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HEMISPHERIC CENTER FOR ENVIRONMENTAL TECHNOLOGY

MONTHLY PROGRESS REPORT

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DISCLAIMER

SUMMARY

- The Princeton Plasma Physics Laboratory (PPPL) demonstration of the diamond wire cutting technology on the surrogate of the Tokamak Fusion Test Reactor (TFTR), Figure 1, was performed from August 23–September 3, 1999. The plated diamond wire, Figure 2, was successful in cutting through all components of the TFTR surrogate including stainless steel, inconel and graphite. The demonstration tested three different void fill materials (mortar with sand, Rheocell-15, and foam) and three cooling systems (water, air, and liquid nitrogen). The optimum combination was determined to be the use of the low-density concrete void fill, Rheocell-15 with an average density of 52 lbs/ft^3, using a water coolant. However, the liquid nitrogen performed better than expected with only minor problems and was considered to be a successful demonstration of the Bluegrass Concrete Cutting, Inc. proprietary liquid-nitrogen coolant system. Data from the demonstration is being calculated and a summary of the technology demonstration will be included in the October monthly report. An ITSR will be written comparing the diamond wire saw to the plasma arc (baseline) technology.

- The MTR Chemical Protective Suit, a proprietary new suit from Kimberly Clark, was evaluated from 8/9/99 to 8/12/99 at Beaver, WV. This particular suit was tested on subjects performing three different tasks: climbing through a horizontal confined space, vertical confined space (pit), and loading and unloading material using a wheel barrow. Multiple test subjects performed each task for 20 minutes each. Performance of the innovative suit was compared to two commonly used types of protective clothing. Vital statistics, including body temperature and heart rate, were continuously monitored and recorded by an authorized physician. A summary of the demonstration will be included in the October monthly report.

- Along with the MTR Chemical Protective Suit, the VitalSense™ Telemetric Monitoring System from Mini Mitter Co., Inc. was evaluated. A summary of the demonstration will be included in the October monthly report.

- A Kool-Vest from MicroClimate Systems, Inc. was evaluated during assessment at Beaver, WV from 8/16/99 to 8/17/99. The evaluation was performed in the same manner as the MTR Chemical Protective Suit described above. A summary of the demonstration will be included in the October monthly report.

- A brochure announcing the new Gateway to Environmental Technology (GET) website was produced by FIU-HCET and is being distributed to the D&D community by FETC-DDFA. The website provides links to the TIS and other decision support systems developed at FIU-HCET.

TABLE OF CONTENTS

I. DEACTIVATION AND DECOMMISSIONING (D&D) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
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Deactivation and Decommissioning Technology Assessment Program

Project Number: HCET-1996-D038

Project objectives

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

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

Major milestones

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

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M3	Test Plan for Waste Management Technologies Assessment Program	Waste Management Technology Test Plan Approved	Scheduled completion 6/30/99. On hold (see issues section below)
D038-M4	Access to the multimedia information system web-based user interface for dismantlement	Assignment of user name and passwords to DDFA provided distribution list.	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.	Started 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.	Started 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 construction of the hydraulic system for standing and supporting the tanks inside the testing facility is ongoing. The Scope of Work is in final internal review and is expected to be sent to prospective vendors by the end of September.
- Two companies are planning to submit proposals for demonstration of their masonry decontamination technologies. Demolition Technologies, a sister of Bluegrass Concrete Cutting, Inc., is proposing to demonstrate a diamond wire wall shaver manufactured by Marcrist Industries, Ltd. Decon Recovery Services is proposing a demonstration of their forklift mounted Nelco blasting unit for walls.
- The Princeton Plasma Physics Laboratory (PPPL) demonstration of the diamond wire cutting technology on the surrogate of the Tokamak Fusion Test Reactor (TFTR), Figure 1, was performed from August 23–September 3, 1999. The plated diamond wire, Figure 2, was successful in cutting through all components of the TFTR surrogate including stainless steel, inconel and graphite. The demonstration tested three different void fill materials (mortar with sand, Rheocell-15, and foam) and three cooling systems (water, air, and liquid nitrogen). The optimum combination was determined to be the use of the low-density concrete void fill, Rheocell-15 with an average density of 52 lbs/ft^3, using a water coolant. However, the liquid nitrogen performed better than expected with only minor problems and was considered to be a successful demonstration of the Bluegrass Concrete Cutting, Inc. proprietary liquid-nitrogen coolant system. Data from the demonstration is being calculated and a summary of the technology demonstration will be included in the October monthly report. An ITSR will be written comparing the diamond wire saw to the plasma arc (baseline) technology.

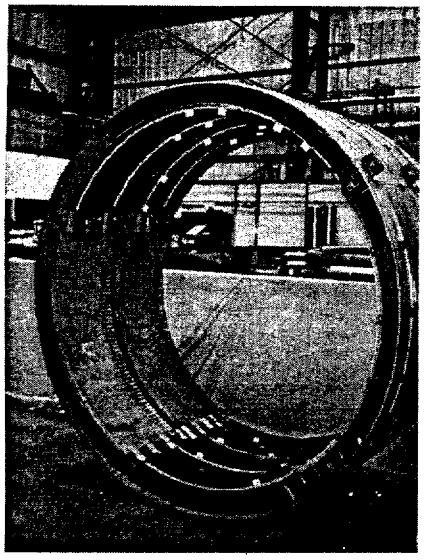

Figure 1. TFTR surrogate.

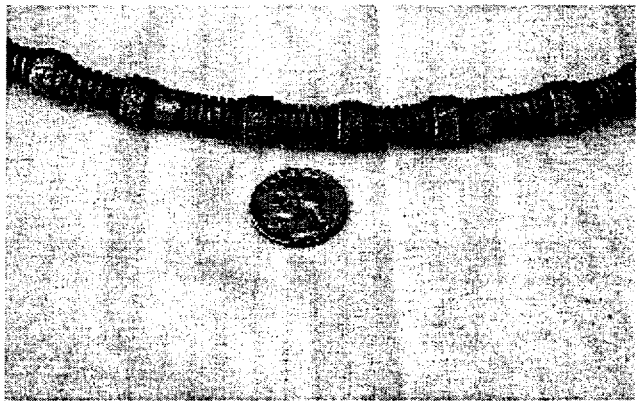

Figure 2. Plated diamond wire, 13mm.

- The MTR Chemical Protective Suit, a proprietary new suit from Kimberly Clark, was evaluated from 8/9/99 to 8/12/99 at Beaver, WV. This particular suit was tested on subjects performing three different tasks: climbing through a horizontal confined space, vertical confined space (pit), and loading and unloading material using a wheel barrow. Multiple test subjects performed each task for 20 minutes each. Performance of the innovative suit was compared to two commonly used types of protective clothing. Vital statistics, including body temperature and heart rate, were continuously monitored and recorded by an authorized physician. A summary of the demonstration will be included in the October monthly report.

- Along with the MTR Chemical Protective Suit, the VitalSense^{TM} Telemetric Monitoring System from Mini Mitter Co., Inc. was evaluated. A summary of the demonstration will be included in the October monthly report.

- A Kool-Vest from MicroClimate Systems, Inc. was evaluated during assessment at Beaver, WV from 8/16/99 to 8/17/99. The evaluation was performed in the same manner as the MTR Chemical Protective Suit described above. A summary of the demonstration will be included in the October monthly report.

- General Lasertronics Corporation has submitted a tentative date of October 19, 1999, for the demonstration of their recently modified Laser Coating Removal System.

Accomplishments and technical progress to date

- Under this grant project and earlier technology assessment projects funded from other sources, FIU-HCET assessed over 60 innovative/improved and baseline technologies for decontamination and equipment dismantlement under standardized, non-nuclear testing conditions. Many of the technologies identified for demonstration at FIU-HCET are selected to address the needs

identified in the EM-50 Needs Management System <http://EM-Needs.em.doe.gov/Home/>. As a result of these assessments, directly comparable performance data related to operations and maintenance, primary and secondary waste generation, and health and safety has been compiled. This data has been valuable in assessing whether a technology meets the screening criteria for those DDFA LSDDPs where these technologies are being considered, as well as assisting EM-40 project managers in making decisions on the deployment of innovative technologies. Technology assessment data is managed using a Microsoft Windows-based multimedia information system.

- In FY99, nine technologies have been evaluated to date in multiple applications giving a total of twelve demonstrations. The technologies evaluated include
  - Bartlett Robotic Climber - Bartlett Services, Inc.
  - Fourier Transform Profilometry – Mississippi State University, DIAL
  - ElectroStrip™ -- EMEC Consultants
  - Ice Blast with Chemical Softner – Ice Blast, Inc.
  - En-Vac Robot Blasting System – MHI Marine Engineering, Ltd.
  - VitalSense™ Telemetric Monitoring System - Mini Mitter Co., Inc.
  - MTR Chemical Protective Suit – Kimberly Clark
  - Kool-Vest – MicroClimate Systems, Inc.
  - Diamond wire saw – Bluegrass Concrete Cutting, Inc.

Assessment of current status and issues

The project schedule for the completion of 16 demonstrations is in jeopardy. To date, nine technologies have been assessed for a total of 12 demonstrations, and only one additional technology is scheduled or tentatively scheduled. However, two proposals to demonstrate decontamination technologies are expected next month. The delay in the preparation of the glove box and tank size reduction mockup facility, the lack of vendor interest in equipment dismantlement technology assessments, and the cancellation of two health & safety demonstrations by the IUOE have made it difficult to meet the goal of 16 technology demonstrations.

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

The generation of a test plan for Waste Management Technology Assessment has been placed on hold pending a reassessment of the complex-wide needs and on-going development programs to allow for an optimized assessment strategy.

Plans for the next two months

Activities for the next two months include the following:

- Demonstrate at least one technology by General Lasertronics by the end of October 1999.

- Complete mock-up for the Glove Box and Tank Size Reduction technology assessments and send out the Scope of Work to begin scheduling technologies for demonstration.
- Work with the OENHP to design the test facility for Non-Intrusive Location of Buried Items Technologies and write test plan for this project.
- Complete the design of the multimedia information system for dismantlement and begin programming.

FIU-HCET collaborator

Marshall W. Allen, (305) 348-1696

Integrated Vertical and Overhead Decontamination System

Project Number: HCET-1998-D023

Project objectives

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

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

Major milestones

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

- Title II design of the decontamination/deployment system was submitted on September 23, 1999, by Redzone Robotics.
- FIU-HCET started review of Title II design submittal for the decontamination/deployment system.
- The design review for the development of a test site for the characterization module was completed.

Accomplishments and technical progress to date

- For details on accomplishments and technical progress on this project during FY98, please refer to the *Integrated Vertical and Overhead Decontamination System FY98 Year-End Report.*
- Performance Specification documents that include conceptual designs of the decontamination and deployment systems were sent for review to the FIU-HCET D&D Program Manager and FIU-HCET Senior Program Manager. Comments received were implemented by the end of January 1999. The reviewed documents and comments have been documented and are available.
- Bid Opening was conducted on April 2, 1999. Two bids were received and reviewed. Bid proposals were reviewed for technical content and responsiveness to bid specifications. A letter was sent to one of the vendors on 4/13/99 seeking clarification on issues in their bid response. A letter was received from the vendor on 4/16/99 containing answers to FIU-HCET questions.
- The Invitation to Bid was sent out to vendors on March 8, 1999. The original Bid Opening date was scheduled for March 19, 1999. All qualified vendors requested additional time to adequately respond to the bid. Based on this request, FIU-HCET issued an extension of the Bid Opening date until April 2, 1999.
- All issues were resolved between the vendor and FIU-HCET. The bid was awarded to a team composed of Redzone Robotics and Bartlett Services.
- Design review documentation for development of a test site for characterization unit was submitted for review and approval by FIU-HCET QA Manager.
- A kick-off meeting was held at Redzone Robotics headquarters in Pittsburgh, PA. This meeting took place on July 1, 1999, and was attended by representatives from Bartlett Nuclear Services and FIU-HCET.
- Title I Design for the development of the decontamination and deployment mechanism was completed by Redzone and submitted to FIU-HCET. The design has been reviewed and approved by FIU-HCET.
- A design review team was convened for the design of the FIU test site, and design documentation was distributed to the team members on August 25, 1999. Approval was obtained for the design for the development of a test site for the characterization module.
- The Title II design of the decontamination/deployment system was submitted on September 23, 1999. FIU-HCET has begun reviewing this submittal and will provide comments to Redzone Robotics.

Assessment of current status and issues

The Title II design of the decontamination/deployment system was submitted on September 23, 1999. FIU has started formal review of this submittal and will provide comments to Redzone Robotics.

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

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

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

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

Plans for the next two months

Activities for the next two months include the following:

- Start test site development and construction.
- Complete review of Title II design.
- Provide comment on Title II design to Redzone Robotics.

FIU-HCET collaborators

Leonel E. Lagos, (305) 348-1810
Man Young Cheung, (305) 348-6653
Richard Musgrove, (305) 348-6622

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

Project Number: HCET-1998-D039

Project objectives

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

The objectives of this project include the following:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D039-M1	Release 1 of the TIS	User Access to the functional LSDDP-TIS via the Internet	Completed on schedule on 1/4/99.
D039-M2	Information from new LSDDPs incorporated	Screening data from new LSDDPs accessible through TIS	Completed, as of 5/30/99 – additional data will be incorporated into the TIS as new evaluations are done.
D039-M3	Information on DOE's baseline technologies and FIU-HCET's Technology Assessment Program incorporated	Information on DOE baseline and FIU-HCET-assessed technologies accessible through TIS	Completed, as of 5/30/99 – additional data will be incorporated into the TIS as new evaluations are done.
D039-M4	Information from DOE databases incorporated	Data from DOE designated databases accessible through TIS	Completed on schedule on 4/30/99.
D039-M5	TIS Linked to other D&D Technology Web Sites	Users of TIS provided with hyperlinks to other technology web sites	Completed on schedule on 5/21/99.
D039-M6	Final Report	Final report on results of the project delivered to DOE.	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

- A brochure announcing the new Gateway to Environmental Technology (GET) website was produced by FIU-HCET and is being distributed to the D&D community by FETC-DDFA. The website provides links to the TIS and other decision support systems developed at FIU-HCET.

Accomplishments and technical progress to date

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

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

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

Assessment of current status and issues

The system development phase of the project is complete. The final report on the project is now being prepared.

Plans for the next two months

- The modular design of the GET systems make them easily customizable to other information management and decision support applications that may be of interest to other focus areas within DOE-EM. FIU-HCET will be exploring these possibilities in the coming months.
- FIU-HCET will complete and deliver to DOE a final report on the results of this project by end October 1999.

FIU-HCET collaborators

Mabel Acosta, (305) 348-6650
Robert Tucker, (305) 348-6181

Ex-Situ Large-Bore Pipe Decontamination and Characterization System

Project Number: HCET-1997-D017

Project objectives

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

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

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

Major milestones

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

Milestone No.	Milestone Description	Completion Criteria	Status
D017-M3	Close-out of decontamination system	This milestone requires the completion of all required activities, including operation/maintenance procedures. Five people from FIU-HCET will be trained on the operation and maintenance of the system. The completed system will be turned over to FIU-HCET for operation and integration with the characterization system.	Ongoing. Scheduled for completion 7/30/99*
D017-M4	Title I of the characterization system complete	FIU-HCET will approve initial design details of the characterization system and the costs associated with the characterization system.	Completed 11/30/98
D017-M5	Title II of the characterization system complete	FIU-HCET will approve initial design details of the characterization system and the costs associated with the characterization system.	Scheduled completion 2/16/99. Actual completion date 2/18/99. Completed
D017-M6	Title III of the characterization system complete	The completion of Title III provides for a complete characterization system ready for a field assessment.	Scheduled completion 7/28/99. This date has been revised to 8/9/99. Completed
D017-M7	Field testing the characterization system	The characterization system will be tested to verify that it meets performance requirements by characterizing five tons of pipes of various sizes and contaminant types.	Scheduled completion 9/14/99. Completed
D017-M8	Close-out of characterization system	This milestone requires the completion of all required activities, including operation/maintenance procedures. Five people from FIU-HCET will be trained on the operation and maintenance of the system. The completed system will be turned over to FIU-HCET for operation and integration with the decontamination system.	Scheduled completion 11/30/99**
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 milestone is still in progress. The system was inspected on September 7, 1999. Training of FIU-HCET personnel has been scheduled for October 4 through October 8, 1999, in Miami.

** This date has been moved forward to allow for a more extensive demonstration to be completed at a commercial site. The training of FIU-HCET personnel will be conducted during the month of October in Miami.

*** A large-scale field deployment of the entire system has been scheduled at Big Rock Point Nuclear Power Plant starting November 1, 1999.

Significant events for this reporting period

- Canberra re-ran the sections of the Factory Acceptance Test (FAT) that were unsuccessful the first time and videotaped the results. The data collected was sent to FIU-HCET for review. FIU-HCET analyzed the collected data and provided comments to Canberra.
- The decontamination, ventilation, and off-loading systems were inspected at Delong Equipment on September 7, 1999. The integration of the system will be completed by September 24, 1999, and the systems will be shipped to Miami on September 30, 1999. FIU-HCET personnel will be trained on the operations and maintenance of the system from October 4 through October 8, 1999.
- A weather barrier structure will be purchased by FIU-HCET for the deployment of the system at Big Rock Point. Five quotes have been received so far.
- An integrated Operations and Maintenance manual is being developed.
- Off-loading system has been built. During the week of September 20, 1999, this system will be tested.
- A mock up test will be conducted at FIU-HCET. The entire system will be assembled at FIU-HCET and a one-week testing will be performed during the week of October 18, 1999. Big Rock personnel will be present during this demonstration.
- Pipes of various size diameter and length are in the process of being coated with bright yellow paint. These pipes will be used during the mock-up test at FIU-HCET. A bright yellow color has been chosen to allow visual verification that the blasting system is decontaminating the entire pipe and to follow the migration of paint chips during the blasting process.

Accomplishments and technical progress to date

Literature Search to Determine Pipe Remediation Problem Set

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

Determine Applicable Regulatory Policies and Procedures

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

Review of Decontamination and Characterization Technologies

The review and collection of data for possible decontamination and characterization options for large-bore pipe are complete. Based on the information reviewed, an initial screening method used for pipe decontamination technologies was developed and implemented. The initial criteria include

the technology's ability to meet the required clean, near-white metal surface finish[1] on the interior or exterior of a pipe and the system's potential to be developed into a field mobile system. Seventeen decontamination technologies were evaluated as part of the initial screening process. Of the technologies screened, six technologies were selected for further evaluation; these six were then narrowed to one technology: grit blasting.

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

Design and Fabricate Decontamination System

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

Title I, Title II and Title III designs have been completed. The entire decontamination system is currently being installed inside a specially designed strong tight container. Once this is accomplished, the entire assembled unit will be placed on a flatbed trailer for transportation. The system will be shipped to FIU-HCET toward the end of September 1999.

Design and Fabricate Characterization System

Title I, Title II and Title III designs have been completed. The entire characterization system will be shipped to FIU-HCET toward the end of September 1999.

Assessment of current status and issues

- A weather barrier structure needs to be purchase for deployment of the system at Big Rock Point. Five quotes have been obtained from vendors so far. Unfortunately, this structure needs to fit in the limited space being provided by Consumers Energy. A vendor will be selected as soon as possible in order to meet deployment schedule.
- A road at Big Rock will need to be expanded in order to accommodate the deployment of the FIU-HCET system. Presently, this road is 36 feet wide and needs to be expanded to at least 55 feet wide paved area and at least to 70 feet wide overall area. Two quotes have been obtained, and a selection will be made as soon as possible.
- Canberra is remedying the software problem identified by FIU-HCET during the factory acceptance testing of the characterization module. Canberra has addressed the problem, and portions of the FAT have been repeated. The new data has been sent to FIU-HCET for analysis and approval. Canberra is confident that the entire system will be ready for delivery in September 1999.

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

Plans for the next two months

- Purchase weather barrier structure.
- Put contract in place with vendor to pave test area at Big Rock Point.
- Transport to and assemble entire system at FIU-HCET.
- Conduct training of FIU-HCET personnel on the Operations and Maintenance of all subsystems, including decontamination, ventilation, off-loading, and characterization modules.
- Transport to and assemble entire system at Big Rock Point facility.
- Conduct cold test and hot test at Big Rock Point starting November 1, 1999.

FIU-HCET collaborator

Leo Lagos, (305) 348-1810

In-Situ Pipe Decontamination System

Project Number: HCET-1999-D041

Project objectives

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

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

The objectives of the project are the following:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D041-M1	Technology selection complete	Determine optimum technology to deploy considering production rate, decontamination factor, and safety factors	Completed 2/1/99
D041-M2	Design plan complete	Peer review of design plan complete and approved	Scheduled completion 2/23/99. Completed 3/31/99. Delay due to revisions in approval requirements.

Milestone No.	Milestone Description	Completion Criteria	Status
D041-M3	Approved design drawings and cost-benefit analysis	Peer review of final design drawings and the cost to complete approved	Scheduled completion 6/11/99. Peer review of the design performed on June 8, 1999. Cost analysis completed on September 10, 1999. Delay in M3 due to delays in M2 and completion of market study. See Assessment of current status and issues.
D041-M4	Prototype system complete and demonstration test plan developed	Fabricated prototype system ready for tests and demonstration test plan approved	Scheduled completion 10/15/99

Significant events for this reporting period

- A review of the pipe cleaning systems was performed. Discussions held with various vendors showed that grit blasting technology is a simple and easy-to-use technology that generates less secondary waste than the other technologies considered and produces a near-white metal finish. In combination with the grit blasting technology, two drive systems were considered and are discussed below: Plan A-a motor-driven system and Plan B-a manually driven system. Cost estimates of these systems were developed.
  - Plan A utilizes the ISL Microtrac Crawler™ , the motor-driven system that can be used for transporting grit-blasting nozzle to any part of the horizontal or vertical pipe. It can also negotiate smooth bends. It is commercially available and can be adapted to the existing FIU-HCET Vertical Pipe Decontamination System (VPDS), which is a grit blasting system. The crawler does have some limitations:
    - Two sets are required for carrying the blast head through bend pipe.
    - Each one of these crawlers costs approximately $32K. Other components cost approximately $4K. Thus, the total cost of the crawler-driven system will be about $68K.
    - They can carry a maximum 50-pound load. That limits the length of the compressed air hose and hence the length of the pipe that can be cleaned.
    - The minimum pipe bore, which can accommodate the crawler, will be 8-inch. This limits its applicability to only pipes with inner diameters of 8 inches and above, which does not adequately fulfill the scope of this project.
  - Plan B incorporates the existing Vertical Pipe Decontamination System (VPDS) into a manually deployed system with a winch extraction for both horizontal and vertical pipe.
    - The improved system, which will be fabricated in-house, costs approximately $3.0K.
    - The minimum pipe bore will be about 5 inches, and with a smaller nozzle, which can be purchased off the shelf, it may be possible to clean bore sizes as small as 2 inches.
    - The maximum length of the pipe will be determined by experimentation.
    - Its limitation for bends in pipe also needs to be determined.

- FIU-HCET plans to proceed with Plan B and build and test this system first. Most of the components used in this system can be disassembled and used in the Plan A system, if a decision to use the prior system is made.

Accomplishments and technical progress to date

- Candidate technologies for in-situ decontamination of pipes were screened and grit blasting was selected for further development.
- In-situ Pipe Decontamination System (IPDS) concept drawings were prepared and approved by the design review committee.
- Modifications were made to the grit blasting and recovery system to make it work satisfactorily.
- Research into the South Florida Building Code (Revised 1994), which establishes specifications for the positioning of clean out openings for pipes of various diameters and lengths was completed. This information is required for the design of the cleaning and grit recovery system.
- Cost estimates of the modification in the existing system for horizontal pipes and pipes with a smooth bend were made for a manual and crawler-driven system.

Assessment of current status and issues

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

Plans for the next two months

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

FIU-HCET collaborators

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

Project Number: HCET-1999-D042

Project objectives

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

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

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

Major milestones

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

Milestone No.	Milestone Description	Completion Criteria	Status
D042-M4	Technological solutions	Identification of candidate technologies for addressing problem sets identified in milestone 3.	August completion date rescheduled to September due to delays in M1 and M2. Technology searches began in September 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 30, 1999.

Significant events for this reporting period

- Responses to the needs assessment survey have been very slow. Of the 25 NPRs participating in the survey, four responded before the July 31, 1999, deadline. As a result of follow-up calls to the remaining participants, an additional five responses have been received to date. The responses are being analyzed to identify problem sets that are likely to be of concern to NPRs undergoing decommissioning.

Accomplishments and technical progress to date

The project is being executed in two phases.

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

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

To date in Phase II, FIU-HCET has researched and compiled a checklist of potential D&D problems which NPR facilities may face during decommissioning. This list formed the basis of a follow-up survey that was sent to participating NPR site managers on June 26, 1999, to more accurately assess their current and future D&D needs. To date, only two NPRs have responded. Follow-up calls are being made to the other participants. Site visits to the State University of New York in Buffalo, University of Virginia, and University of Washington were planned for August 1999, but these have been postponed to September 1999 due to the slow responses to the needs assessment questionnaire.

Assessment of current status and issues

- Responses to surveys have been slow, but no major issues are foreseen that would hinder completion of this project on time.

Plans for the next two months

- FIU-HCET has begun analyzing responses from participating NPRs. Common problem sets among the respondents will form the basis of technology searches to identify feasible D&D technological solutions. Identified problems are being ranked according to frequency of occurrence at sites and urgency assigned by site managers. The problem sets and solutions will be used to develop a decision tool that NPR site managers may use to identify technologies for their site-specific cleanup projects.
- In September 1999, FIU-HCET personnel will visit three NPR sites to assess their current and potential decommissioning needs. These visits will allow FIU-HCET personnel to better assess site-specific decommissioning needs. Information gathered will complement data collected through the needs assessment survey.
- Mr. Brendan Ryan, Reactor Facility Manager at Kansas State University and a member of the American Nuclear Society (ANS), has requested permission from FIU-HCET to publish in the ANS newsletter the results of the survey. Mr. Ryan is of the opinion that technological solutions to remediation problems will be very useful, not only to research facilities but also to others in the nuclear decommissioning community. This will provide additional exposure for DOE-OST-developed technologies and for FIU-HCET as an environmental technology leader. Mr. Ryan's request is under consideration by FETC.

FIU-HCET collaborators

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Life-Cycle Cost Analysis for Radioactively Contaminated Scrap Metal

Project Number: HCET-1999-D043

Project objectives

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

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

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

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

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

Major milestones

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

Significant events for this reporting period

- A meeting scheduled for the week of August 23-27, 1999, to review the first draft of the LCCA final had to be postponed due to other pressing exigencies requiring the NMR participants to travel. The review has been tentatively rescheduled for the end of September. To expedite completion of the final report, some reviewers provided comments, and these have been incorporated into a revised draft that will be submitted to FETC and NMR during the week of September 20-24, 1999.

Accomplishments and technical progress to date

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

Assessment of current status and issues

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

Plans for the next two months

- Draft 2 of the final report will be reviewed by DOE-FETC and DOE-OR/NMR. Within one week of the review, comments will be incorporated by FIU-HCET, and the report will be finalized and submitted to FETC for approval.
- DOE-FETC, DOE-OR/NMR, and FIU-HCET will decide how best to integrate the "gate-to-ground" life-cycle disposal costs determined by FIU-HCET under the current scope of this project, with the other costs associated with RSM disposal to arrive at a total life-cycle disposal cost for RSM.

FIU-HCET collaborators

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Legacy Waste Disposition for the Oak Ridge Reservation

Project Number: HCET-1999-D044

Project objectives

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

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

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

Under this project, FIU-HCET will

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

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

Major milestones

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

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

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

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

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

Significant events for this reporting period

- FIU-HCET has completed developing the systematic approach for evaluating MLLW, along with assisting cost analysis decision modules. These have been successfully utilized to evaluate four selected MLLW waste streams.
- FIU-HCET has completed a preliminary draft final report and submitted it to Bechtel Jacobs for review and input.

Accomplishments and technical progress to date

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

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

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

- FIU-HCET is working with Bechtel Jacobs personnel to identify, define, and develop tasks associated with the Broad Spectrum waste disposition effort and the identification of potential orphan MLLW streams, which FIU-HCET can address in this project.
- FIU-HCET completed the assessment of the MLLW Broad Spectrum Treatment Plan (BSTP) developed by Bechtel Jacobs.
- FIU-HCET completed a detailed review of the MLLW database and of waste populations of particular interest to Bechtel Jacobs.
- The systematic approach for evaluating MLLW has been diagrammed, along with the supporting cost analysis decision modules, and utilized to evaluate the four selected MLLW waste streams.

Assessment of current status and issues

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

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

Plans for the next two months

FIU-HCET will

- Complete a final report incorporating review comments by Bechtel Jacobs.

FIU-HCET collaborators

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National Contract for Radioactive Scrap Metal Recycle

Project Number: HCET-1999-W002

Project objectives

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

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

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

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

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

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

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

Major milestones

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

Note: Additional milestones to be determined by NMR.

Significant events for this reporting period

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

Accomplishments and technical progress to date

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

Assessment of current status and issues

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

Plans for the next two months

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

FIU-HCET collaborator

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II. TANKS FOCUS AREA (TFA) PROGRAM

MONTHLY PROGRESS REPORT

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

http://www.hcet.fiu.edu

Waste Conditioning for Tank Slurry Transfer

Project Number: HCET-1998-T004

Project objectives

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

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

This project should accomplish the following:

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

Major milestones

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

Significant events for this reporting period

- Slurry settling tests were completed. These tests included settling measurements of the different simulants at different pH. Test procedures and results are listed in the next section.
- Gelation tests were continued. Several tests were performed with sodium aluminate, which was identified as a precipitate in both SRS and Hanford wastes. The kinetics of the precipitation is very slow, so wastes need to be conditioned at certain temperatures to truly represent the gelling phenomenon of the wastes.
- Rheology testing of the plugging-and-unplugging slurry samples is being performed according to the project needs. The last sample obtained from the plugging-and-unplugging project corresponds to a 30 wt% SRS slurry and was tested in the experimental loop.

Accomplishments and technical progress to date

- The following procedure was used to vary the slurries' pH for settling tests:
  - Initial pH of the slurry was recorded.
  - 1 mL of concentrated sulfuric acid was added to each simulant sample. Each sample was about 250 mL in volume.
  - Upon shaking the samples and mixing them well, pH was recorded again.
  - Then the settling tests were performed in 500 mL cylinders.
  - The main idea was to compare the settling behavior of the simulants when one similar volume of acid was added to each sample.
  - A clear layer (supernate) and a dark portion (solids) were observed in all samples. The corresponding difference in layers divided by time indicates the settling rate of the sample.
  - Settling data for each sample at original pH was performed in the past, so both results were correlated.
- Following are the results of both the pH adjustments and the settling rates.

Table 1.
Simulants' pH values before and after pH adjustments

Simulant Sample	Original pH	pH after acid addition
Hanford	8.06	2.14
Fernald	8.36	1.50
SRS	11.84	5.50

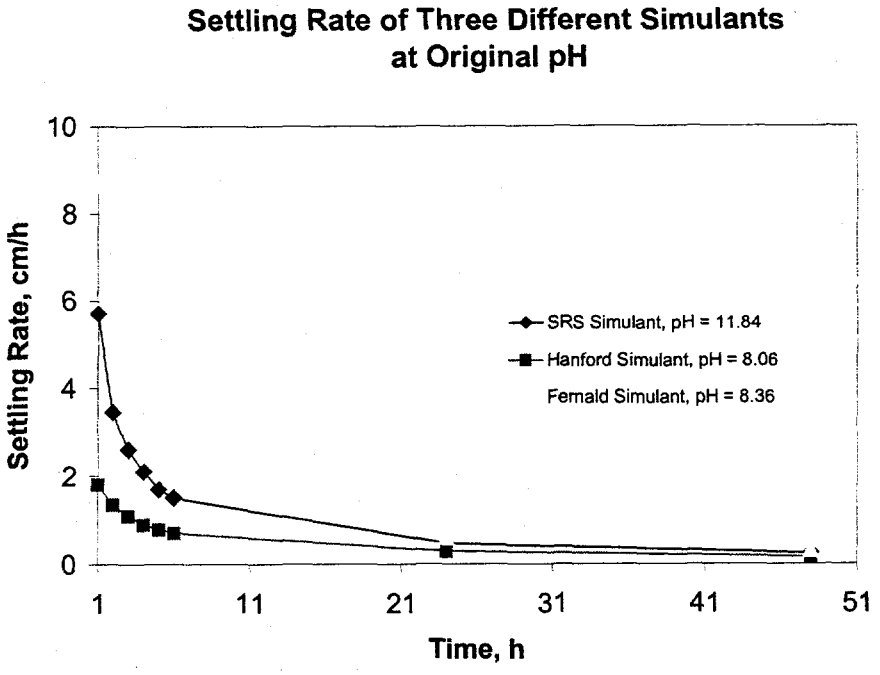

Figure 1. Settling rate comparison. Original pH.

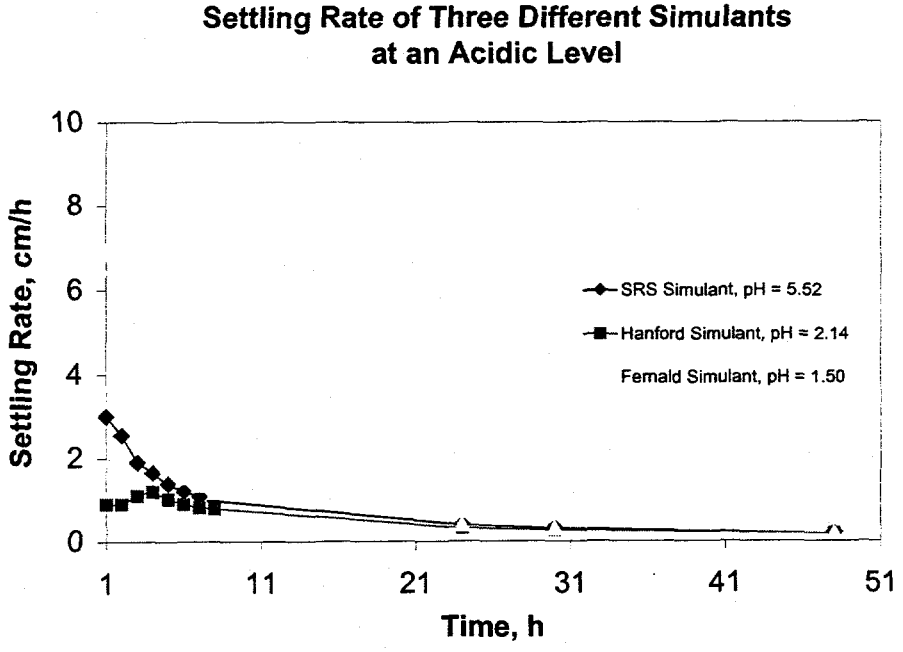

Figure 2. Settling rate comparison. Acidic pH.

- As can be observed in the previous two figures, the settling rate had decreased at lower pH in all three cases. This may be due to acid-washing of some particles that were attached together. When particles are attached, they are heavier; therefore, the settling rate increases.
- Since sodium aluminate was chosen to be used in the gelation tests, this compound was prepared by dissolving alumina hydrate into sodium hydroxide in the lab. In addition, granular sodium aluminate and a 45 wt% sodium aluminate solution were ordered for such tests.
- The granular sodium aluminate is a white powder that dissolves readily in water and is a dry form of liquid sodium aluminate. Solid is obtained by removal of free moisture of the solution.
- The gelling behavior of the sodium aluminate can be observed by looking at the viscosity of 45 wt% solution at different temperatures. As temperature decreases, its viscosity increases dramatically.
- The following tests were performed by dissolving alumina hydrate into sodium hydroxide.

Table 2.
Gelation test samples

No.	WATER (ml)	NaOH (gm)	Alumina (gm)
1	100	10	10
2	100	20	20
3	100	30	30
4	100	10	20
5	100	20	10

- A very clear distinction between water and a white settled phase was observed in sample number 1. After mixing and heating the sample at 60°C, the solution dissolved better.
- Similar behavior was observed in all samples. However, distinction between phases was not that clear at higher solid concentrations.
- Some solid deposition was observed in samples 3, 4, and 5 when the samples were heated to 60°C.
- Additional tests were performed by mixing the granular sodium aluminate and water. The mixture looked pretty much like gel at the beginning, but it got harder after exposure to air for about 3 hours.

Assessment of current status and issues

Rheology measurements of the different gel samples under different conditions will help to understand the gelling phenomenon. This phenomenon is likely to occur at lower temperatures. Therefore, a good approach will be to test the rheology of these samples at various temperatures to check how viscosity is related to gelling of the sample.

Plan for the next two months

- Perform rheology tests to gel samples. Do it at lower temperature where gelling is likely to occur.
- Analyze plugging-and-unplugging simulant samples. Perform data correlation.
- Start putting together different experimental data obtained throughout the year to create year-end report.
- Perform task number 6 as specified in PTP. This task corresponds to simulant viscosity measurements under different conditions.

FIU-HCET collaborators

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Plugging and Unplugging of Waste Transfer Pipelines

Project Number: HCET-1998-T005

Project objectives

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

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

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

The objectives of this work include the following:

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

Major milestones

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

Milestone No.	Milestone Description	Completion Criteria	Status
T005-M2	Develop systematic methods for characterization of slurries for transport experiments	Documentation and application of slurry characterization method for slurry preparation, rheology measurement, and data presentation of slurry transport experiments.	Completed 3/20/99; met the schedule
T005-M3	Modification of flow loop setup for additional slurry transport experiments with horizontal pipeline	Set up the flow loop with a higher capacity pump, improved sampling system, and an additional pressure transducer.	Scheduled completion 3/30/99; met the schedule
T005-M4	Finalize the design of full-size test bed for equipment tests and demonstrations	Detailed design drawings of the pipelines for the three full-size test beds.	Scheduled completion 3/30/99; met the schedule
T005-M5	Perform additional slurry transport experiments in flow loop with horizontal pipeline	Obtain data by data acquisition system and video recording system at one additional slurry concentration. Some critical velocity data will be repeated by varying slurry flow rate from very high level to low level.	Scheduled completion 5/28/99 Test loop was modified and tasks were completed 5/28/99
T005-M6	Plan, design, and modification of flow loop with inclined pipelines	Set up a flow loop with inclined pipelines that have the same geometrical layout as those used at DOE sites.	Scheduled completion 6/25/99. The task is delayed due to task change and system modification. This task is proposed to complete 10/25/99.
T005-M7	Construction of the test beds for equipment tests and demonstrations	Three test beds representing gravity pipeline, long pipeline, and buried pipeline will be fabricated with the specified material and dimensions.	Scheduled completion 9/15/99. Completed 9/10/99
T005-M8	Perform slurry transport experiments in flow loop with two inclined pipelines	Obtain results of pressure drop and critical velocity in the flow loop with two kinds of inclined pipeline	Scheduled completion 9/30/99.
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

- Particle size distribution for SRS slurry simulant has been analyzed.
- Pressure drop calculation for SRS slurry at 10 wt% and 20 wt% is being conducted for the flow loop in horizontal pipe orientation.
- SRS dip for flow loop experiment has been designed.

- SRS Jumper for Test Bed #1 (Gravity Drain Line) has been tested with video scope. It will be shipped to FIU-HCET within a few weeks.
- Scope of Work (SOW) and test plan have been drafted for the equipment test on the large-scale test beds.

Accomplishments and technical progress to date

Part 1 Flow Loop Research on Pipeline Plugging and Unplugging

1.1 Particle size distribution for SRS slurry simulant

Table1 lists the particle size distribution for SRS slurry simulant, which was analyzed using a Philips XL30 Scanning Electron Microscope. Overall, it appeared that most particles fell into the 0 – 30 (μm) range. Small particles such as these may be difficult to pump and may show minimal settling in a slurry form.

Table 1. Particle size distribution in different ranges

	Size (μm)	SiO_2 (Vol%) $\rho_{s1} = 2.38$	MnO_2 (Vol%) $\rho_{s2} = 5.03$	Al_2O_3 (Vol%) $\rho_{s3} = 3.94$	NiO (Vol%) $\rho_{s4} = 6.67$	Fe_2O_3 (Vol%) $\rho_{s5} = 5.24$	Total (%)
1	0-30	0	5.4	0	11.7	37.2	54.3
2	30-60	0	5.4	3.92	0	0	9.32
3	60-90	0	0	3.92	0	0	3.92
4	90-120	0	0	7.84	0	0	7.84
5	120-150	0	0	3.92	0	0	3.92
6	150-180	20.7	0	0	0	0	20.7
Total							100

1.2 Calculation of the total pressure drop for SRS slurry simulant

Based on Wasp's (1979) theory, the following procedure and mathematical model are used to simulate the SRS slurry simulant flow in the loop.

1. The first step is to calculate the Reynolds number.

   Reynolds Number (Nre) = $(V * D)/\nu$

2. Using the above value of Reynolds number, the friction factor (f) was determined.

3. Friction loss or pressure drop due to water was then calculated using the value of friction factor (ΔP_{veh}).

   Friction loss (ΔP_{veh}) = $(4*V*f^2/2 * g * D)$

4. Friction velocity was then calculated (u^*).

   Friction Velocity (u^*) = V * Sqrt(f/2)

5. Settling velocities for the corresponding mean diameters of the solid was determined.

   Settling Velocity (w) = $(3.33 * [(\rho_s - \rho)/\rho * d]^{1/2})$

6. The drag coefficient for different diameters and different settling velocities was then calculated (C_d).

   $C_d = [4 * g *((\rho_s - \rho)/\rho) * d/ 3 * w^2)]$

7. Volume % solids for the corresponding mean diameter was calculated and then tabulated (100ϕ).

8. The next step was to determine the concentration fraction.

   $\log(C/C_A) = - 1.8 *[w/(\beta\chi u^*)]$

9. $100\phi_{Veh}$ was calculated by multiplying (100ϕ) with C/C_A.

   $100\phi_{Veh} = [(100\phi) * C/C_A]$

10. $100\phi_{bed}$ was then calculated by subtracting $100\phi_{Veh}$ from (100ϕ).

    $100\phi_{bed} = (100\phi) - 100\phi_{Veh}$

11. Finally, the pressure drop of bed (ΔP_{bed}) was then calculated using the equation given below.

    Pressure drop of Bed :

    $\Delta P_{bed} = 82 * \Delta P_{water} * \phi_{bed} * [g *D * (s-1)/V^2 * Sqrt (C_d)]^{1.5}$

12. The total pressure drop of the slurry is the sum of bed pressure drop (ΔP_{bed}) and pressure drop due to water (ΔP_{veh}).

    $\Delta P_{slurry} = \Delta P_{veh} + \Delta P_{bed}$

The above steps will be repeated until the iterated value becomes approximately equal to the final value (less than 5%). The above procedure is just for one particle size. For a number of particle sizes, sum up the individual particle size's pressure drop results.

An example of the calculation for SRS slurry simulant at 0.5 m/s is shown in Table 2. Wasp's (1979) theory works very well for the 20 wt% SRS slurry simulant.

Table 2.
Comparison of Experimental Results with Calculated Data

Slurry simulant	Experimental (Pa/m)	Calculated (Pa/m)	Deviation (%)
10 wt%	100	199.7	-99.7
20 wt%	400	290.0	27.5

1.3 Sketch of SRS dip for flow loop experiment

Based on the suggestions of Peter W. Gibbons, DOE's Tank Focus Area (TFA) technical leader, and Dr. Fadel F. Erian of PNNL, the schematic diagram of SRS dip for flow loop has been drawn as shown in Figure 1. The purpose of this inclined pipe is to obtain the following:

1) the time it takes for the solids to settle completely and form an "equilibrium" plug
2) the rate of the plug forming and the power required to push the plug forward.

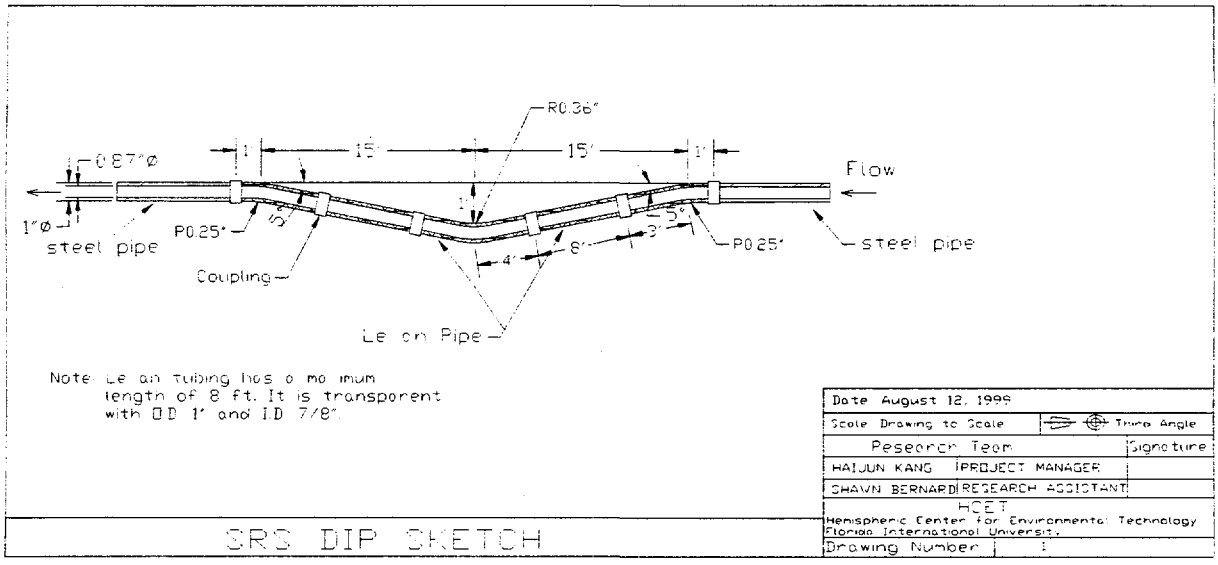

Figure 1. Schematic diagram of SRS dip for flow loop experiment

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

2.1 The Construction of the Test Beds

A representative of the FIU-HCET technical team visited SRS the week of August 23, 1999, to observe the process of sending a probe into the SRS Evaporator jumper. Video scope was used to visualize the roughness and/or smoothness inside of the test jumper. The jumper will be shipped from SRS to FIU-HCET within the next few weeks in order for the construction to be completed.

Scope of Work has been revised, and a test plan was drafted for this project. Other documents concerning the description of the test beds and blockage materials have been updated and revised,

and they are available on the web at <www.hcet.fiu.edu/r&d/tfa/unplugging/documents.html>. Scope of Work including test plan will be available on the web as well as soon as it is approved by Pete Gibbons, a technical leader of DOE's Tank Focus Area (TFA).

For buried pipeline in Test Bed #3, Carbon Steel pipes with 4-inch diameter are already in place; however, construction of the bed will be resumed as soon as the 3-inch diameter Stainless Steel pipes are welded for 60 foot long. The gate valve of 1-inch diameter has been installed for Gravity Drain Line (GDL) in Test Bed #1. Jumper will be installed on the ground level to simulate the actual jumper as soon as it is received by FIU-HCET.

2.2 Blockage material simulation and its location

The sheet wax with 260°F melting temperature was tested as a possible blockage material. It was tested as a solid cylindrical and annular form inside of the 3-inch diameter pipe. It did not melt under the high solar radiation; however, it shrank after it cooled down, and it did not stick to the inner surface of the Stainless Steel pipe. Therefore, an idea of coating the inside of the pipe with boat floor paint or tar paint has been discussed. This idea could be useful when treating the inside of the jumper to make the test jumper perform more like the actual jumper. The sheet wax could still be a blockage material candidate for horizontal and buried pipelines for the purpose of reaching and unplugging the blockage.

Another idea for treating the pipeline is to coat it with glass or epoxy so that it will produce a hard, adherent coating on the inner surface of the pipe. This treatment could be used for Test Bed #1 (GDL). More testing and research are needed to identify the material.

Plans for the next two months

- The flow loop experiments will be conducted for 30 wt% SRS slurry.
- Pressure drop calculation for SRS slurry at 10 wt%, 20 wt%, and 30 wt% will be finished for the flow loop in horizontal pipe orientation.
- SRS dip will be manufactured and installed in the flow loop.
- Fiberglass epoxy and other materials will be tested as blockage materials for equipment test of large-scale test beds to be performed in FY00.
- Scope of work, test plan, and specifications of test beds and blockages for the large-scale test beds will be finalized.

Reference

E. J. Wasp, "Solid-liquid Flow Slurry Pipeline Transportation", Gulf Publishing Company, 1979.

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 March 1996. However, the operation has been marked by extreme difficulty in maintaining a stable pouring process. There have been flow fluctuations accompanied by an unusual flow phenomenon, termed "wicking." In this situation, the falling glass stream wavers and departs from a normal vertical trajectory. The pour spout and associated hardware connecting it to the canister have been coated and often plugged with glass. The objective of the project is to investigate the pouring behavior of molten glass over a pour spout knife edge.

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T003-M1	Installation of an additional heat zone	Achievement of 1150 °C by the knife edge	Completed as scheduled. Due date: 1/31/99
T003-M2	Report the effect of crud deposits on the back side of the knife edge	Experiments ES-1, ES-2, ES-3, and ES-4	Completed as scheduled. Due date: 5/31/99
T003-M3	Report the effect of eroded knife edges	Experiments ES-5, ES-6, ES-7, ES-8, ES-9, ES-10, ES-11, ES-12, ES-13, ES-14, ES-15, and ES-16	Due Date: 8/31/99
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

- The horizontal section of the melter was replaced with a new 2" inconel pipe. The horizontal section had to be replaced as it had buckled and creeped after being in operation at high temperatures of 1150°C.
- Roger Gilchrist, Bill Holtzcheiter, and Hector Guerrero of DOE-TFA visited FIU-HCET on September 13, 1999, for a review of the project. A presentation was made to apprise them of the progress made during the fiscal year and the difficulties that have been encountered and the lessons learned.

Accomplishments and technical progress to date

- The horizontal section of the melter was replaced with a new 2" inconel pipe. The horizontal section had to be replaced as it had buckled and creeped (Figure 1) after being in operation at high temperatures of 1150°C. After replacement of the horizontal section (Figure 2), the pour spout of the melter reverted to its vertical orientation as required for the glass pouring experiments.
- The broken elements in Zone 1 and Zone 2 were broken and were rewelded. The melter was reassembled after the repairs, and low-temperature back knife-edge insert experiments are planned for the next month.
- All the copper tubings and connectors used for gas feeding and providing the vent to the melter have been replaced with stainless steel tubing. This will ensure leak-free operation at high temperatures of 1150°C.
- Additions have been made to the melter to provide support to the pour spout from the bottom and the top. It is expected that the additional support will take care of the metal creep problem.
- During the DOE-TFA meeting at FIU-HCET, it was decided that weekly conference calls will be made to SRTC for information exchange on the glass pouring project and better coordination of activities between the Clemson melting operation, the FIU-HCET melter, and the SRTC molten glass flow modeling effort.
- The DOE-TFA group was presented with the FIU-HCET tri-fold brochure and the FIU-HCET informational video showing the experimental setup, operation, and results.
- Suggestions made by DOE-TFA during the meeting are as follow:
  - A ruler will be placed next to the knife-edge before the start of the experiment and video recorded. This will serve as the calibration for the subsequent glass pouring experiment.
  - A plumb line will be dropped from the top of the pour spout to ensure the vertical orientation of the knife edge.
  - A plumb line will be placed permanently in the side of the pour spout and be lined up with the knife edge. This will help to locate the pour spout knife edge in the recorded side view of the experiment. It will also provide the reference for the fluctuation of the glass stream (wicking) measurements.

  - The glass stream profile in the front view will be ascertained. This will be accomplished by measuring the stream thickness at 3 positions located at 5mm, 10mm, and 15 mm below the knife edge.
  - Start discussions with DOE-TFA to put in a strong proposal for the EMSP initiative due out in February 2000.
  - Coordinate the documentation of the experimental results with Clemson and SRTC and present the findings to the scientific community by publishing a 3-part paper in an established scientific journal.
- The above-mentioned experiment-related suggestions have been implemented at the FIU-HCET melter for the upcoming set of glass pouring experiments.
- FY2000 scope was discussed during the meeting, and changes have been made to the Project Technical Plan (PTP) for the glass pouring project. The number of experiments to be carried out during the year remains the same; however, an additional task of thermal modeling of the pour spout of the FIU-HCET melter and the Clemson melter has been added. The thermal modeling will be done using the FLUENT software. Also, any experiments left over from this year will carry over to the next fiscal year. In brief, the following tasks are planned for FY 2000:
  - Manufacture of a new pour spout and 2 knife edges completely simulating the DWPF melter pour spout.
  - Experimental steady and transient glass pouring runs with altered (more viscous) glass chemistry.
  - Testing for the effect of inserts currently being used at DWPF and newly designed inserts. The investigation will focus on the effect of the temperature profile of the melter/pour spout combination (new and eroded knife edges) on the molten glass pouring.
  - Numerical modeling to simulate the temperature gradients in the FIU and the DWPF pour spouts.
- A complete new pour spout with 2 knife edges will be manufactured during FY 2000. SRTC and DWPF will participate in the design and safety review.

Assessment of current status and issues

The replacement of the horizontal section resulted in the project being behind schedule. However, if the melter does not encounter any serious problems, FIU-HCET should still be able to complete 90% of the experimental runs planned for this year. The rest of the experimental runs will then be carried over to FY 2000.

Plans for the next two months

- Run alternate glass chemistry experiments using a lower glass temperature with the same surrogate glass and experiments simulating corroded and eroded knife edge by methodical destruction of the knife edge.

FIU-HCET collaborator

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Figure 1. Bending of the horizontal section due to metal creep at 1150°C.

Figure 2. Welding of the replaced horizontal section of the melter . The replacement reverted the vertical orientation of the pour spout.

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

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
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http://www.hcet.fiu.edu

Online Measurement of the Progress of Decontamination

Project Number: HCET-1998-C005

Project objectives

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C005-M1	Operational prototype	Prototype functional	Due 3/3/99 *Delayed until 10/31/99
C005-M2	Demonstration at FIU-HCET	Documented demonstration of prototype	Due 5/30/99 *Delayed until 11/30/99
C005-M3	Deployment	Initiate deployment at DOE site	Due 9/28/99 *Rescheduled 12/15/99
C005-M4	Year-end report	Submission	Due 10/30/99

* As per FY99 PTP, a design and implementation review required revisions to design and procurement. The project has been redirected accordingly. Milestones 1–3 have been forecast delayed as shown above. Additional explanation is provided below in *Assessment of current status and issues*

Significant events for this reporting period

- Discussions are currently underway with representatives of Electric Power Research Institute (EPRI) for deployment of the prototype system at a commercial nuclear site.
- Progress toward operational prototype milestone C005-M1 has been accelerated after having been delayed by project review and adjustment in emphasis from decontamination efficiency to potential characterization for release. Detailed control and interface software and hardware design is underway
- Final delivery of procured and fabricated components is somewhat delayed; however, receipt is still expected for most items in September, allowing a major acceleration of the project in October.

Accomplishments and technical progress to date

- Discussions are open with EPRI for deployment at a commercial nuclear site sometime following November 1999.
- Plans for FY00 are complete.
- Initiated integration process of the online system into the Idaho LSDDP.
- Completed detailed component design of the detector mechanical arrangements:
  - Vibration, shock, and debris isolation suspension for pre- and post-decontamination
  - Replaceable shields (brush) and "tear-off" windows
  - Radiation shielding for background from room and mechanical shields also affecting collimation
  - Shot-blast suspension modifications
  - Low-cost disposable pneumatic tube section for effluent (waste stream) sensor array liner.
- Operator interface and associated components design refined:
  - Simple indication using commercial circular colored indicator light arrays with absolute value indication
  - Simplified limit calibration, either absolute engineering units or placement of the sensors over calibration surfaces
  - Preliminary operational procedures generated for creation of control coding.
- 3D position-determining system preliminary design complete:
  - Combination angulation/lateration relational geometry
  - Single stationary station required
  - No RF links necessary
  - System has added benefit of providing detailed topographic map revealing actual removal depths following decontamination as well as radiological characterization survey maps

- Characterization system sensor details including applicable detectors, interface electronics, and isotopic discrimination capabilities are under refinement to optimize sensitivity for final release levels.
- Refinement of radiological characterization sensors, including capability of isotope discrimination through multichannel analysis (MCA) spectroscopy, is in progress.
- Discussions are continuing with representatives directly involved with DOE site demonstration and deployment to finalize a schedule for demonstration of this system.

Assessment of current status and issues

- After FIU-HCET design review and project review by outside peers at the DDFA midyear review in April, a need for a revised design was determined. DOE DDFA management traveled to FIU-HCET in June and agreed that the project should be extended into FY00. The plan for FY00 will be to complete testing and deployment of the revised design.
- Travel is planned to DDFA in October 1999 to finalize a revised schedule to match the already revised scope.

Plans for the next two months

- Complete assembly and test of subsystems.
- Complete electronic design including control software.
- Assemble and integrate all tested subsystems of prototype onto concrete decontamination machine at FIU-HCET. This will move the system from a laboratory prototype to an engineered prototype ready for field testing.
- Test and refine prototype assembly.
- Demonstrate prototype at FIU-HCET.

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 a 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 -- desire remote surveillance of their facilities. These facilities include production areas, structures, utilities, equipment, drums, tanks, and effluent lines. Currently, these facilities awaiting deactivation and decommissioning (D&D) must be periodically surveyed for various criteria including contamination levels, structural deterioration, water intrusion, animal intrusion, integrity of storage containers, atmospheric conditions, and radioactive and hazardous substance releases. The surveys themselves are intrusive, time-consuming, expensive, and expose survey personnel to radioactive contamination and radiation. The purpose of this project is to develop a remote surveillance system that collects data from DOE sites (remote station) and transmits data to a central location (base station).

Following are the objectives of the project:

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

Major milestones

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 *Delayed until 11/15/99
C006-M2	Testing at a DOE site	Tested at a DOE site for site-specific parameters	Due: 4/16/99 *Delayed until 2/15/00
C006-M3	System Improvement	Modifications completed.	Due: 5/17/99 *Delayed until 04/15/99
C006-M4	Performance evaluation	Performance evaluated under ambient environmental conditions	Due: 8/27/99 *Rescheduled for FY00

Milestone No.	Milestone Description	Completion Criteria	Status
C006-M5	Deployment plan	DOE site deployment plan created.	Due: 10/1/99 *Rescheduled for 12/31/99
C006-M6	Commercialization plan	Industrial partner interested in commercialization of the system identified	Due: 10/30/99 *Rescheduled for 2/20/00
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

- Technical discussions continue with commercial sources for adaptable multichannel micropower data acquisition systems.
- Procurement of commercial intermittent remote data sampling systems is underway.

Accomplishments and technical progress to date

- Commercial sources of remote power maintenance subsystems investigated with purchase of components underway to further testing and integration.
- Initiated discussions with representatives of Bechtel Hanford and Pacific Northwest National Laboratory (PNNL) regarding deployment of custom remote surveillance systems at Hanford facilities. Discussions were set up in response to an expression of interest by Bechtel Hanford at the DDFA Midyear Review. Discussions are currently in progress.
- Prepared and delivered project status presentations to visiting DDFA Program Managers who, in turn, agreed that the project should continue into FY00.
- Initiated integration process of the Remote Surveillance system into the Idaho LSDDP. Technology screening forms were received and are being completed.
- Matrix of possible transducers, power sources, and sampling conventions assembled.
- Incorporation with and improvements to existing DOE remote sampling systems investigated.

Assessment of current status and issues

- Finalization, design, procurement, and component fabrication have put the project behind schedule. Initial lack of interest of DOE sites deciding acceptable functional requirements for the system was the major cause of delay. There is interest now, and the system is being engineered. Once procured and fabricated components begin to arrive in September, the project will accelerate. Resources assigned to other projects during the final design and procurement phase will be dedicated to systems integration and testing of the prototype.

- Travel is planned to DDFA in October 1999 to finalize a revised schedule to match the already revised scope.

Plans for the next two months

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

FIU-HCET collaborator

Richard Musgrove, (305) 348-6622

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

Project Number: HCET-1998-C008

Project objectives

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C008-M1	Cost-benefit analysis	Data showing performance of EIC vs. baseline technologies	Due 12/15/98. 1. Measurements using EICs and baseline technology (alpha probe) completed at a test bed at FIU-HCET. Cost comparison performed. 2. Comparative assessment with baseline technology performed. Completed 2/26/99. The reason for delay addressed in section "Assessment of current status and issues" of this report.

Milestone No.	Milestone Description	Completion Criteria	Status
C008-M2	Deployment Plan and Demonstration at DOE facilities	Integration with D&D Focus Area's Large-Scale Demonstration and Deployment Program (LSDDP). Commitment for use of EICs for alpha contamination measurement from one or more DOE sites	Due 2/8/99 Delayed due to slow response from DOE site users. Completed 7/1/99 1. FIU-HCET will support DDFA for LSDDP at Savannah River, including evaluation of EICs and preparation of the Innovative Technical Summary Report (ITSR). FIU-HCET reviewed the test plan for EIC. LSDDP began in June 1999 and is complete. FIU-HCET will review draft of the ITSR. 2. Deployment plan for Oak Ridge reviewed on April 17, 1999, and suggested changes were incorporated. Pending site approval of the plan.
C008-M3	Deployment of EICs at DOE site. Likely Oak Ridge (Bldg. 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	Due 5/17/99. Delayed due to pending approval of the test plan by Oak Ridge (Bldg. K-1420). Rescheduled for August 30, 1999 Possible that SRS LSDDP could be a demonstration as well as a deployment
C008-M4	Information flow- FIU-HCET development of work and controlling documents	Transmittal of procedures, instructions, manuals, and information on measuring contaminants on DOE sites	Due 10/30/99, on schedule
C008-M5	Final report	Report completed and issued	Due 11/30/99, on schedule

Significant events for this reporting period

- Coordination activities to support DDFA with the SRS LSDDP continued. As a part of the LSDDP, demonstration and deployment of the technology was performed at SRS. A draft of the ITSR on electret ion chamber technology for surface alpha contamination measurement is ready. It will be reviewed by FIU-HCET.
- Continued to receive request for reprints for the paper entitled "Ceramic Tiles as Inexpensive Large Area Test-beds for Electret Ion Chambers and other Instruments used for Measuring Alpha Contamination on Surfaces" presented at the 44th annual meeting of the Health Physics Society, Philadelphia, PA, June 27-July 1, 1999.
- Work on measurement of alpha particle energy for a mixture of two alpha emitters completed and analysis of measurements performed to determine alpha particle energies and their abundance. A paper entitled "Electret ion chambers for measurement of alpha particle energy,"

was prepared and circulated for internal review prior to submission for publication in Health Physics Journal.

- A paper entitled "Evaluation of electret ion chambers for measurement of surface alpha contamination in preparation for SRS-LSDDP," was presented at the American Nuclear Society 2nd Tropical Meeting on Decommissioning, Decontamination and reutilization of Commercial and Government Facilities, Knoxville, Tennessee, September 12-16, 1999.

Accomplishments and technical progress to date

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

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 demonstration and deployment of the EIC was completed at SRS as a part of the LSDDP. FIU-HCET reviewed the test plan of using EICs at the SRS LSDDP. A draft on the ITSR using electret ion chamber is ready. It will be reviewed by FIU-HCET. Test plan for deployment at Decontamination Recovery Services L.L.C. (DRS), Oak Ridge, which was reviewed by FIU-HCET liaison at Oak Ridge, was submitted for DRS approval. DRS reviewed the plan, and discussions were held on its implementation. DRS wants both alpha and beta contamination to be measured by an EIC.

  There are some difficulties with beta measurement. 1) As per scope of the project, the system has been calibrated for alpha sources only. For surfaces with both alpha-beta contamination, we measure beta contamination, which is subtracted from the total reading to obtain alpha contamination. 2) Response of EIC depends on beta energy, which means beta calibration standard should represent surface beta contamination. Procurement time for these calibration

standards is more than two months. These sources are expensive and unless DRS commits to testing and deployment of the EIC after calibration for beta is performed, the whole exercise may be futile. In September 1999 an FIU-HCET representative traveled to Knoxville to resolve the issues to enable early deployment. Discussions are in progress.

- Milestone 1 was completed on February 26, 1999. Milestone 2 is moving forward. Demonstration and deployment of the EICs for surface alpha contamination measurement has been performed at SRS LSDDP. Draft of the ITSR is ready and will be sent to FIU-HCET for review. However, deployment at DRS, which was rescheduled to August 30, 1999, is delayed due to slow user response. Based on recent progress and existing commitments, pending approval of DRS test plan, Milestone 3 will be delayed. Alternatively, deployment of EICs in the glovebox size reduction facility at Rocky Flats is being actively pursued. FIU-HCET is part of the project team. All FY99 project objectives are expected to be complete by the end of the fiscal year, although some milestones will be completed later than originally planned. User response continues to be a problem.
- Tests reveal that FIU-HCET found an important extension of the EIC technical performance in developing an inexpensive spectral measurement methodology and identification of alpha emitters.
- Measurements on tiles to determine thickness of the tile material embedding the alpha emitters uranium, thorium, and their decay products were begun.

Plans for the next two months

- Pursue floor characterization at Bldg. K-1420, DRS, Oak Ridge, to get commitment from user on actual date of deployment.
- Continue supporting the SRS-LSDDP and review the draft of the ITSR.
- Submit to Health Physics Journal a paper on application of the EIC for determination of alpha particle energy and identification of alpha-emitting radionuclides.
- Perform measurements on tiles to determine thickness of the tile material embedding the alpha emitters uranium, thorium, and their decay products.

FIU-HCET collaborator

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Review of Current Characterization and Monitoring Practices at DOE Sites

Project Number: HCET-1998-C009

Project objectives

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

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

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

Major milestones

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

Significant events for this reporting period

- Continued programming activities to improve the prototype database.
- An internet address was established that allows people to use and read the database.
- Continued editing the text describing baseline technologies.

Accomplishments and technical progress to date

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

Assessment of current status and issues

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

Plans for the next two months

- Continue programming activities to improve the prototype database.
- Initiate publicizing the database.
- Initiate Fiscal Year 2000 activities
- Finish writing the draft year-end report.

FIU-HCET collaborator

Hans Weger, (305) 348-6620

Demonstration and Deployment of CMST-CP Technologies

Project Number: HCET-1998-C010

Project objectives

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

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

To assist CMST-CP, FIU-HCET will:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C010-M1	Schedule & number of demonstrations and/or deployments	Definitive list of activities generated.	Completed on schedule 3/15/99
C010-M2	Choose sites	Deployment/demonstration sites identified.	Completed on schedule 3/31/99
C010-M3	Demonstrations	Complete scheduling and organization	Due 3/31/99, Completed 7/19/99
C010-M4	Deployment	Site commitment to deploy a selected CMST-CP technology.	Due 10/30/99, on schedule
C010-M5	Marketing	Multiple site users are briefed on technology capabilities.	Completed 7/8/99, ahead of scheduled date of 10/30/99

Significant events for this reporting period

- Pre-demonstration surveying of the facilities by baseline methods was performed by BNFL to set up a test area for LIFI. However, this survey found the surprising result that the main contaminant of concern is technetium, not uranium. The presence of technetium most places that also contain uranium negate the cost savings for deploying the LIFI system. It is much less expensive to decontaminate and then follow up with alpha and beta detectors. The need for an instrument to detect uranium, long believed to be the main contaminant, is no longer a need at Oak Ridge following the latest findings. The cause of the technetium contamination is not fully understood yet. Based on this new understanding, on September 15, BNFL cancelled the LIFI demonstration scheduled for September 21 at Oak Ridge.
- FIU-HCET set up a conference call with STL and BNFL to discuss the cancellation of the demonstration. A report concerning LIFI – its benefits and applicability to detecting uranium oxide contamination - and the cancelled demonstration was written and sent to several DOE personnel.
- After the demonstration cancellation, discussions were continued with DRS concerning demonstrating LIFI at Oak Ridge if a facility can be found with no technetium contamination and also on near-term schedule for D&D.

Accomplishments and technical progress to date

- Discussions about the project's scope with the CMST-CP representatives were held during the first quarter of FY99. A revised tasking list and milestone list were prepared.
- Based on the literature review of CMST-CP technologies and discussions with CMST personnel and the principal investigator at the CMST-CP Midyear review, the portable uranium survey tool using Laser-Induced Fluorescence Imaging (LIFI), developed by Special Technologies Laboratories (STL) in Santa Barbara, California, was selected for deployment assistance.
- Attended technology demonstration of LIFI at Oak Ridge that was arranged by STL with a contractor (before FIU0HCET was involved). The demonstration was insufficient in achieving all objectives. A further demonstration was determined to be necessary. One of the main objectives not fulfilled is the need to determine potential false-positives and their corrections that can be found in the field.
- Discussions were held with Oak Ridge personnel concerning their impression of LIFI after the March demonstration. This information was used to develop a demonstration and deployment strategy.
- Efforts to demonstrate and deploy the technology at Fernald were discontinued due to concerns stated by site personnel that contamination at Fernald includes both uranium(IV) and uranium(VI). LIFI can detect only uranium(VI). Therefore, site managers were reluctant to demonstrate or deploy LIFI.
- During the March demonstration at Oak Ridge, false-positives were obtained with certain materials. Samples of these materials (galvanized steel and paint) were obtained from a similar facility and sent to STL for analysis to help prepare for the September demonstration.

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

Assessment of current status and issues

Due to funding cuts from CMST-CP, the project scope was reduced. Discussions about scope with the CMST-CP representatives continued during the first quarter of FY99. The project work began in the second quarter. Milestones 1, 2, 3, and 5 were completed and remaining milestone 4 is on schedule. One milestone (M3) was completed late due to inability to get DOE Fernald and Oak Ridge sites to commit to a demonstration before September 1999. The surprise cancellation of the September 21 demonstration at Oak Ridge might result in milestone 4 being canceled by the D&D Focus Area.

Plans for the next two months

- Continue discussions with site managers and subcontractors for a demonstration of LIFI.

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

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

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

Major milestones

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

Significant events for this reporting period

- Concluded identification of technologies, either available or being developed, that meet post-closure needs of DOE sites.
- Continued writing the final report.

Accomplishments and technical progress to date

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

Assessment of current status and issues

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

Plans for the next two months

- Complete draft final and final reports for this project.

FIU-HCET collaborator

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IV. INTERNATIONAL TECHNOLOGY INTEGRATION (ITI) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET International Coordinator	**Ana Ferreira**
Focus Area Technical Lead	**Elizabeth O'Malley**
Program Officers	**John Wengle**
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Opportunities to Market U.S. Technologies Throughout the Western Hemisphere

Project Number: HCET 1996-I001

Project objectives

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

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

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

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

Major Milestones

Milestone No.	Milestone Description	Completion Criteria	Status
I001-M1	Database: Formulate a database of U.S. business contacts working in the field of environmental technologies	This milestone is ongoing.	Will continue to identify organizations to incorporate on database. Database will be incorporated onto the energy website. Due date: 12/10/99. Date was postponed from 9/10/99 to allow more time to work on database entries.
I001-M2	Interactive Communication Website: Maintain the Energy website for the members/participants of the Western Hemisphere Energy Initiative	Identify funding mechanism for the support of the Interactive Communication Website.	Business Plan on funding website has been completed. A draft letter officially recognizing FIU-HCET as host of the website has been submitted to DOE. Letter is in the process of being reviewed/signed. Due date: 9/28/99
I001-M3	Participate at the next Hemispheric Energy Steering Committee meeting in Lima, Peru.	Make a presentation of the 'Virtual Secretariat' and introduce FIU-HCET to participants of the Steering Committee.	Completed: 2/11/99
I001-M4	Enterprise Florida: Identify U.S. companies who would be interested in participating in the next Export Marketing Mission to Argentina, April 10-16, 1999.	Identify a minimum of 20 companies for mission. Enterprise FL has suggested that FIU-HCET participate.	Responses by companies were forwarded to Enterprise Fl. Completed: 3/2/99 ahead of schedule.
I001-M5	ITI Year End Report	Letter by EM/OST to accompany report needs to be sent to FIU-HCET publications.	Report was completed and a draft letter to accompany report was sent. Report has been reviewed by EM/OST. Letter to accompany report has been sent by EM/OST. Due Date: Completed 5/19/99
I001-M6	The Fourth USDOE International Decommissioning Symposium (D&D 2000)	Meet all scheduled Milestones developed and agreed to by DOE. Coordinate all international activities associated with this event.	Draft a list of Steering Keynoters, Executive.. Due Date: Completed 8/30/99 NOTE: This milestone has moved to project I002.
I001-M7	Open contract vehicle between the Office of International Affairs (IA) and FIU-HCET	Draft a Statement of Work and prepare a five-year budget plan.	Statement of Work and Budget were completed ahead of schedule (due date for this action item was 6/28). Copies were sent to International Affairs Budget and Procurement Officer. Due Date: 10/99 (date was changed by DOE to begin contract with their fiscal year)

Significant events for this reporting period

- FIU-HCET has completed the Hemispheric Energy Initiative Website Business Plan. The Business Plan will be forwarded to DOE officials at the Office of International Affairs. A pamphlet to send to private sector representatives interested in the energy site for posting of information and/or advertising is in the design process. A test page has been developed by FIU-HCET information technology representatives for the advertising and registration form that will be added to the official energy site.
- The special edition *news highlights* on the IV Energy Ministerial was prepared by an FIU-HCET representative and is in the process of being distributed to DOE officials.
- FIU-HCET representatives hosted a two-day visit with the Environmental Quality Center (EQC) of Chihuahua, Mexico, to discuss possible collaboration. A Memorandum of Understanding is in the process of being signed by representatives from FIU-HCET and EQC.
- An FIU-HCET representative will attend the 1999 Americas Conference where key business leaders, government officials, financiers, educators, and economists explore vital issues in an international and multicultural atmosphere.
- An FIU-HCET representative has been contacted by the Argentine Consulate for possible collaboration in hosting a meeting on energy and environmental technologies for the Argentine marketplace in May 2000. FIU-HCET will be in communication with the Deputy Consul-General to draft a proposal.

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 identify international opportunities for U.S. environmental technologies.

FIU-HCET collaborator

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International Deactivation and Decommissioning Symposium

Project Number: HCET-1999-I002

Project objectives

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

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

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

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

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

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

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

Major milestones

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

Significant events for this reporting period

- The Tradeshow subcontractor has been selected. Ed Helminski is under contract to provide services that include the Tradeshow execution, symposium marketing, and Technical Tour coordination.
- The new IDS 2000 Internet address has been selected. The web page has been established at <www.ids2000.org>. This page will be updated throughout the conference planning and execution stages.

Accomplishments and technical progress to date

Milestones IOO2-M2 and IOO2-M5 have been completed and their completion communicated to the IDS 2000 DOE-OR representatives.

Significant progress has been made in support of Milestones IOO2-M1, IOO2-M6, and IOO2-M7:

- Review notes for the draft Project Plan and Schedule were received from DOE-OR, incorporated, and resubmitted to DOE-OR for final approval.
- The proposed Steering Committee has been submitted to DOE-OR and is currently under review. Approval of this proposal will allow FIU-HCET to initiate recruitment of the proposed members.
- The Preliminary Announcement Brochure is ready for mailing. The mailing is expected to occur on 9/27/99.

Assessment of current status and issues

FIU-HCET efforts on Milestones IOO2-M1 and IOO2-M6 are on hold pending DOE-OR review and approval. Completion of this review is expected the week of 9/27/99. Acceptance of the Project Management Plan, recruitment of committee members, and initiation of committee meetings are all critical steps in ensuring the symposium receives the level of marketing and publicity that elicits participation by both DOE and private industry sectors, as well as the Oak Ridge community.

Plans for the next two months

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

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

FIU-HCET collaborators

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