Evaluate the STCG characterization and monitoring needs for INEEL and SRS.
- Continue programming activities to improve and upgrade the database.

FIU-HCET collaborator

Hans Weger, (305) 348-6620

Demonstration and Deployment of CMST-CP Technologies

Project Number: HCET-1998-C010

Project objectives

The Characterization, Monitoring, and Sensor Technology Crosscutting Program (CMST-CP) exists to deliver appropriate characterization, monitoring, and sensor technologies to the DOE, Office of Waste Management (EM-30), Office of Environmental Restoration (EM-40), and Office of Facility Transition and Management (EM-60).

The purpose of this project is to assist the Characterization Monitoring Sensor Technology – Crosscutting Program (CMST-CP) with the final steps of this process. In short, it will take technologies developed by CMST-CP to their ultimate use in the field. It is also a goal of this project to strengthen CMST-CP relationships with the users, deploying technologies more quickly and efficiently. To that end, FIU-HCET will help coordinate some of the deployment and related activities between the CMST-CP and the site users. In addition, this activity will directly support CMST-CP's liaison to the Deactivation and Decommissioning Focus Area.

To assist CMST-CP, FIU-HCET will

- Examine the technology development activities and work with CMST-CP to develop schedules for demonstration and deployment of these technologies.
- Match the technologies with characterization and monitoring needs of the customers.
- Choose sites to help facilitate demonstration and/or deployment.
- Use FIU-HCET's existing relationships with the rest of EM and the other focus areas to assist CMST-CP in selling the use of its technologies.
- Work with the customer to refine the demonstration/deployment process and schedule, once an agreement has been reached. If the user and CMST-CP so desire, FIU-HCET could then coordinate and perform the demonstration at the user's site.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C010-M1	Schedule & number of demonstrations and/or deployments	Definitive list of activities generated.	Completed on schedule 3/15/99
C010-M2	Choose sites	Deployment/demonstration sites identified.	Completed on schedule 3/31/99
C010-M3	Demonstrations	Complete scheduling and organization	Due 3/31/99, Completed 7/19/99

Milestone No.	Milestone Description	Completion Criteria	Status
C010-M4	Deployment	Site commitment to deploy a selected CMST-CP technology.	Pre-demonstration activities resulted in a need change from uranium to technetium characterization. DOE cancelled the milestone.
C010-M5	Marketing	Multiple site users are briefed on technology capabilities.	Completed 7/8/99, ahead of scheduled date of 10/30/99

Significant events for this reporting period

- Continued discussions with Oak Ridge and DOE personnel concerning technologies that can characterize both uranium and technetium.
- Wrote the draft final report for this project.
- The Large Scale Demonstration and Deployment Project (LSDDP) committee for Idaho National Engineering and Environmental Laboratory (INEEL) decided not to demonstrate LIFI.

Accomplishments and technical progress to date

- Discussions about the project's scope with the CMST-CP representatives were held during the first quarter of FY99. A revised tasking and milestone list were prepared.
- Based on the literature review of CMST-CP technologies and discussions with CMST personnel and the principal investigator at the CMST-CP Mid-Year review, the portable uranium survey tool using Laser-Induced Fluorescence Imaging (LIFI), developed by Special Technologies Laboratories (STL) in Santa Barbara, California, was selected for deployment assistance.
- Attended technology demonstration of LIFI at Oak Ridge that was arranged by STL with a contractor (before HCET was involved). The demonstration was insufficient in achieving all objectives. A further demonstration was determined to be necessary. One of the main objectives not fulfilled is the need to determine potential false-positives and their corrections that can be found in the field.
- Discussions were held with Oak Ridge personnel concerning their impression of LIFI after the March demonstration. This information was used to develop a demonstration and deployment strategy.
- Efforts to demonstrate and deploy the technology at Fernald were discontinued due to concerns stated by site personnel that contamination at Fernald includes both uranium(IV) and uranium(VI). LIFI can detect only uranium(VI). Therefore, site managers were reluctant to demonstrate or deploy LIFI.
- During the March demonstration at Oak Ridge, false-positives were obtained with certain materials. Samples of these materials (galvanized steel and paint) were obtained from a similar facility and sent to STL for analysis, to help prepare for the September demonstration.

- Submitted LIFI to be considered in the LSDDPs for Savannah River and INEEL. LIFI was not chosen to be demonstrated at either site.
- Visited STL for training in LIFI, to obtain technical information, and for discussions with the principal investigator and CMST-CP representatives concerning demonstration and deployment strategy.
- Contacted subcontractors at Oak Ridge involved in characterizing facilities for decontamination. BNFL agreed to participate in a demonstration of LIFI that could lead to deployment. However, pre-demonstration surveying of the facilities resulted in the discovery that technetium, not uranium, is the main contaminant. Before this new understanding, uranium was believed to be the main contaminant, and need statements concerning this were published. Based on these results, BNFL has cancelled the demonstration.

Assessment of current status and issues

Due to funding cuts from CMST-CP, the project scope was reduced. Discussions about scope with the CMST-CP representatives continued during the first quarter of FY99. The project work began in the second quarter. Milestones 1, 2, 3, and 5 were completed. Supporting activities for Milestone 4 resulted in a better understanding of the characterization needs for Oak Ridge. The need changed from characterization of uranium to characterization of uranium and technetium. Consequently, the demonstration planned for Oak Ridge was cancelled by the subcontractor and Milestone 4 was cancelled by the DOE.

Plans for the next two months

- Project is complete and Final Report is being drafted.
- This month is the final month of this project.

FIU-HCET collaborator

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Identification of DOE's Post-Closure Monitoring Needs and Requirements

Project Number: HCET-1998-C011

Project objectives

The DOE complex cleanup plan entitled "Accelerating Cleanup: Paths to Closure" sets an ambitious agenda for the DOE, Office of Environmental Management's (DOE-EM) cleanup work. Closure refers to the completion of area- or facility-specific cleanup tasks. The cleanup levels are determined by the planned future use of the site or facility. Many of the future land use decisions have yet to be made, although certain basic cost-based land use assumptions have been determined. Limited DOE land will be remediated for "residential use" levels; most will be remediated for "industrial use" levels with access restrictions while some areas will be closed off (contained).

Most of the industrial use and closed-off lands will require monitoring. In the restricted and waste storage areas, the waste levels, condition, and containment will need to be monitored as well. In the nearby areas, groundwater and soils will be monitored per requirements imposed by regulators and stakeholders. Regulators will not approve closure plans without the specification of clearly defined monitoring methods using approved technologies. Therefore, inadequate planning for monitoring and the lack of appropriate monitoring technologies often prevent closure.

The current and evolving post-closure monitoring requirements at DOE-EM sites must be determined, documented, and tracked to provide DOE with information to guide post-closure technology development and deployment efforts. As part of this subtask, Florida International University's Hemispheric Center for Environmental Technology (FIU-HCET) will determine and track post-closure monitoring needs at the Hanford, Savannah River, and Fernald sites (FY98) and the Oak Ridge (OR) and Rocky Flats (RF) sites (FY99).

Major milestones

Milestone No.	Description	Completion Criteria	Status
C011-M1	Identify key post-closure monitoring needs and commitments at Oak Ridge.	A report, to be included as part of the final report, of the post-closure monitoring needs and commitments for Oak Ridge.	Completed on 4/5/99, ahead of schedule 4/30/99
C011-M2	Identify key post-closure monitoring needs and commitments at Rocky Flats.	A report, to be included as part of the final report, of the post-closure monitoring needs and commitments for Rocky Flats.	Completed on 6/10/99, ahead of schedule 6/30/99
C011-M3	Identify the most common post-closure monitoring needs within EM	A report, to be included as part of the final report, of the most pressing post-closure needs based on the five sites reviewed in FY98 and FY99.	Completed on 8/13/99, ahead of schedule 9/30/99
C011-M4	Write the final report for the project	Report describing the post-closure needs for Oak Ridge and Rocky Flats, summarizes the post-closure needs for all five sites reviewed in FY98 and FY99, and the most pressing post-closure needs within EM	Completed on schedule 10/31/99

Significant events for this reporting period

- Concluded writing the draft final report.

Accomplishments and technical progress to date

- Completed year-end report for Fiscal Year 1998. This report includes descriptions of post-closure requirements, activities and plans for the Fernald, Savannah River and the Hanford sites, as well as the review of post-closure monitoring programs for Western Europe and Japan (to provide lessons learned to assist the DOE in their post-closure planning).
- Completed a draft report for post-closure requirements, activities and plans for the Oak Ridge and Rocky Flats sites (milestones 1 and 2 for FY99). These reports will be included in the final report.
- Identified the most common post-closure needs within EM (milestone 3 for FY99) from post-closure requirements, activities and plans of the five DOE sites reviewed, from the regulatory requirements, and from stewardship discussions.
- Identified the technologies, either available or being developed, that might meet post-closure needs of DOE sites.
- Wrote a draft final report that includes all of the information obtained in FY98 and FY99. The post-closure needs and the technology available are analyzed and the needs determined.

Assessment of current status and issues

All milestones have been completed on or ahead of schedule. This project is concluded this month.

Plans for the next two months

- This month is the final month of this project.

FIU-HCET collaborator

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IV. INTERNATIONAL TECHNOLOGY INTEGRATION (ITI) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
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Opportunities to Market U.S. Technologies Throughout the Western Hemisphere

Project Number: HCET 1996-I001

Project objectives

Because of its size, sophistication, and geographic proximity, the U.S. environmental industry has the potential to become a major player in the environmental markets in Latin America and the Caribbean. Building on the alliances previously established by Florida International University (FIU) with organizations in Latin America and the Caribbean, the Hemispheric Center for Environmental Technology (FIU-HCET) will work with U.S. governmental agencies and industry to develop, adapt, and market/transfer their technologies throughout the Western Hemisphere. FIU-HCET will aid government leaders of the Americas in the promotion of the use of efficient and non-polluting technologies.

The international environmental market is continually being analyzed to provide a clearer understanding of which technologies may be commercially viable in the Latin American and Caribbean nations (LACNs). Technology assessment information on existing and innovative technologies is maintained and distributed. This allows FIU-HCET to advise, demonstrate, and transfer performance-maximization technologies to the LACNs in support of the Department of Energy's Office of Science and Technology (DOE-OST) International goals and objectives.

FIU-HCET has a direct link to international government agencies and the private sector. As the host to the Interactive Communication Website FIU-HCET supports the energy cooperative undertaking agreed to at the 1994 Summit of the Americas in Miami. This entails collecting information on the Latin American energy sector, as well as updating contact information for energy personnel in Latin America. The Energy Minister, the Steering Committee, and working groups responsible for environmental and economic energy related tasks set by the heads of states of their respective countries use this site <www.americasenergy.org>.

FIU-HCET manages an aggressive international program for applied research, development, demonstration, testing, and evaluation. This program to identify opportunities to market U.S. technologies throughout the Western Hemisphere has been successful. It has made a number of cooperative agreements that seek to identify technologies to aid in the cleanup of DOE nuclear component manufacturing sites and, at the same time, identify technologies for international usage to work faster, safer, and cheaper than current available technologies.

Milestones

Milestone No.	Milestone Description	Completion Criteria	Status
I001-M1	Database: Formulate a database of U.S. business contacts working in the field of environmental technologies	This milestone is ongoing.	Will continue to identify organizations to incorporate on database. Database will be incorporated onto the energy website. Due date: 12/10/99.

Milestone No.	Milestone Description	Completion Criteria	Status
			Date was postponed from 9/10/99 to allow more time to work on database entries.
I001-M2	Interactive Communication Website: Maintain the Energy website for the members/participants of the Western Hemisphere Energy Initiative	Identify funding mechanism for the support of the Interactive Communication Website.	Letter designating FIU-HCET as official host of the energy website has been forwarded to FIU-HCET. Due date: 9/28/99. Completed
I001-M3	Participate at the next Hemispheric Energy Steering Committee meeting in Lima, Peru.	Make a presentation of the 'Virtual Secretariat' and introduce FIU-HCET to participants of the Steering Committee.	Completed: 2/11/99
I001-M4	Enterprise Florida: Identify U.S. companies who would be interested in participating in the next Export Marketing Mission to Argentina, April 10-16, 1999.	Identify a minimum of 20 companies for mission. Enterprise FL has suggested that FIU-HCET participate.	Responses by companies were forwarded to Enterprise Fl. Completed: 3/2/99 ahead of schedule.
I001-M5	ITI Year End Report	Letter by EM/OST to accompany report needs to be sent to FIU-HCET publications.	Report was completed and a draft letter to accompany report was sent. Report has been reviewed by EM/OST. Letter to accompany report has been sent by EM/OST. Due Date: Completed 5/19/99
I001-M6	The Fourth USDOE International Decommissioning Symposium (D&D 2000)	Meet all scheduled Milestones developed and agreed to by DOE. Coordinate all international activities associated with this event.	Draft a list of Steering Keynoters, Executive. Due Date: Completed, 8/30/99 NOTE: This milestone has moved to project I002.
I001-M7	Open contract vehicle between the Office of International Affairs (IA) and FIU-HCET	Draft a Statement of Work and prepare a five-year budget plan.	Statement of Work and Budget were completed ahead of schedule (due date for this action item was 6/28). Copies were sent to International Affairs Budget and Procurement Officer. Due Date: 11/99 (date was changed by DOE to begin contract with their fiscal year)

Significant events for this reporting period

- FIU-HCET has completed the Hemispheric Energy Initiative Website Business Plan. The pamphlet for the energy website has been completed. In addition, the letter from DOE officially designating FIU-HCET as the host of the energy website has been received. A mailing list is

being developed to send a copy of the letter and pamphlet to a wide range of international contacts.

- As instructed by the university, drafted the language to accompany the energy website advertising form. Completed a price list for advertising on the energy website. In the process of consulting the university on how best to collect the funds from those companies/organizations interested in advertising on the energy website.
- FIU-HCET signed a Memorandum of Understanding with the Environmental Quality Center (EQC) of Chihuahua, Mexico. In the process of identifying collaborative work. The first project will involve the training of maquiladoras in environmental management systems. The training is scheduled to take place in January 2000.
- FIU-HCET was forwarded the record from the August 30 – September 1, 1999 Fourth Joint Coordinating Committee for Radioactive and Mixed Waste Management meeting between U.S. Department of Energy (DOE) and Argentina National Commission of Atomic Energy (CNEA). On a visit to Washington, D.C. (October 14, 1999) a DOE-EM representative discussed FIU-HCET's involvement in identifying a collaborative project between DOE and CNEA and also briefed FIU-HCET on the action items of the meeting.
- FIU-HCET representative attended the 1999 Americas Conference at the Biltmore in Coral Gables where key business leaders, government officials, financiers, educators, and economists met to explore vital issues taking place throughout Latin America.
- FIU-HCET personnel have been contacted by the Argentinean Consulate for possible collaboration in hosting a meeting on energy and environmental technologies for the Argentina market place in May 2000. FIU-HCET will be in communication with the Deputy Consul General to draft a proposal of mentioned project.
- FIU-HCET representative traveled to Washington, DC on October 14, 1999, to meet with a number of DOE representatives. Meetings consisted of discussing FIU-HCET international capabilities with the Office of International Affairs, Office of Nuclear Energy, and the Office of Environmental Management.
- FIU-HCET representative has been invited to participate in a hemispheric dialogue of technical specialist and policy experts on environmentally sound trade expansions in the Americas. The ITI program manager will be a commentator on the panel entitled *Selling Sustainable Development*. The meeting is a collaboration between the Dante B. Fascell North-South Center and the Organization of American States.

Plans for the next two months

- FIU-HCET personnel will continue to assist the DOE-EM international program manager in activities with the CNEA of Argentina.
- FIU-HCET personnel will continue to work on Opportunities to Market U.S. Technologies Throughout the Western Hemisphere year end-report for DOE-OST.
- FIU-HCET personnel will continue to identify international opportunities for U.S. environmental technologies.

FIU-HCET collaborator

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International Deactivation and Decommissioning Symposium

Project Number: HCET-1999-I002

Project objectives

Within the United States, DOE is chartered with the responsibility for management and resolution of federal environmental and waste concerns associated with the operation and shutdown of nuclear systems. During the 1980s, DOE supported and developed new technologies to meet the significant technical and economic challenges to effective environmental restoration and remediation of DOE facilities. Per DOE *Paths to Closure* documentation, the federal government has estimated that more than 7,000 DOE facilities require environmental action, with costs of approximately $147 billion and a schedule extending through 2070.

Beyond DOE and other government operations, cost projections for the decommissioning of private- and commercial nuclear utility facilities worldwide could exceed $100,000,000. Market demand of this size is attractive to nuclear industry suppliers that have developed specialized skills, technologies, and goods and services for remediation. Federal, commercial, and international facilities represent a global business opportunity for the restoration/decommissioning industry.

The fourth International Decommissioning Symposium (IDS 2000) will provide a venue to review D&D activities and to develop partnerships for environmental restoration between government and industry in a global environment. The symposium will be an ideal forum to showcase available decommissioning skills and emerging decommissioning technologies. The IDS 2000 will reinforce DOE's vision and commitment to efficient decommissioning progress, technology development and transfer, and business partnerships.

FIU-HCET provides the following services to DOE in support of the IDS 2000:

- Development of a Project Plan defining the objectives, scope, cost, and schedule.
- Development of committees necessary to attract and organize the planned Technical Program participants, targeted attendees and exhibitors.
- Execution and management of the IDS 2000 per the approved Project Plan and in accordance with direction provided by both DOE and the conference committees.

These services are in direct support of the objectives of IDS 2000. Specific milestones associated with these services and identified in the Project Plan include the following:

- Documentation and communication of the IDS 2000 objectives, scope, cost, and schedule.
- Marketing and Public Relations efforts to ensure more than 800 attendees and exhibitors.
- Selection of Technical Papers and subsequent development of the IDS 2000 Technical Program.
- Selection and development of Technical Demonstrations, including site selection and setup and mobilization and demobilization of the demonstration equipment.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
I002-M1	Project Plan and Schedule	Acceptance of the Project Plan and Schedule by DOE.	9/30/99
I002-M2	Subcontractor Award for Tradeshow	Contract established.	8/15/99 Complete
I002-M3	Acceptance notification for papers	Letters of acceptance mailed to all selected authors.	11/17/99
I002-M4	Final approval papers due	Receipt of all final submittals.	01/28/00
I002-M5	Website established	Website online.	9/1/99 Complete
I002-M6	Organizational Committee formation complete	All Organizational Committee members' acceptance letters and/or verbal commitments received.	09/30/99 Complete
I002-M7	Preliminary Announcement Brochure	Preliminary Announcement Brochure mailings complete.	9/27/99 Complete.
I002-M8	Registration/Program Brochure	Registration/Program Brochure mailings complete.	03/20/00
I002-M9	Final Agenda	Acceptance of Final Agenda by DOE.	03/01/00
I002-M10	Proceedings	Development of CD and Paper Proceedings.	06/12/00
I002-M11	Technology Demonstrations Selected	Acceptance Letters mailed to approved Technology Demonstrators.	04/03/00

Significant events for this reporting period

- Preliminary Announcement Brochures were mailed out in September. Thirty thousand brochures were mailed out with a Call for Papers deadline extension.
- FIU-HCET held a preliminary Organizational Committee meeting with DOE-OR, Bechtel Jacobs, and Akins Public Strategies. The meeting focussed on adjustments to the Project Plan, Akins' role in the Symposium planning and execution, and the communication protocol that will be followed between the team members. The meeting also addressed the importance of DOE-OR feedback regarding the proposed committee members and session chairs.

Accomplishments and technical progress to date

Milestones I002-M2, I002-M5, and I002-M7 have been completed. The completion of these milestones has been communicated to the IDS 2000 DOE-OR representatives.

Significant progress has been made in support of Milestones I002-M1 and I002-M6:

- A meeting was held on 10/15/99 to discuss the Project Plan and Schedule. This meeting allowed DOE-OR to communicate their vision for IDS 2000. This vision will be incorporated into the Project Plan. The Project Plan will be resubmitted for DOE-OR review.
- The proposed Organizational Committee has been submitted to DOE-OR and is currently under review. Approval of this proposal will allow FIU-HCET to initiate recruitment of the proposed members.

Assessment of current status and issues

FIU-HCET effort on Milestone I002-M6 is on hold pending DOE-OR review and approval. Completion of this review is expected the week of 10/18/99. Acceptance of the Project Management Plan, recruitment of committee members, and initiation of committee meetings are all critical steps in ensuring the symposium receives the level of marketing and publicity that elicits participation by both DOE and private industry sectors, as well as the Oak Ridge community.

Thirty-five of the targeted one hundred Technical Papers have been received. This number is expected to increase as a result of Preliminary Brochure mailings and the assignment of Technical Session Chairs.

Plans for the next two months

FIU-HCET will focus efforts on the following tasks, in accordance with the Project Management Plan, over the next two-month period:

- All technical paper abstracts will be submitted by November 1, 1999.
- Abstracts will undergo a review/approval process.
- Online registration system design will be added to the IDS Website.
- Technical, Executive, and Organizational committees will be approved and implemented.
- Exhibitor marketing materials will be produced and mailed.
- Technical Demonstration prospect list will be developed, and marketing/sales will begin.
- Design of Technical Program tracks, sessions, and organizations will begin.
- Subcontractor management (hotels, convention center, and exhibit contractor) will continue.
- International marketing activities will continue.
- Weekly Organizational Committee meetings (initiated on 10/15/99) will continue through November and December.

FIU-HCET collaborators

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