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**MONTHLY PROGRESS REPORT**

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## SUMMARY

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- The programming and website for the advanced Technology Information System (TIS) have been completed. Over and above the LSDDP-TIS, the new system provides information on DOE's baseline technologies, technology data contained in DOE's databases, technologies assessed at FIU-HCET Technology Assessment Program (TAP), as well as links to other selected D&D sites with valuable technology information. The new name for the website is Gateway for Environmental Technology (GET).
- A super-vacuum type blasting system was tested for decontamination of 12-in pipe internal surfaces. The system operates on compressed air and propels grit media at high speed at wall surfaces. It is equipped with a vacuum system for collecting grit, dust, and debris. This technology was selected for further development.
- The electret ion chamber (EIC) system for measurement of alpha contamination on surfaces has been calibrated and is ready for demonstration and deployment. FIU-HCET is working with representatives from Fernald, Oak Ridge, Rocky Flats, and Savannah River to procure a demonstration and deployment site.
- Final arrangements are ongoing for the mock-up design for the glove box and tank size reduction technology assessments, including designing of support bases for tanks, a piping support system, and a mobilization plan for glove boxes and tanks from storage site to the PermaCon.



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## I. DEACTIVATION AND DECOMMISSIONING (D&D) FOCUS AREA

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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 web sites 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 to 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.	Four technologies evaluated for various applications for a total of six demonstrations. One technology is scheduled for June. The PPPL demo is scheduled for July.
D038-M2	Test Plan for Characterization Technologies Assessment Program	Characterization Technology Test Plan Approved	Completed 4/30/99.

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M3	Test Plan for Waste Management Technologies Assessment Program	Waste Management Technology Test Plan Approved	Revised scheduled start 5/17/99. Scheduled completion 6/30/99.
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.	Design started 12/7/98. Scheduled completion 10/1/99.
D038-M5	Access to the information system characterization database	Assignment of user name and passwords to DDFA provided distribution list.	Scheduled start 7/6/99. Scheduled completion 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.
D038-M7	Report on the decision analysis tool for dismantlement design	Final copy of report sent to DDFA.	Scheduled start 7/6/99. Scheduled completion 10/29/99.

### Significant events for this reporting period

- Work is progressing on the technology assessment test facilities for the size reduction of glove boxes and tanks. The expanded PermaCon is now installed and designs are being developed for transferring the 3,000 lb, 10-ft high tanks into the PermaCon and lifting them into an upright position. The test plan is being completed, and technology assessments will be scheduled for this summer.
- The test plan for assessing technologies for facility characterization has been completed. Demonstrations are expected to begin in late summer.
- Demonstration of the Ice Blast technology with a chemical softener was performed by Universal Ice Blast, Inc. on 4/26/99 – 5/4/99. The technology was able to remove the paint from masonry surfaces but failed to remove paint from the carbon steel surfaces.
- The Project Manager at the En-Vac Blasting Systems at the MHI-ME Ltd. has scheduled a pre-demonstration inspection at FIU-HCET for 5/18/99. The demonstration is scheduled for the week of June 7, 1999.
- Data entry of all FIU-HCET technology assessments for metal and masonry decontamination into the Multimedia Information System has started. The data from 38 technology assessments along with the multimedia pictures and videos will be entered and validated. This process is expected to be completed by the end of the fiscal year.
- The FIU-HCET Technology Assessment Program was included in the new "Catalog of Environmental Technology Verification Programs in North America" prepared by the Pacific Rim Enterprise Center and the Colorado Center for Environmental Management. The catalog is intended to increase the awareness about environmental technology verification as a tool, highlight some of the issues affecting verification efforts, and present the diversity of the 23 current verification programs.

## Accomplishments and technical progress to date

- Under this grant project, which began in FY96, 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, four technologies have been evaluated to date in multiple applications giving a total of six demonstrations. Additional technology assessments scheduled include
  - En-Vac - mid-June
  - PPPL diamond wire saw demonstration – end of July.

## Assessment of current status and issues

This project is on schedule. Four technologies have been assessed in FY99, and two additional technologies are scheduled. Test plans for assessing Facility Dismantlement and Facility Characterization technologies have been completed.

The test plan for Waste Management Technology Assessment was postponed to complete the work being performed on the Glove Box and Tank Size Reduction Technology Assessments. However, the milestone for the Waste Management test plan is not in jeopardy.

## Plans for the next two months

Activities for the next two months include the following:

- Continue technology search for FY99 demos. Demonstrate one technology, En-Vac, by the end of June 1999.
- Finalize the data collected from the ElectroStrip and Ice Blast technology assessments completed in April. Include summaries of each technology in the monthly reports.
- Complete the test plan for the Glove Box and Tank size reduction technology assessments and begin scheduling technologies for demonstration.
- Complete the test plan for Waste Management technology assessments.
- Complete the scope of work for performing demonstrations at the IUOE testing facilities in Beaver, WV.

- Complete the design of the multimedia information system for dismantlement and begin programming.

**FIU-HCET collaborator**

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## Integrated Vertical and Overhead Decontamination System

Project Number: HCET-1998-D023

### Project objectives

The overall objective of this subtask 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 Partner to design and manufacture decontamination and deployment systems	Selection of a responsible and qualified vendor	In progress. See section "Assessment of current status and issues" for detailed explanation
D023-M2	Approved Design Specifications for the Decontamination System	Approval of final design specifications for the decontamination system	Scheduled completion 4/6/99. See "Assessment of current status and issues" for explanation.
D023-M3	Fabrication of Decontamination System	Complete fabrication of decontamination system unit	Scheduled completion 7/30/99
D023-M4	Field Testing of Decontamination System	Completion of testing of decontamination unit at FIU-HCET Test Site	Scheduled completion 8/16/99.
D023-M5	Design Drawings for the Characterization System	Approval of final design specifications for the characterization system	Scheduled completion 6/1/99
D023-M6	Fabrication of Characterization System	Complete fabrication of characterization system	Scheduled completion 9/30/99.
D023-M7	Testing the Characterization System	Completion of characterization system testing at FIU-HCET	Scheduled completion 10/15/99
D023-M8	Final report on the Decontamination and Characterization System.	Deliver final report to DDFA-determined distribution list	Scheduled completion 11/30/99

### **Significant events for this reporting period**

- Discussions between vendors and FIU were held. Details of the contractual agreement are currently being worked out.
- Based on the extension to the Bid Opening date, M1 has been deferred and will result in a delay in subsequent milestones. The new Bid Opening date directly affects M2, "Approved Design Specifications for the Decontamination System," and possibly M3 and M4.
- A Test Plan for the development of a mock-up facility for the testing of the characterization technology has been reviewed. A copy will be sent to the DDFA program and project managers for review and approval.

### **Accomplishments and technical progress to date**

- 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.
- 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.
- Performance Specification documents that included conceptual designs of the decontamination and deployment systems were sent for review to the DDFA 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.
- For additional details on accomplishments and technical progress, refer to the Integrated Vertical and Overhead Decontamination System FY98 Year-End Report.

### **Assessment of current status and issues**

Bid Opening was conducted on April 2, 1999. Two responses were received and reviewed. Based on the review, additional information was requested and obtained from one of the vendors. Contractual issues are being discussed with the FIU Sponsored Research Officer and FIU Purchasing Agent. A contract with the selected vendor will be put in place as soon as these issues are resolved. Based on this development, project milestones M1 and M2 have been delayed. Based on the vendor's schedule, milestones M1, M2, and M3, and M4 will need to be rescheduled. As soon as the contract is put in place with the selected vendor, a formal revision of the PTP milestones and due dates based on the vendor's schedule will be submitted to DOE-FETC.

A Test Plan for the development of the mock-up area for testing of the radiological sensors was sent to the DDFA Program Manager for review. As soon as this plan is approved, the test area will be constructed.



### **Plans for the next two months**

Activities for the next two months include the following:

- Complete contractual issues with selected vendor and place contract with vendor.
- Submit revision of PTP milestones and due dates to DOE-FETC.
- Start test site development and construction.

### **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 subtask 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	Scheduled completion – 3/1/99 delayed – data still being received.
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	Ongoing. Scheduled completion date of 3/1/99 delayed due to incomplete information in PAM; had to be researched elsewhere.
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	Scheduled completion – 6/30/99
D039-M6	Final Report	Final report on results of the project delivered to DOE.	Scheduled completion – 10/31/99
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.	If approved, scheduled for FY00.

### Significant events for this reporting period

- The programming and website for the advanced TIS have been completed. Over and above the LSDDP-TIS, the new system provides information on DOE's baseline technologies, technology data contained in DOE's databases, technologies assessed at FIU-HCET Technology Assessment Program (TAP), as well as links to other selected D&D sites with valuable technology information.
- The advanced TIS will be showcased at the FETC Mid-year Review in Morgantown, West Virginia, at the end of May 1999, along with the FIU-HCET-developed Multimedia Information System for Decontamination and the Decision Analysis System for Decontamination.

### Accomplishments and technical progress to date

- All data from Savannah River Site has been entered into the database.
- FETC database has been converted and exported to the TIS database.
- New name for the website is Gateway for Environmental Technology (GET).
- Technology screening datasheets from the four new LSDDPs are being collected. All datasheets received to date have been entered into the database.

New LSDDP Sites	# of Technologies Reviewed 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)	45	45	45
Idaho National Environmental Engineering Laboratory (INEEL)	123	48	48
Los Alamos National Laboratory (LANL)	41	41	41

### Assessment of current status and issues

The system development phase of the project is proceeding on schedule and no major problems are foreseen.

### Plans for the next two months

- The advanced TIS website will be fully implemented.
- Work will be completed on linking the LSDDP-TIS website to other D&D technology websites.

**FIU-HCET collaborator**

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## 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.	Ongoing. Scheduled completion 6/30/99. Delivery schedule for container has impacted the completion date. This delay does not place this item on the critical path.

Milestone No.	Milestone Description	Completion Criteria	Status
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.	Delayed. Scheduled for completion 4/20/99. Final run-off test on May 12, 13 unsuccessful. Re-test scheduled for May 21.
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
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.
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
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 pipe of various sizes and contaminant types.	Scheduled completion 9/14/99
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**
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

\*\* This date has been moved forward to allow for a more extensive demonstration to be completed at a commercial site.

## Significant events for this reporting period

- On May 12 and May 13, a final run-off of the decontamination unit was not successful when attempting to decontaminate the inside of the pipe. DeLong Equipment will make the adjustments to meet the performance specifications. Another run-off test has been scheduled for 5/21/99.
- The procurement of the decontamination container is complete. The container was delivered in May 1999.
- The flatbed trailer arrived at Canberra and the Seabox Container was received on May 12. The container has a few minor problems which will be fixed. This will not delay the schedule.

## 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<sup>3</sup> of pipe at Hanford and 5,880 m<sup>3</sup> 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<sup>1</sup> 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.

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<sup>1</sup> "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.)

### *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 involve 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 and Title II design are complete. Title III design is currently being performed.

### *Design and Fabricate Characterization System*

Canberra, Inc., was selected as contractor to supply the characterization module. A kick-off meeting was held on August 28, 1998. Title I design was completed on November 30, 1998. Title II design was completed on February 18, 1999.

## **Assessment of current status and issues**

- The characterization system is on schedule. The current schedule is valid with no major concerns anticipated.
- Three of the four transportation trailers were delivered. The last trailer is expected to be delivered by the end of the month.
- Canberra's software programming is progressing on schedule. The main electrical control box has been completed and is awaiting installation into the container.
- The computer and printer have been tested and are working well. The cabinet for the computer and NIM has been assembled and is awaiting installation into the container.
- The run-off of the decontamination unit was not successful when attempting to decontaminate the inside of the pipe. DeLong Equipment will make the adjustments to meet the performance specifications. Another run-off test has been scheduled for 5/21/99.
- Development of the detectors for the characterization is progressing on schedule. The germanium detector manufacturing is the riskiest part of the schedule and therefore will be monitored closely by FIU-HCET.

## **Plans for the next two months**

- Another attempt of material run-off for the decontamination system will be made on May 21.
- Transport the completed decontamination unit to DeLong Equipment in Atlanta and integrate the unit with the vacuum system.
- The procurement of the material off-loading system is complete and the design is underway.
- All ventilation equipment will be installed and operationally checked. Scheduled completion is May 30, 1999.
- The decontamination system will be installed into the decontamination container. This system will then be transported to Atlanta, where the ventilation system will be incorporated. Additional testing of the system will be completed at that point.



**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 subtask 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
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

### **Significant events for this reporting period**

- A super-vacuum type blasting system was tested for decontamination of 12-inch pipe internal surfaces. The system operates on compressed air and propels grit media at high speed at the wall surface. It is equipped with a vacuum system for collection of grit, dust and debris. Test results show that improvements are needed in cleaning rate, deployment platform and maneuverability. An additional moisture trap for compressed air is also needed to prevent entry of water into the system.

### **Accomplishments and technical progress to date**

- Candidate technologies for in-situ decontamination of pipes were screened and grit blasting was selected for further development.
- IPDS concept drawings are being prepared
- FIU-HCET is in discussions with national decontamination firms regarding teaming partnerships.

### **Assessment of current status and issues**

This is the first year of a two-year project. The project is currently on track and no issues impacting design or deployment have been identified to date.

### **Plans for the next two months**

FIU-HCET will

- Complete concept drawings.
- Perform design testing on concept testing platform.
- Continue discussion with commercial partners regarding partnering on this project.

### **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.	April 30, 1999, completion date rescheduled to May 30, 1999, pending DOE concurrence.
D042-M3	Site needs assessment	Identification of key problem sets facing each NPR scheduled for decommissioning.	June 1 completion date rescheduled to June 30 due to delays in M1.
D042-M4	Technological solutions	Identification of candidate technologies for addressing problem sets identified in milestone 3.	Scheduled to begin July 1999.
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.	To be completed before October 31, 1999.

### **Significant events for this reporting period**

- Contact information for one additional facility (University of Washington) was obtained bringing to 44 the total number of facilities surveyed.
- Further attempts were made to contact the remaining 26 site managers who had not responded to the initial request for participation. Eighteen were contacted and the remaining eight who did not respond by May 14, 1999, are assumed to be uninterested in participating in the survey.
- On April 26, 1999, a report summarizing the responses from NPR managers regarding their willingness to participate in this study was sent to DOE-FETC. Twenty-five (25) facilities have agreed to participate, of which five have immediate D&D technology needs. Based on this level of participation and the needs expressed by the NPR managers, FIU-HCET has recommended that the project be continued to Phase II (Needs Assessment and Technological Solutions).

### **Accomplishments and technical progress to date**

Of the 44 NPRs included in the survey:

- Eight did not respond to FIU-HCET's request for participation and information.
- Eleven responded that they are unable to participate in the survey.
- Twenty indicated that they do not have any immediate plans for decommissioning but would be willing to work with FIU-HCET in identifying potential problem sets and technology needs that may be encountered during the D&D of NPRs and corresponding technology solutions.
- Five have already identified specific needs and would welcome FIU-HCET's assistance in completing their needs assessment and identifying technological or process solutions. They are
  - State University of New York in Buffalo
  - University of Virginia
  - Rensselaer Polytechnic Institute
  - University of Washington
  - Georgia Institute of Technology (to whom FIU-HCET is already providing D&D project support)
- Twenty-three of the 36 respondents have already filed, or plan to file, for extension of their licenses when they expire.

### **Assessment of current status and issues**

- FIU-HCET is awaiting DOE-FETC's concurrence to continue to Phase II.
- Several NPR managers have expressed great interest in the outcome of this study as well as their willingness to provide information. No major issues have been identified that would hinder completion of this project.

### **Plans for the next two months**

- FIU-HCET has begun working with selected NPRs in defining D&D problem sets, developing technology needs assessments, and identifying feasible technology solutions.
- Based on research and initial discussions, a checklist of potential D&D problem sets has been compiled and this will be used as the starting point for compiling more detailed information on needs at the sites being surveyed.
- Work will begin on developing the decision model that NPR site managers will be able to use to identify feasible technology solutions for their D&D problems.

### **FIU-HCET collaborators**

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## Life-Cycle Cost Analysis for Radioactively Contaminated Scrap Metal

Project Number: HCET-1999-D043

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### 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 of RSM in landfills over recycling. 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 objective of this subtask is to estimate the range of DOE's real costs for direct disposal of DOE-generated RSM.

## 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.	Due date: June 15, 1999
D043-M2	Committed waste site managers	A list of waste site managers willing to provide information necessary for developing LCCAs.	Due date: 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.	Due date: June 30, 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
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.
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.
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.	This task was revised to exclude LCCAs for disposal means other than direct disposal. Due date: August 31, 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.
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	Due date: October 31, 1999

## Significant events for this reporting period

- FIU-HCET prepared and issued a survey questionnaire to DOE sites requesting data on current and future RSM inventories. The memorandum provides the individual 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. Data from the sites is expected no



later than June 15, 1999. The response will also provide an indication of site managers' willingness to participate further in the study.

- FIU-HCET was invited by Ms. Jennifer Clay, DOE-EM, to DOE's Waste Issues Team Workshop V in Las Vegas, NV, to make a presentation on the LCCA-RSM project and objectives. This meeting was held May 4 – 6. Several of the presenters had direct germane information regarding the project activities, which many of them were pleased to share with FIU-HCET. Dr. Yuracko was also in attendance and indicated the importance of apprising the group of the goals of the LCCA-RSM project now rather than at the end of the process. Site disposal facility cost elements were provided in addition to studies and reports previously completed. The Nevada Test Site personnel provided invaluable information regarding the disposal costs for the NTS LLW facility. Currently, FIU-HCET is awaiting NTS personnel to provide the current PBS on the LLW disposal facility as well as the Life Cycle Baseline. Following the workshop FIU-HCET extended an invitation to the group to hold their November 1999 meeting in Miami, FL at its facilities.
- On May 5, 1999, representatives from FIU-HCET and NMR visited the commercial LLW disposal facility, Envirocare of Utah, Inc., in Salt Lake City, for the purpose of collecting information needed for the RSM-LCCA study. FIU-HCET was able to identify cost elements for commercial LLW disposal facilities that are different from those at the DOE sites. Two (2) years of annual waste reports were obtained for the Envirocare facility and a third is forthcoming.

### **Accomplishments and technical progress to date**

- In March 1999, representatives from FIU-HCET and the DOE's Federal Energy Technology Center (DOE-FETC) and National Center of Excellence for Metals Recycle (DOE-NMR) reviewed the scope of work and objectives of this project. The outcome of the review was that FIU-HCET's efforts on this project will 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 will not be investigated. These changes as well as the revised schedule for completion of the project have been endorsed by DOE-FETC and are reflected in the Major Milestones table below and in a revised Project Technical Plan (PTP).
- Following the revision of the statement of work (SOW) and PTP, the project has focused on RSM inventory and disposal facility cost elements (DOE and commercial). Sites which were designated by the DOE for evaluation have been visited and information collected from them. These sites were established by the DOE to include the Nevada Test Site and Envirocare of Utah, Inc.
- Other key issues that are being addressed are
  - a clear and common understanding of the meaning of each factor that is taken into account in current LCCAs. Therefore, one of the tasks that FIU-HCET will undertake is to compile a taxonomy of the factors and their definitions.
  - a more accurate means of estimating future costs of maintaining waste disposal sites including facility surveillance and maintenance. Most importantly, current methodologies

do not account for potential future liability in the event of accidental occurrences such as exposure or leakage at these facilities.

- disposal Facility Summaries and/or Waste Disposition Maps indicating quantities of RSM and possible TSD alternatives have been obtained for the Fernald Environmental Management Project, Hanford Operations Site Environmental Restoration Disposal Facility, Idaho National Environmental Engineering Laboratory, Nevada Test Site, Oak Ridge Reservation, Savannah River Site, Rocky Flats Environmental Test Site, and Los Alamos National Laboratory. Together these facilities have a current stockpile of over one million tons of RSM.

### **Assessment of current status and issues**

Initial contact with disposal sites at LANL, Chicago, ORR, SRS, INEEL, NTS, Fernald, Hanford, and Rocky Flats has been made to request information on RSM current and future inventories. If the information is returned to FIU-HCET by June 15, 1999, Phase I of the project will be completed on schedule. A follow-up memorandum reminder has already been sent to the sites reminding them of the June 15 deadline. An initial outline of the report to DOE on Phase I activities has been drafted and is awaiting data from the survey.

Once the data from existing RSM inventories has been analyzed and reconciled by FIU-HCET, the results will be reviewed with NMR and correlated to their current estimates in order to derive a realistic estimate of DOE's present and future RSM inventories.

A Proposed Phase II Project Plan has been developed.

### **Plans for the next two months**

During the next two months, the following will be accomplished:

- FIU-HCET will complete the inventory of the quantities and properties of RSM currently stockpiled at DOE facilities as well as RSM expected to be generated from future D&D activities.
- FIU-HCET shall ascertain the level of cooperation expected from DOE waste site managers in providing full information needed for the assessment of life-cycle costs for disposal and to develop LCCAs.
- FIU-HCET shall develop a comprehensive list in association with Dr. Kathy Yuracko on cost elements associated with DOE disposal facilities and commercial disposal facilities. In conjunction with this, these cost elements will be reviewed and verified by facility representatives during site visitation.
- FIU-HCET will present the project, accomplishments, and paths forward at the Deactivation & Decommissioning Focus Area FY99 Mid-Year Review May 25 – 27.
- FIU-HCET will complete its Report to DOE on Phase I Activities which should contain the current and future inventories from the baseline disposition maps of RSM, contamination ranges, site points of contact, level of expected cooperation, and specific types of metals.

**FIU-HCET collaborators**

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## Legacy Waste Disposition for the Oak Ridge Reservation

Project Number: HCET-1999-D044

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### 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 subtask, 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 the tasks were redefined in March 1999 by Bechtel Jacobs 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 has been deleted by Bechtel Jacobs (see Note 1).
D044-M2 (on hold)	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 has been put on hold by Bechtel Jacobs (see Note 2).
D044-M3 (on hold)	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 has been put on hold 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 has been 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	Scheduled for completion 6/30/99. Delay in installation and testing schedule for TSCA Incinerator PM-CEMs shifted FIU-HCET support initiation to 5/15/99. For this reason, FIU-HCET's FY99 technical support will be limited to a technical review of the PM-CEM Performance Evaluation Test Plan.
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

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

Milestone No.	Milestone Description	Completion Criteria	Status
D044-M10 (added)	Documentation of effectiveness of systematic approach to ORR MLLW evaluation and disposition	Documentation of reduced treatment effort required	Scheduled for completion 6/15/99

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

Note 2. These tasks have been put on hold per email received April 9, 1999, from John Patterson, Manager of Planning and Integration at Bechtel Jacobs, pending further EM Integration guidance.

### Significant events for this reporting period

- FIU-HCET has completed a review of, and updated, Bechtel Jacobs's BDAT database according to current RCRA/LDR regulations. The current treatment standards for all waste codes included in the Broad Spectrum BOI database have been identified and new waste code subcategories added where required. Using the updated BDAT database, a crosscheck of the waste inventory was carried out to ensure that all waste codes were addressed.
- FIU-HCET conducted a detailed review of waste code assignments and treatability groupings for four sample waste populations in the ORR MLLW BOI database, viz., soft debris contaminated with enriched uranium, construction debris, scrap metal, and radiogenic lead.
- FIU-HCET is addressing disposition conflicts and options for these four waste streams.
- Work associated with milestone D044-M5 was scheduled to begin May 15. FIU-HCET, with technical assistance from UT Knoxville, will carry out a technical review of the test plan to be followed in the performance evaluation of three PM-CEM systems to be installed and tested this summer at the TSCA Incinerator.

### 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 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 website 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.

The overall outcome of this project will be a systematic process for evaluating MLLW waste streams to assist in waste code and waste grouping assignment and the choice of most cost-effective disposition option.

### **Assessment of current status and issues**

The scope of this subtask is currently being reviewed with Bechtel Jacobs and the DOE's Federal Energy Technology Center in light of the redefined needs of Bechtel Jacobs. The review may result in further modification of the tasks, milestones, and deliverables for the project. In the meantime, progress is being made with those tasks associated with the Bechtel Jacobs Broad Spectrum MLLW.

It is anticipated that the time and effort invested in re-evaluating the tasks and deliverables under this project will result in a more comprehensive and useful decision support model with application not only at ORR but at waste processing sites across the DOE complex.

### **Plans for the next two months**

FIU-HCET will

- continue assessing the MLLW BSTP developed by Bechtel Jacobs.
- continue a detailed review of the MLLW database and of waste populations of particular interest to Bechtel Jacobs.

- work with Bechtel Jacobs to assess and document the current processes and options for characterizing, transporting/handling, treating, and disposing of difficult MLLW streams.
- develop the outline of a systematic approach for evaluating waste streams in the MLLW inventory.
- prepare a report on the technical review of the test plan to be followed in the performance evaluation of three PM-CEM systems to be installed and tested at the TSCA incinerator this summer.

### **FIU-HCET collaborators**

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## National Contract for Radioactive Scrap Metal Recycle

Project Number: HCET-1999-W002

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### 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 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.

Note: Additional milestones to be determined by NMR.

## Significant events for this reporting period

There are no significant events for this reporting period. At this time, FIU-HCET is awaiting the assignment of additional tasks by the DOE.

## Accomplishments and technical progress to date

Identification and subsequent meetings with scrap metal recyclers capable of both decontamination and metal melt operations provided FIU-HCET with a more thorough understanding of the specific steps involved in the current radioactive scrap metal recycle process. This more thorough understanding allowed FIU-HCET to develop a Statement of Work that closely matched existing procedures for metal recycling technologies and that also allowed the incorporation of new, innovative technologies during the life of the metal recycle contract.

## 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 National Contract for Radioactive Scrap Metal Recycle. As additional subtask 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**

Ken Eudy, (423) 220-8844



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## II. TANKS FOCUS AREA (TFA)

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### MONTHLY PROGRESS REPORT

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## 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	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
T004-M6	Measure slurry viscosity	Perform 26 viscosity tests as described in Table 5 in the PTP	Due date: 09/30/99
T004-M7	Perform data correlation and documentation	Write a project final report	Due date: 10/30/99

### Significant events for this reporting period

- A review meeting was held on May 17, 1999, with the presence of DOE contacts, Pete Gibbons from NHC and Fadel Erian from PNNL. The purpose of this meeting was to review the status and plans for next year for both the plugging-and-unplugging and the waste conditioning projects.
- Milestone 3 was completed. Pictures obtained from a Scanning Electron Microscope (SEM) were analyzed to determine the particles smoothness and sphericity variation with mixing.
- The rheology of a Hanford simulant was tested at different concentration, pH, and temperature. The purpose of these tests was to compare results with the SRS data obtained in the past and which was used in a paper submitted for publication.

### Accomplishments and technical progress to date

- Several issues were brought up in the review meeting. A summary of some of these issues is cited next.
  - No literature is available regarding multi-specie slurry characterization. Therefore, work being performed at FIU-HCET is very important and unique.
  - It is important to develop a method to change concentration without affecting the particle size distribution of the slurry when testing it in the pipeline loop.
  - It is important to determine why the particle size distribution of a slurry changes when the pH is adjusted.
  - Settling rate of the slurries needs to be measured by testing each particle size portion separately because different sizes settle at different rates.
  - A Hanford slurry recipe will be provided by Dr. Erian. This slurry will be tested in the horizontal pipeline loop after testing a SRS slurry in the same loop.
  - Also, some activities were identified to be performed in FY00. One of these tasks is to study gelation of the waste, since gel is to be used for blockage in the large-scale test beds.
- Crystallization tests are being performed as described in Table 3 in the PTP. Samples are taken from the supernatant portion of each slurry sample. These samples are cooled for a long period of time at about 1°C to determine the crystallization rate.
- In addition, thermal analyzer (TA) equipment will be used with such samples. This device analyzes the differential and gravimetric thermal change of the sample.
- As observed in the following graphs, the Hanford simulant tested exhibits a behavior similar to the SRS simulant tested before.



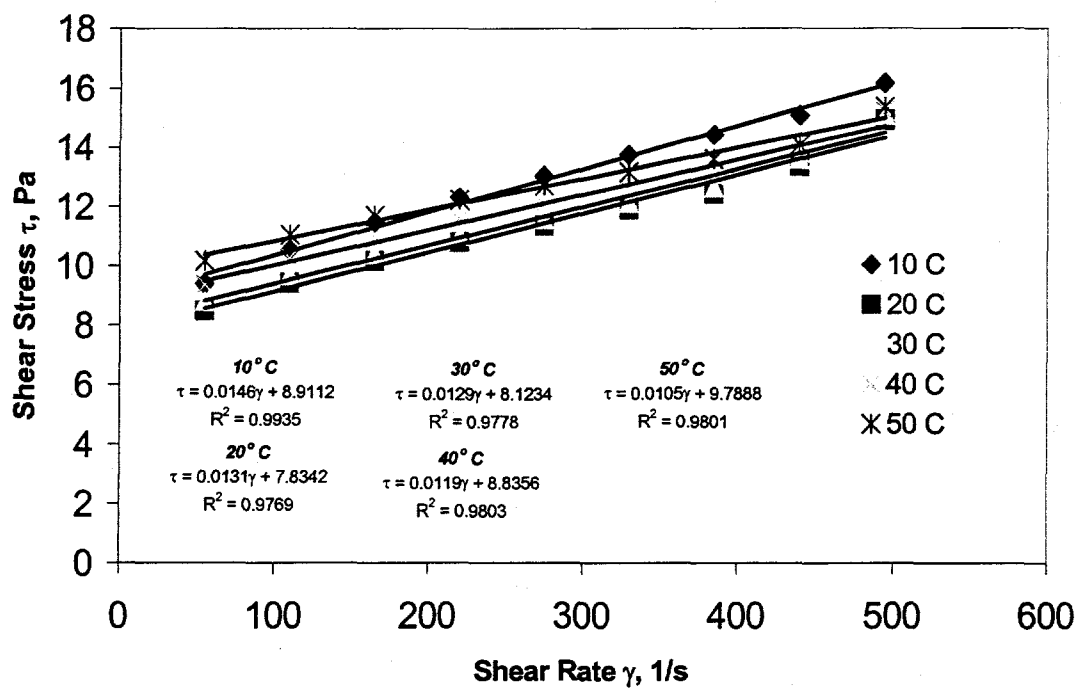


Figure 1. Effect of temperature on the rheology of a Hanford simulant.

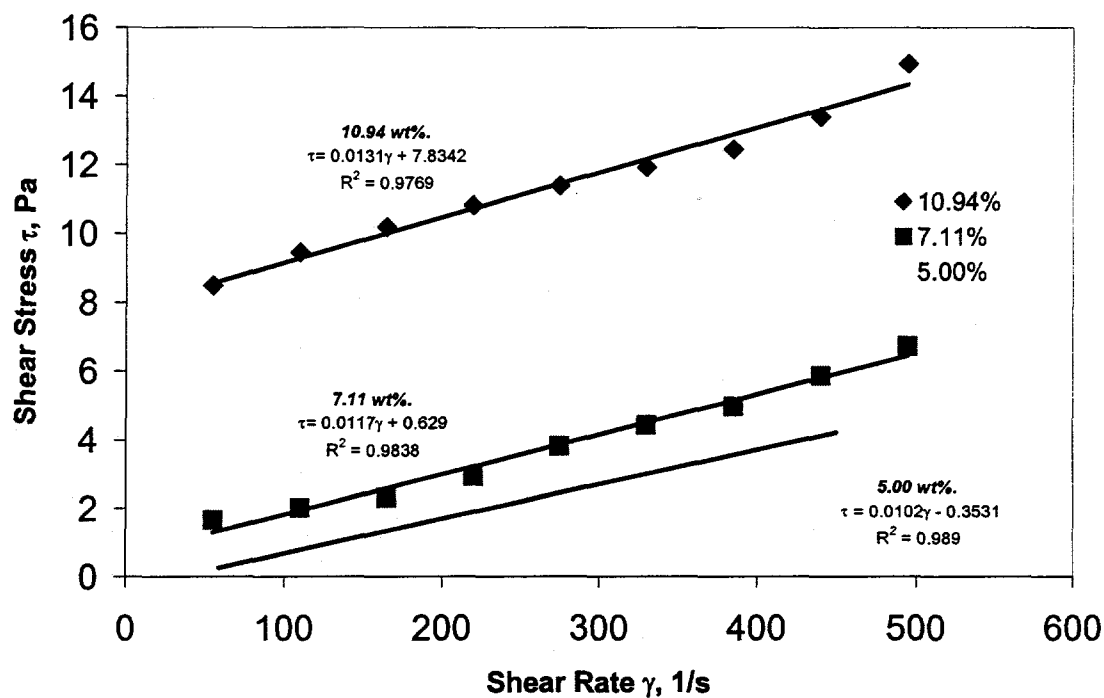


Figure 2. Effect of concentration on the rheology of a Hanford simulant.

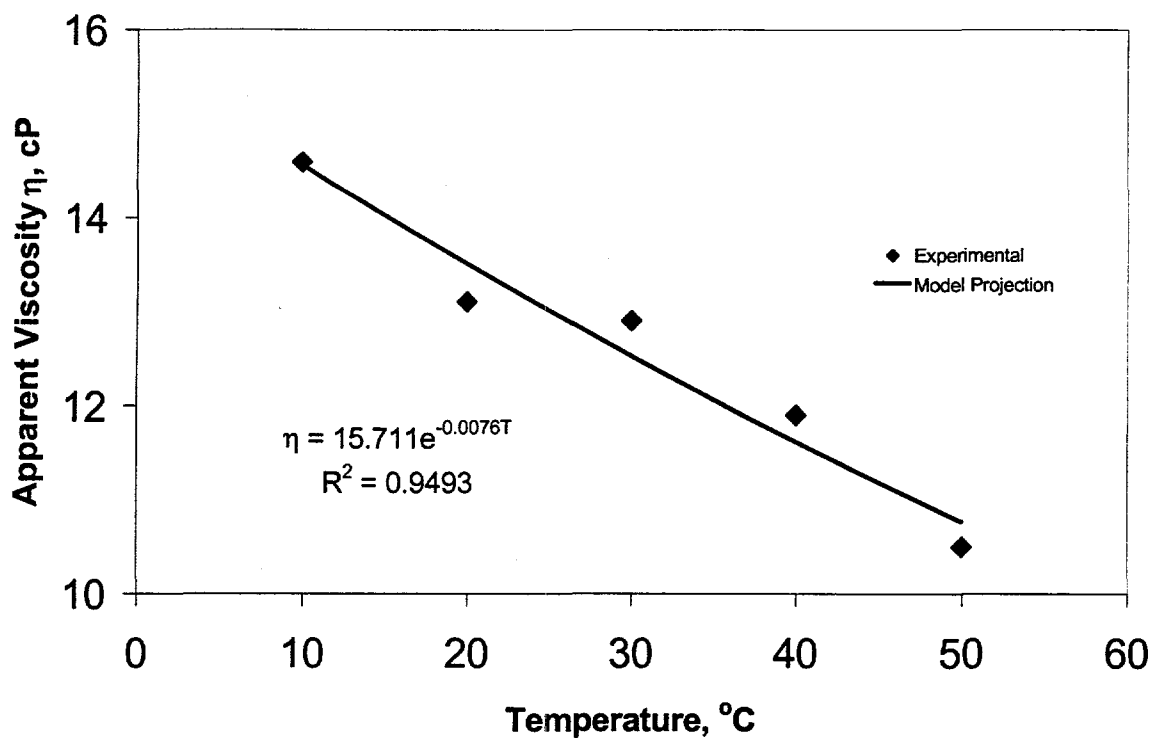


Figure 3. Effect of temperature on the apparent viscosity of a Hanford simulant.

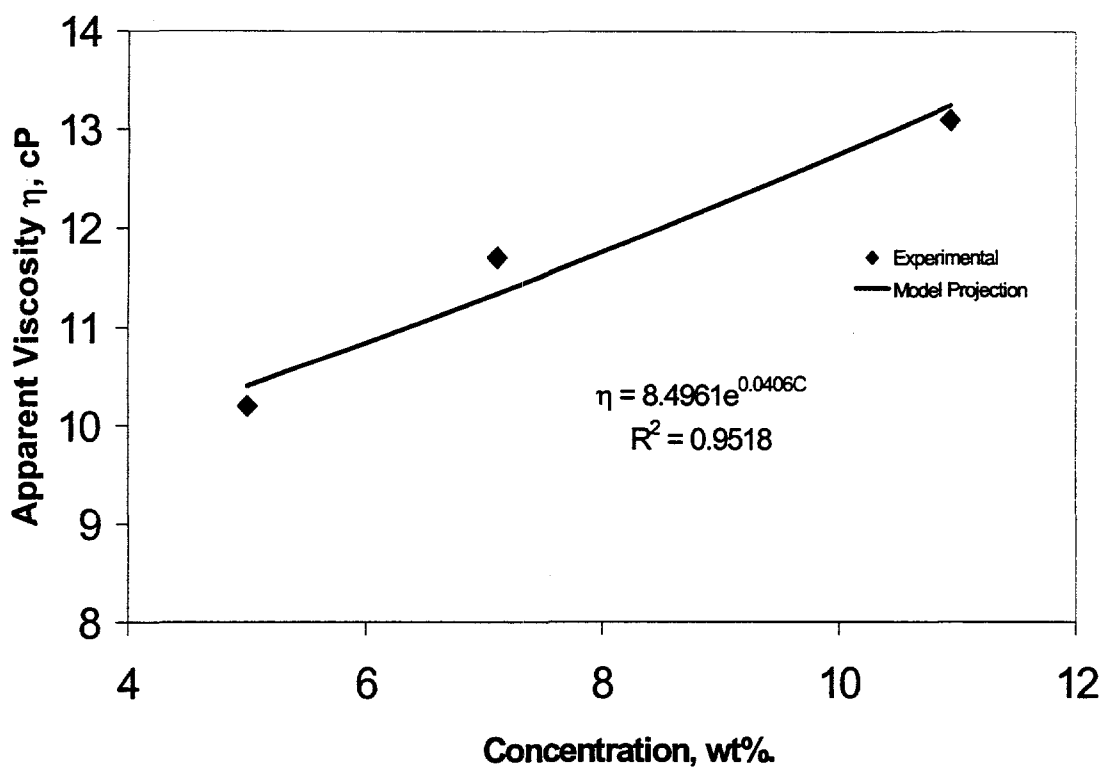


Figure 4. Effect of concentration on the apparent viscosity of a Hanford simulant.

### **Assessment of current status and issues**

Since no literature is presently available for characterization of multi-specie slurries, several new parameters need to be analyzed. Therefore, such characterization will be very useful because the slurries being tested are close simulants of the actual nuclear waste slurry used by DOE.

### **Plan for the next two months**

- Continue crystallization tests in cold water bath.
- Perform thermal tests with the thermal analyzer (TA). The purpose of these tests is to evaluate the material behavior at different temperatures, especially those temperatures where crystallization may occur.
- Perform slurry chracterization for plugging-and-unplugging samples. These samples will be obtained as soon as the horizontal pipeline loop tests start in the near future.

### **FIU-HCET collaborators**

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## Plugging and Unplugging of Waste Transfer Pipelines

Project Number: HCET-1998-T005

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### 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 the pipe plugging caused by settling, pipe plugging and unplugging phenomena induced by gelling will also be studied by both experimental and theoretical methods. Some 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
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
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.
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.
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.
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 physical components for the SRS slurry simulant have been identified.
- The data acquisition system for the slurry transport experiments was tested and inspected.
- The contractor for large-scale test bed #2 has been identified. The construction of test bed #2 will resume in the week of May 17, 1999.
- The CBD for large-scale demonstration test bed has been prepared by Dr. Fadel F. Erain at PNNL, and it will be discussed in detail during their planned visit to FIU-HCET on May 17-18, 1999.

## Accomplishments and technical progress to date

### Part 1 Flow Loop Research on Pipeline Plugging and Unplugging

#### 1.1 The slurry simulants

Although information about the chemical components for SRS and Hanford slurries is published in analytical reports, their physical components are not well known, especially for the Hanford slurry. Table 1 shows the SRS slurry simulant's physical components currently used by FIU-HCET for the slurry transport experiments. In Table 2 are some of the physical components found in a research article in which SRS slurry is investigated. Based on the discussion with PNNL, the components in Table 2 will be used at FIU-HCET's flow loop for future slurry transport experiments. As only five components will be used in the experiments, their actual weight concentration will be adjusted to make sure the sum of all individual weight concentrations will be 100%.

The cases to be run in the flow loop of horizontal pipeline have been determined. Table 3 is the matrix of slurry transport experiments with SRS slurry and Hanford slurry. In order to obtain more precise data sets, more experimental cases will be inserted into the matrix in the range of low flow rate.

The data acquisition system with LabView was tested and inspected. The software works well for the slurry transport experiments. The data acquisition system can still be used to obtain the required level of confidence in the data about pressure, pressure drop, and flow rate. To further improve the level of signal quality, the data acquisition system will be upgraded.

**Table 1.**  
**Weight concentration of SRS physical components currently used**

Chemical Component	Weight Concentration
Fe <sub>2</sub> O <sub>3</sub>	33.0%
Al <sub>2</sub> O <sub>3</sub>	11.0%
CaCO <sub>3</sub>	2.85%
MnO <sub>2</sub>	3.15%
SiO <sub>2</sub>	50.0%

**Table 2.**  
**Weight concentration of SRS physical components found in literature<sup>†</sup>**

Chemical Component	Weight Concentration
Fe <sub>2</sub> O <sub>3</sub>	36.7%
Al <sub>2</sub> O <sub>3</sub>	16.7%
CaCO <sub>3</sub>	6.10%
MnO <sub>2</sub>	10.8%
SiO <sub>2</sub>	10.0%

**Table 3.**  
**Matrix of Slurry Transport Experiments**

Water		Velocity (m/s)									
		4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.3	0.2
S R S	10wt %	3.0	2.75	2.5	2.25	2.0	1.75	1.5	1.25	1.0	0.75
	20wt %	3.0	2.75	2.5	2.25	2.0	1.75	1.5	1.25	1.0	0.75
	30wt %	3.0	2.75	2.5	2.25	2.0	1.75	1.5	1.25	1.0	0.75
H A N F O R D	10wt %	3.0	2.75	2.5	2.25	2.0	1.75	1.5	1.25	1.0	0.75
	20wt %	3.0	2.75	2.5	2.25	2.0	1.75	1.5	1.25	1.0	0.75
	30wt %	3.0	2.75	2.5	2.25	2.0	1.75	1.5	1.25	1.0	0.75

Note: 10wt% corresponds to 2.54% volume concentration.

20wt% corresponds to 7.0% volume concentration.

30wt% corresponds to 11.0% volume concentration.

<sup>†</sup> Chapman, C.C., Pope, J.M., and Barnes, S.M., "Electric melting of nuclear waste glasses", *Journal of non-crystalline solids*, 86, 226-240, Elsevier Science Publisher, Amsterdam, 1986.

## Part 2 Large-Scale Industrial Equipment Test Bed of Plug Locating and Unplugging Technologies

### 2.1 The design of test beds

FIU-HCET has been designing and will construct a large-scale industrial equipment test bed for plug locating and unplugging technologies. Three test beds have been proposed based on the five original cases provided in the document of "Functions and Requirements for Blockage Locating and Removal Methods in Waste Transfer Lines", which was prepared by SRS. The designs of the three large-scale test beds have been reviewed and finalized by Dr. Fadel F. Erian of PNNL, Peter Gibbons of NHC, and the FIU-HCET technical staff including Project/Program Manager and Senior Engineers.

### 2.2 The construction of the test beds

Figure 1 shows the space allocation approved by the space committee of FIU for the construction of the three test beds adjacent to the EAS building that houses FIU-HCET. It describes how the three test beds will be located with respect to each other. Each test bed will occupy its own space in order to reserve the accessibility for construction.

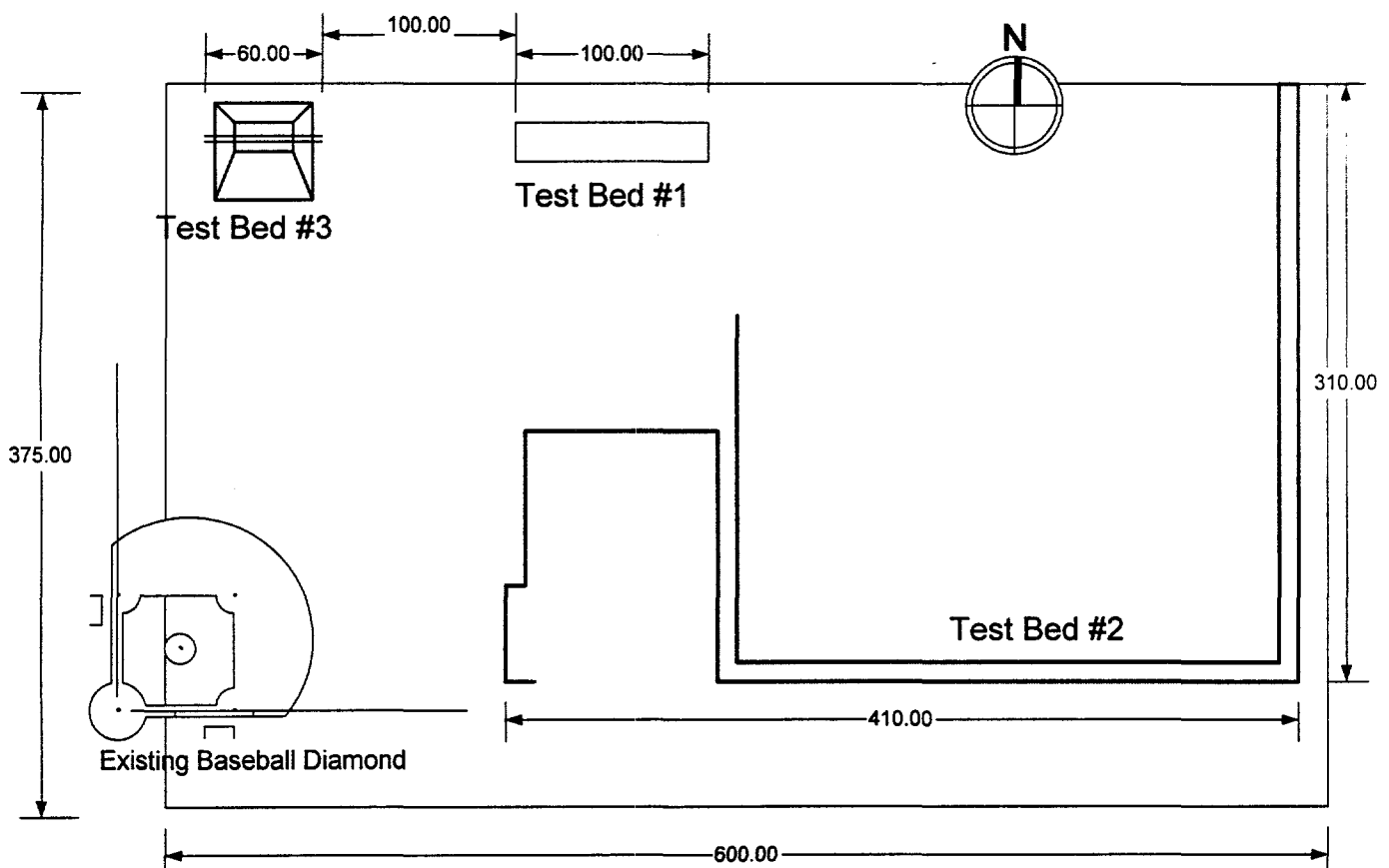


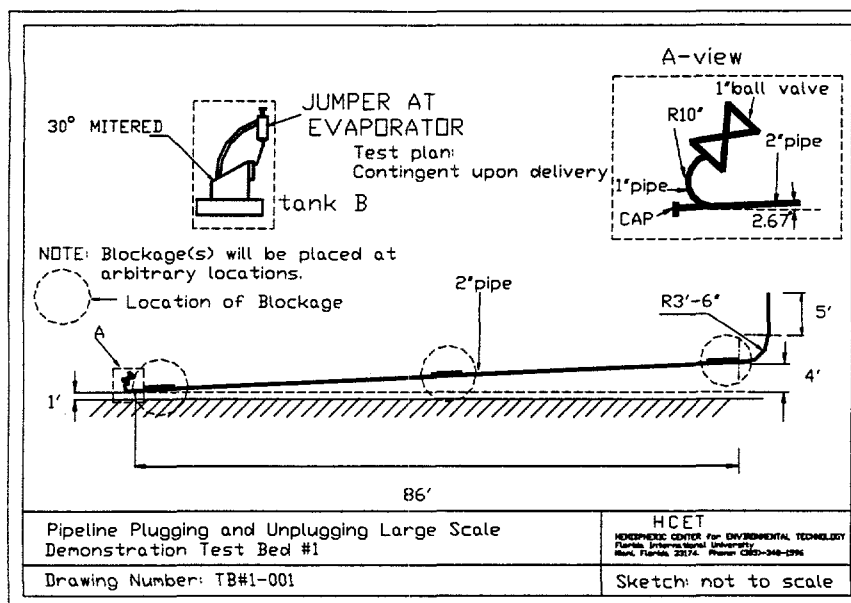
Figure 1. Space allocation for three large-scale test beds.



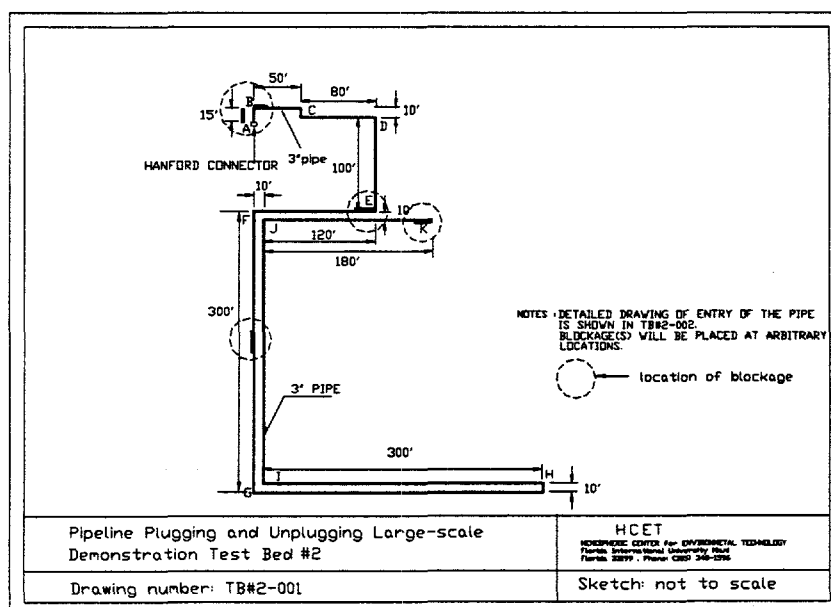
A test plan has been under preparation and will be discussed during the week of May 17, 1999. Table 4 is the description of the blockages which will be considered as a part of the sample test plan. Figure 2 through Figure 4 describe the possible proposed blockage locations for the three test beds. Actual locations of the blockages will not be revealed prior to demonstration in order to test the technology.

**Table 4.**  
**Blockage description of large-scale test bed**

Test Bed	Blockage Material	Location	Preparation
# 1	(1) Concentrated (70-80%) SRS & Hanford slurry simulants used by the current loop test at FIU-HCET (2) above + Bentonite (3) Gel with no solid particles as suggested by Dr. Erian (4) Wax	Blockages will be placed in the middle of the pipe and also at two locations before the curves. (See Figure 2.)	All the blockages will be prepared on site or in the lab. Strength of the blockage should be tested using tension (or pressure) gage. For all the test beds, each pipe section is made for a length of 20 ft. For special cases, pipes will be ordered for the desired length (10 ft. to 15 ft.) Blockage can be pushed into the pipe by a metal thread with rubber bumper. Blockage can also be placed by taking the pipelines apart and placing another pipe section with a blockage in place.
# 2	Same as above. (Blockage length may vary.)	It depends on the capability of the blockage removal apparatus, however, initial planning is made at following locations: section B-C, section E-F, section F-G (or section I-J), and section J-K, and a separate piece next to the entry section of the pipe. (See Figure 3.)	Same as above.
# 3	Same as above.	Blockages will be placed in the middle and at the end of the pipeline for both cases; however, the location and length may vary for the jacketed pipe. (Once determined, location of the blockage in the jacketed pipe will be fixed – See Figure 4.)	Same as above.



**Figure 2. Schematic diagram of large-scale test bed #1 with sample blockage locations.**



**Figure 3. Schematic diagram of large-scale test bed #2 with sample blockage locations.**

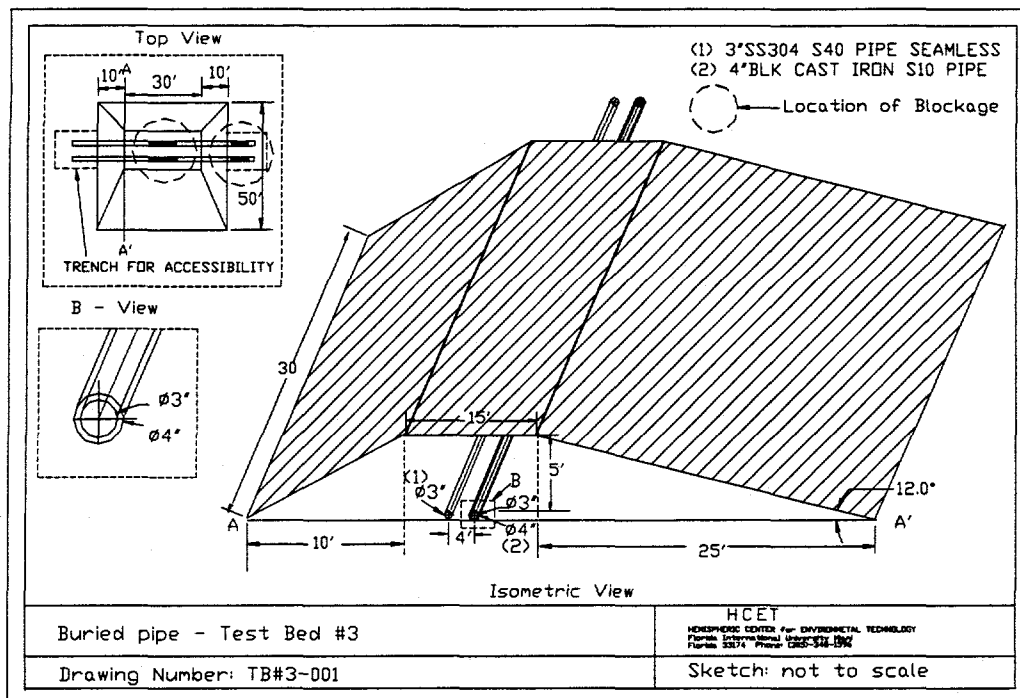


Figure 4. Schematic diagram of large-scale test bed #3 with sample blockage locations.

Sample blockages using concentrated (70-80%) SRS and Hanford slurry simulants have been prepared in the FIU-HCET lab. Strength of the blockages will be tested using tension or pressure gage, and they will be evaluated for its purpose. Bentonite could be added to the simulants for more firmness.

Wax has been considered as an additional material for the blockage. Blocks of wax have been ordered, and they shall be tested as a sample blockage upon arrival.

### Assessment of current status and issues

The progress will also be dependent on the support and approval of Dr. Fadel F. Erian at PNNL and Peter Gibbons at DOE sites. As PNNL, NHC, and FIU-HCET have weekly conference calls, the project's progress will basically depend on the discussions and action items identified during the visit and the conference calls.

As of this writing, almost all milestones have been completed on schedule. Due to extra or unplanned work on tank mixing and pipeline sampling, the slurry transport experiments currently have a very tight timeframe.

During the visit of Pete Gibbons (NHC) and Dr. Fadel Erian (PNNL) in the week of May 17, 1999, it will be decided when all the slurry transport tests for both horizontal and inclined pipes will be completed.

### **Plans for the Next Two Months**

- The modified flow loop will be calibrated using water to identify the loop performance.
- After the calibration test with water, transport experiments with SRS slurry simulant will be tested in the loop with horizontal pipelines.
- A flow loop with inclined pipelines that simulate the real pipeline layout at DOE sites will be planned and designed.
- Construction of large-scale test bed #2 (horizontal pipeline) will be completed in June 1999.
- CBD announcement for the test beds will be finalized in order to solicit the technology application.
- Potential candidate technologies for pipe plugging inspection and removal will be identified.

### **FIU-HCET collaborators**

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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 April 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 Tanks 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 on schedule. 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	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
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
T003-M5	Final report	Draft and distribute the Final report on results of the project delivered to DOE	Due Date: 10/31/99

### **Significant events for this reporting period**

- Information regarding the scope of work for FY00 was exchanged with DOE contacts, Dr. Bill Holtzcheiter and other technical personnel at Savannah River Technology Center.
- The project manager attended a waste melter review meeting to gather and exchange information with others in the field on melter development status and future works for the second generation melter technologies.

### **Accomplishments and technical progress to date**

- Two pulsating flow experiments were completed. Wicking was observed in both the cases. Data is being analyzed. Video of the glass pouring experiments will be placed on the FIU-HCET website and also be provided to SRTC.
- Progress has been hampered by two shutdowns during the reporting period. Breakage of Zone 3 element caused the first shutdown and breakage of Zone 4 element caused the second shutdown. The second shutdown occurred during a pulsating flow experiment. Temperature at the end of the pour spout dropped sharply from 1000 °C to 700 °C. This resulted in glass buildup and solidification in the pour spout (Figure 1). The melter will be taken out of the furnace, and the pour spout will be cleaned using a sand blaster before restarting the experiments.
- The insert for studying the effect of crud deposits behind the knife edge has been fabricated and shown in Figure 2. The insert will be installed behind the knife edge once the pulsating flow experiments are complete.
- Work is in progress for compiling scope of work for FY00. SRTC has been contacted for their input. A part of the task at FIU-HCET will be to fabricate a new and improved pour spout complete with a knife edge and a horizontal section for FY00. This will be imperative in view of experiments planned toward the end of the current fiscal year that call for methodical degradation of the knife edge and the pour spout.
- Glass pour samples along with the virgin glass have been shipped to SRTC for Inductively Coupled Plasma (ICP) analysis. ICP analysis will help elucidate the difference in glass composition from repeated pouring as compared to glass that has yet to be poured. XRD analysis completed at FIU-HCET during the last reporting period showed Cr buildup on the side of glass in direct contact with the stainless steel collection bin. Also, repeated melting and cooling must have resulted in lowering the concentration of the volatile fraction.

### **Assessment of current status and issues**

The project is on schedule as per the revised PTP. However, due to plugging it may fall behind schedule by 15 days by the end of next reporting period.

### Plans for the next two months

Experiments with the fabricated insert will be performed to study the effect of crud deposits behind the knife edge. After these experiments' methodical destruction, the knife edge will be carried out to study the effect of erosion/corrosion on the glass pouring behavior.



Figure 1. Plugging of pour spout due to failure of heater elements at the end of the pour spout during experiment.

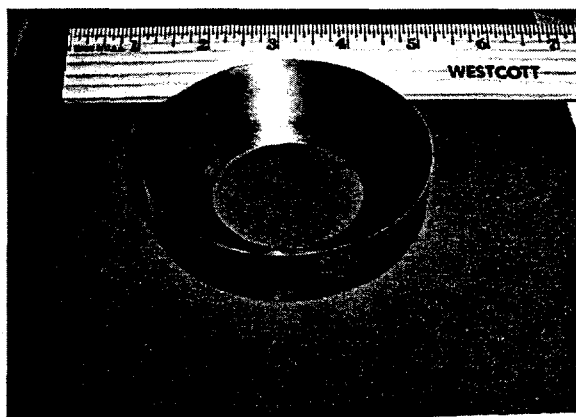


Figure 2. Insert for studying the effect of crud deposits behind the knife edge on the glass pouring behavior.

### FIU-HCET collaborators

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### III. CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY

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#### MONTHLY PROGRESS REPORT

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FIU-HCET CMST Program Manager	Paul Szerszen
Focus Area Technical Lead	Charles Nalezny
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

The accurate characterization of contaminants is a critical task during several different phases of deactivation and decommissioning (D&D) operations. This project focuses directly on in-process characterization. Present characterization technologies typically require the cessation of decontamination activities, while the contamination remaining is assessed. This usually requires the decontamination activity to cease awaiting a separate radiological survey.

The specific aims of this subtask include the following:

- Find in-process characterization methods, especially in the area of radiation sensor systems that can be integrated with a suitable decontamination technology in order to combine decontamination and characterization activities.
- Include in the technology integration data collection, storage, and transmission components on the instrument for remote monitoring and computer downloading functions, allowing for 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 that a minimum amount of material could be removed with a commensurate minimum production of 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. This integration of technologies will yield an improved instrument that may be continuously operated, removing contaminated materials and simultaneously assessing the removal progress.

### Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C005-M1	Operational prototype	Prototype functional	Due 3/3/99 *Delayed until 6/25/99
C005-M2	Demonstration at FIU-HCET	Documented demonstration of prototype	Due 5/30/99 *Delayed until 7/30/99
C005-M3	Deployment	Initiate deployment at DOE site	Due 8/28/99
C005-M4	Year-end report	Submission	Due 9/30/99

\* As per FY99 PTP and Assessment of Current Status following, a design and implementation review required revisions to design and procurement. Milestone 1 is expected to be delayed until no later than June 25, 1999, and milestone 2 until no later than July 30, 1999.

### **Significant events for this reporting period**

- Presentation for DDFA midyear review meeting completed.
- Detailed mechanical design of surface characterization detector carriers and support structure is complete, and detailed formal drawings for production are underway.
- Design of effluent characterization detector carrier including tooling for generation of disposable tube section complete.
- Detail control electronics design is in progress.

### **Accomplishments and technical progress to date**

- Detailed component design of the detector mechanical arrangements completed.
  - 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.
- Pursuit of an applicable commercial 3D position-determining system while continuing preliminary design of a proprietary system:
  - Combination angulation/range relational geometry
  - Mixed source technologies
  - Single stationary station required
  - No RF links necessary.
- Specific contacts have been established with representatives directly involved with DOE site demonstration and deployment to ascertain a scheduled demonstration.

### **Assessment of current status and issues**

- Review of conceptual design and proposed implementation, as required by FY99 PTP, revealed discrepancies between design and specified equipment with original scope and plan. A revised

design and requisition is in process with any additional schedule time being absorbed within the previous intervals between tasks. Minimal disruption of the initial milestone and task procession will result, and the deployment should take place as scheduled.

- Parallel projects are providing synergism and effectively accelerating the rate of progress. One of these projects, High Productivity Vacuum Blasting System, includes real-time operator feedback of the efficacy of the decontamination process. Another is Integrated Vertical and Overhead Decontamination and includes real-time characterization of vertical and overhead surfaces during decontamination. The function and implementation of the three sensor systems will by intent include interchangeable processes and components.
- The primary decontamination machine for the project prototype is available at FIU-HCET and required modification is underway.
- Demonstration prototype detectors, interface electronics, display components, and communication modules have been selected.
- Calibration electronics to accompany the detectors were selected.
- Assembly of characterization components has begun.
- Detailed mechanical, electrical, and control software design is nearly ready for FIU-HCET QA review.

### **Plans for the next two months**

- Continue design/development activities on position determination system.
- Complete mechanical design and fabrication of mechanical components to integrate sensors and indicators to decon machine.
- Complete electronic design including control software.
- Assemble all components into prototype assembly.
- Refine component test and calibration plan.
- Test prototype assembly at FIU-HCET under varied conditions.
- Continue negotiations for DOE facility deployment.
- Continue development of an FIU-HCET demonstration plan.
- Perform and document design reviews to meet FIU-HCET QA standards specified in the FIU-HCET QA Program Manual. Scheduled for design review committee at end of May.

### **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 of the three-year project. Many DOE sites -- Albuquerque Operations Office, Chicago Operations Office, Idaho Operations Office, Ohio Operations Office, Oak Ridge Operations Office, and Savannah Operations Office -- require remote surveillance of their facilities such as 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, the 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 is capable of collecting data from a DOE site (remote station) and transmitting the data to a central location (base station).

Following are the objectives of the project:

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

### Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C006-M1	Testing at FIU-HCET	Components and integrated unit tested at FIU-HCET	Due: 1/11/99 *. Rescheduled for 7/31/99
C006-M2	Testing at a DOE site	Tested at a DOE site for site-specific parameters	Due: 4/16/99 *. Rescheduled for 8/30/99

Milestone No.	Milestone Description	Completion Criteria	Status
C006-M3	System Improvement	Modifications completed.	Due: 5/17/99 * Rescheduled for 10/30/99
C006-M4	Performance evaluation	Performance evaluated under ambient environmental conditions	Due: 8/27/99 * Rescheduled for FY00
C006-M5	Deployment plan	DOE site deployment plan created.	Due: 10/1/99
C006-M6	Commercialization plan	Industrial partner interested in commercialization of the system identified	Due: 10/30/99
C006-M7	Year-end report	Report completion	Due: 11/30/99

\* In FY98 the project has had difficulty securing site user support that was originally planned to be the driver for technology development and integration. During FY99 this approach has been reversed as users expressed an interest in reviewing an a-priori design and then ordering customized options for deployment at their sites. The project has been redirected accordingly. Additional explanation is provided below in *Assessment of current status and issues*.

### Significant events for this reporting period

- Presentation for DDFA midyear review meeting is complete.

### Accomplishments and technical progress to date

- Commercial sources of remote power maintenance subsystems investigated.
- 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

- Project has been reviewed, and redirection has been created enabling convergence with initial scheduled status within fourth quarter of the fiscal year.
- FY98 tasks incomplete and in progress for execution within FY99 include
  - Selection of suitable technology
  - Assessment of cost-saving and safety improvements expected from the development of the monitoring system
  - Engineering review of the selected remote surveillance technology
  - Procurement of sensors, components, and measurement units
  - System integration.
- Selection and procurement of sensor components is underway.
- Communication hardware and protocol structure is being engineered.
- Incorporation of/with existing commercial intermittent remote data sampling systems investigated.

### **Plans for the next two months**

- Continue detailed electronic and mechanical design of sensing modules.
- Further purchase of system components and test at FIU-HCET.
- Continue to provide FIU-HCET's site liaisons 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 plants 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 be able to measure such contamination and classify it as below or above the permissible levels. The permissible levels of alpha contamination are low. The DOE requires low-cost, reliable methods for measuring low levels of alpha contamination. Current methods for measurement of low levels of alpha contamination in a large facility are expensive and expose survey personnel to radiation. The goal of this two-year project:

- Develop a system for low-cost, low exposure and reliable measurement of surface alpha contamination and to deploy it at a DOE site. This involves the use of commercially available electret ion chambers and their calibration using reference alpha sources.
- Determine times required for measurement of an 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	<p>Scheduled for completion by 12/15/98.</p> <ol style="list-style-type: none"> <li>1. Measurements using EICs and baseline technology (alpha probe) completed at a test-bed at FIU-HCET. Cost comparison performed.</li> <li>2. Comparative assessment with baseline technology performed.</li> </ol> <p>Completed on 2/26/99. The reason for delay addressed in section "Assessment of current status and issues" of this report.</p>

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	Originally scheduled for completion by 2/8/99. Delayed due to slow response from DOE site users. 1. HCET will support DDFA for LSDDP at Savannah River, including evaluation of EICs and preparation of the Innovative Technical Summary Report (ITSR). LSDDP for EIC is scheduled for end of May to mid-June 1999. 2. Deployment plan for Oak Ridge reviewed on April 17, 1999, and suggested changes were incorporated. Pending site approval of the plan, tentative completion date of May 17 is likely to be moved to July 1999.
C008-M3	Deployment of EICs at DRS, Oak Ridge (K-1420) for characterization of floor. Main source of contamination: depleted and enriched uranium.	Deployment of the EIC system at one or more DOE sites	Scheduled for completion by 5/17/99. Will be delayed pending approval of the test plan by DRS, Oak Ridge.
C008-M4	Information flow- HCET development of work and controlling documents	Transmittal of procedures, instructions, manuals, and information on measuring contaminants on DOE sites	Scheduled for completion before 10/30/99
C008-M5	Final report	Report completed and issued	Scheduled for completion by 11/30/99

### Significant events for this reporting period

- Coordination activities to support DDFA with the SRS LSDDP continued. An abstract entitled "Evaluation of electret ion chambers for measurement of surface alpha contamination in preparation for SRS-LSDDP, coauthored by FIU-HCET and SRS-LSDDP, which was submitted to the American Nuclear Society's 2<sup>nd</sup> Topical Meeting on Decontamination, Decommissioning, and Reutilization of Commercial and Government Facilities, Knoxville, Tennessee, was accepted.
- FIU-HCET test plan for deployment of EICs at Decon Recovery Systems (DRS), Oak Ridge, was reviewed by FIU-HCET liaison at Oak Ridge. Necessary suggested changes were incorporated.
- Preliminary measurements indicate that, in appropriate configuration, EIC could be used for spectral characterization.

### **Accomplishments and technical progress to date**

- From FIU-HCET measurements of response of electret ion chamber at different electret voltages for calibration sources of different alpha energies, a correlation between response, mid-point voltage, and energy was developed. Using this correlation and alpha contamination measurements made with EIC and baseline technology, it may now be possible to determine alpha particle energy and hence identification of the radionuclide. Earlier, EIC was considered as only a charge-integrating device without spectrometric capability. This is a potentially significant development accomplished by FIU-HCET. It could appreciably lower the current cost of spectral characterization.
- Discussions were continued with the Fernald representative for demonstration of EICs at Fernald, Ohio.

### **Assessment of current status and issues**

- The system has been calibrated and is ready for demonstration and deployment. FIU-HCET is working with representatives from Fernald, Oak Ridge, Rocky Flats, and Savannah River for demonstration and deployment of the technology. Among these sites, LSDDP is scheduled at SRS. FIU-HCET will continue to support DDFA in SRS LSDDP and in preparation of ITSR. Test plan for DRS, Oak Ridge, has been reviewed by FIU-HCET liaison at Oak Ridge and will be submitted to DRS for approval.
- Milestone 1 was completed on February 26, 1999. Milestone 2 is moving forward because user involvement has occurred and DDFA has committed to using EICs at SRS LSDDP. However, the final step to completion is being delayed due to still slow user response. Based on recent progress and existing commitments, pending approval of DRS test plan, Milestone 3 will be delayed. All project objectives planned for FY99 will be met during the FY but with schedule slippage. The user response continues to be a moving target.
- It is possible that FIU-HCET found an important extension of the EIC technical performance in developing a spectral measurement methodology.

### **Plans for the next two months**

- Complete approval of the test plan for floor characterization at K-1420, DRS, Oak Ridge.
- Get commitment from user on actual date of deployment.
- Continue supporting the SRS-LSDDP and prepare for demonstration.
- Write full paper on "Evaluation of electret ion chambers for measurement of surface alpha contamination in preparation for SRS-LSDDP" for American Nuclear Society's September 1999 meeting.
- Continue to refine spectral measurement methodology.

**FIU-HCET collaborator**

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

## Review of Current Characterization and Monitoring Practices at DOE Sites

Project Number: HCET-1999-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 project sponsors. 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.	On schedule to be completed by 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	To be completed by 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 by 11/30/99

### **Significant events for this reporting period**

- Completed milestone 3 on shedule.

### **Accomplishments and technical progress to date**

- Completed milestone 3, which is the description of each baseline technology and its performance data (in what areas is it insufficient and in what areas is it sufficient to meet the STCG technical needs). Over 30 technologies have been identified and described.
- Continued searching and reviewing various documents (Innovative Technology Summary Reports, Environmental Technology Verification Reports, vendor literature, websites, and others) for cost and performance information for both Oak Ridge and Hanford current practices.
- Continued developing and designing the database.

### **Assessment of current status and issues**

This project is proceeding and no scheduling deadlines have been missed. Milestones 1, 2, and 3 have been completed. Currently, no impediments are known that could delay the on-schedule completion of the milestones.

### **Plans for the next two months**

- Continue obtaining cost data for the baseline technologies by reviewing documents and contacting vendors and site personnel.
- Continue work on developing database.
- Convert database from Access to SQL.

### **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 CMST-CP with the final steps of this process. In short, it will help take the 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 with the idea of 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 D&D coordinator.

To assist CMST-CP, FIU-HCET will provide the following:

- Examine the technology development activities and work together 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.
- Once an agreement has been reached, work with the customer to refine the demonstration/deployment process and schedule. 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	Rescheduled for 7/19/99
C010-M4	Deployment	Site commitment to deploy a selected CMST-CP technology.	Due 10/30/99
C010-M5	Marketing	Site commitment to deploy	Due 10/30/99

### **Significant events for this reporting period**

- Milestone 3 was rescheduled to 7/19/99 based on discussions with the FIU-HCET manager of the field office at Oak Ridge. The previous completion date (3/31/99) did not allow the amount of time necessary (estimated at 3 months) to arrange interviews with site managers and to obtain decisions from them.

### **Accomplishments and technical progress to date**

- Efforts to demonstrate the technology at Fernald were discontinued. Contamination at Fernald includes both U(IV) and U(VI). However, since Laser-Induced Fluorescence Imaging (LIFI) can detect only U(VI), site managers were reluctant to demonstrate or deploy LIFI.
- Continued discussions with the Principal Investigator (PI), project engineer from Special Technologies Laboratory (STL), of LIFI concerning performance data, history of previous demonstrations, technical specifications. This information will be sent to FIU-HCET.
- Continued discussions with the FIU-HCET manager of the field office at Oak Ridge concerning demonstration of LIFI at Oak Ridge. Based on his recommendations, a proposal to demonstrate LIFI at Oak Ridge was written by FIU-HCET and reviewed by the PI at STL.

### **Assessment of current status and issues**

Due to funding cuts from CMST-CP, the project scope has been 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 and 2 have been completed. Milestone 3 has been rescheduled.

### **Plans for the next two months**

- Discuss the demonstration and deployment of LIFI at Oak Ridge in a conference call with personnel from STL, HCET, CMST-CP, DDFA, and Oak Ridge STCG.
- Visit STL for LIFI technology training.
- Obtain and review information from the PI of the LIFI project concerning technical specifications and performance data. This information will be used to write a brochure describing the technology.
- Discuss with site managers at Oak Ridge and the FIU-HCET personnel at the field office at Oak Ridge about demonstrating and deploying LIFI at Oak Ridge.

### **FIU-HCET collaborator**

Hans Weger, (305) 348-6620



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

Project Number: HCET-1998-C011

### Project objectives

The 2006 plan sets an ambitious agenda for the DOE, Office of Environmental Management's (DOE-EM) cleanup work. In the context of Accelerating Cleanup: Focus on 2006, closure refers to the completion of area- or facility-specific cleanup subtasks. 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, though certain basic cost-based land use assumptions have been determined. Little or no EM land will be remediated to "residential use" levels; most will be remediated to "industrial use" levels with access restrictions, while some areas will be closed off through containment.

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. In the nearby areas, groundwater and soils will need to be monitored per monitoring 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 the Characterization, Monitoring, and Sensor Technology Crosscutting Program (CMST-CP) with information to guide its 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.	On schedule to be completed by 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.	On schedule to be completed by 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	To be completed by 10/31/99

### **Significant events for this reporting period**

- Completed review of all available Rocky Flat's documents concerning post-closure monitoring requirements, except for regulatory concerns.

### **Accomplishments and technical progress to date**

- Completed reviewing the Rocky Flat's *Integrated Monitoring Plan, Beyond Closure: Stewardship at Rocky Flats*, and other documents.
- Continued the identification of technologies, either available or being developed, that are capable of meeting post-closure needs of DOE sites.

### **Assessment of current status and issues**

This project is proceeding and no scheduling deadlines have been missed. Milestone 1 has been completed. Currently, no impediments are known that could delay the on-schedule completion of the milestones.

### **Plans for the next two months**

- Conclude the review of Rocky Flats (only regulatory concerns remain to be reviewed). A draft report will be prepared for Rocky Flats that will be included as a section in the Final Report.
- Initiate summarizing the common post-closure needs for the five DOE sites reviewed and the most pressing post-closure needs within EM.

### **FIU-HCET collaborator**

Hans Weger, (305) 348-6620

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#### IV. INTERNATIONAL TECHNOLOGY INTEGRATION (ITI)

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#### MONTHLY PROGRESS REPORT

**FIU-HCET Principal Investigator**  
**FIU-HCET International Coordinator**  
**Focus Area Technical Lead**  
**Program Officers**

**M.A. Ebadian**  
**Ana Ferreira**  
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## **Opportunities to Market U.S. Technologies Throughout the Western Hemisphere**

**Project Number: HCET 1996-I001**

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### **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.

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.

### ***D&D 2000***

FIU-HCET's international focus includes the coordination of conferences that promote investment in Latin America and the Caribbean by U.S. industry. To this end, this project involves participating in and hosting a number of prestigious international conferences, workshops, and seminars. To fulfill this task, FIU-HCET will co-host with the U.S. Department of Energy the Fourth USDOE International Decommissioning Symposium. The international program will be tasked with coordinating all international activities. This includes the development of international marketing material and customized proposals, targeting international organizations and industries, recruiting and appropriate marketing calls.

This project involves an open-ended, continuous process of information gathering with respect to Latin American and Caribbean environmental issues. This entails the development of contacts with individuals and institutions conducting research and work on issues of sustainability and environmental technology in the Americas. As part of this phase, a database containing information on firms, non-governmental organizations (NGOs), governmental institutions, and other participants in Latin America's environmental sector is being developed.

### ***Website***

FIU-HCET also hosts the Interactive Communication Website. The Website 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](http://www.americasenergy.org)).

## 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. Will discuss with DOE's Office of Policy, the possibility of incorporating database with energy web site. Ongoing.
I001-M2	Interactive Communication Web site: Maintain the Energy web site for the members/participants of the Western Hemisphere Energy Initiative	Identify funding mechanism for the support of the Interactive Communication Web site and prepare site for presentation at the IV Ministerial Meeting.	A tentative meeting was proposed by DOE's Office of Policy to discuss funding the Web site. The Office of Policy to support the Energy web site has allocated additional funding. Due date: 7/28/99 (Note: The due date has been assigned by DOE's Office of Policy.)
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)	Coordinate all international activities associated with this event.	Target international organizations and participants for the symposium. Date: TBD (NOTE: Waiting for DOE funding to be transferred to begin work.)
I001-M7	Open contract vehicle between the Office of Policy (PO) and FIU-HCET	Draft a Statement of Work and prepare a five-year budget plan.	Statement of Work has been completed. Working with the Budget Office at FIU-HCET to finalize the five-year budget plan. ITI Program Manager is reviewing first draft. Due Date: 6/28/99

## Significant events in this reporting period

- The preliminary funding meeting for website proposed by DOE for March 1999 has been postponed. DOE representative will determine new date. The date was changed due to Secretary's Richardson extensive travel schedule to Latin America. However, additional funding to support the website until a meeting can be scheduled has been identified by the Office of Policy (PO), DOE. PO has sent the paperwork to FETC.
- FIU-HCET personnel visited DOE headquarters in Washington, DC. The visit allowed the opportunity to solidify relationship with a number of program offices. In addition, it gave FIU-HCET the opportunity to meet with a number of DOE officials one-on-one to discuss the activities being pursued by FIU-HCET internationally.
- Invited and attended the inaugural seminar "Doing Business with Florida," sponsored by the Consulate General of the Argentine Republic. Met with Mrs. Ana Kessler, Secretary for Small and Medium-sized Enterprises of the Argentine Nation and Mrs. Elena Leticia Mikusinski de Rossi, Deputy Consul General of the Argentine Republic.
- The Interactive Communication Website information is being updated. The DOE press release announcing the IV Ministerial to be held in New Orleans has been posted as requested by DOE. In addition, a link to the website to register for the ministerial meeting has been formulated. Documentation will be posted as received from DOE personnel. In addition, FIU-HCET has been asked to play a role at this upcoming meeting. Both DOE and FIU-HCET personnel are working on defining roles.
- Working on identifying the international participants for the Fourth USDOE International Symposium, June 2000. This has included targeting international organizations and industries for a promotional purpose.
- FIU-HCET has been contacted by Universidad de la Marina Mercante (U de MM) in Argentina. They are interested in identifying collaborative work with FIU-HCET and in signing an MOU. FIU-HCET information has been sent and received confirmation of delivery. Received the U de MM information. In the process of reviewing.
- FIU-HCET has been in contact with TFC International Corporation, an Argentinean company based in Buenos Aires representing a local client who wants to work with a U.S. affiliate with expertise in sludge treatment. TFC is very interested in collaborating on a project.

## 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 send bi-weekly e-mails to DOE-EM on the Center's Latin American initiatives on behalf of DOE.
- FIU-HCET will continue to expand its scope of work to include other DOE program offices pursuing projects in Latin America and the Caribbean.

**FIU-HCET collaborator**

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