HCET News Highlights

May 1999

Hemispheric Center for Environmental Technology, Florida International University

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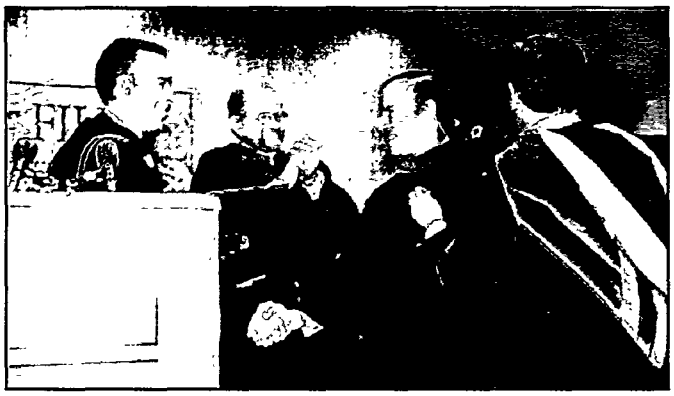
Honorary Degree– Carlos Saúl Menem, President of Argentina

On March 23, 1999, Florida International University honored His Excellency Carlos Saúl Menem with an honorary degree, a Doctor of Public Service.

Attending were Dr. Mark B. Rosenberg, Provost; Dr. Modesto Maidique, President of Florida International University; Dr. Mark Szuchman, Associate Dean, College of Arts & Sciences; Eduardo Gamarra, Director, Latin American and Caribbean Center; Joe Carollo, Mayor of Miami, Ambassador Guellar; Consul General Goni; and many other distinguished guests.

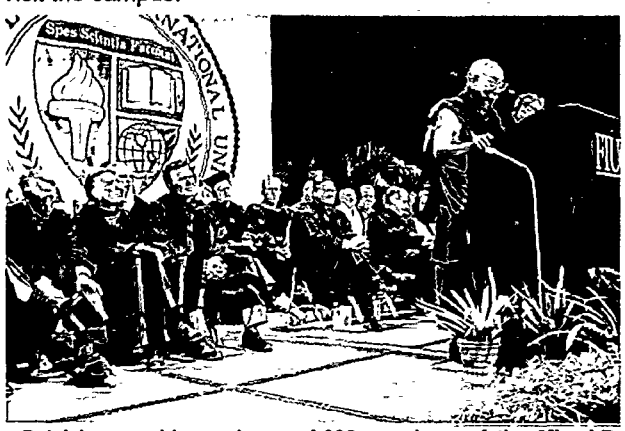


Carlos Saúl Menem, President of Argentina, receives an honorary degree at Florida International University.

President Menem permitted a short session of questions and answers after the official ceremony. Sponsored by Spectrum Communications, the activities were held in the East Ballroom located at FIU's Graham Center Building at University Park.

Dalai Lama Delivers Message of Peace at FIU

At a special commencement held in his honor, His Holiness Tenzik Gyatso, the 14th Dalai Lama of Tibet, was welcomed at FIU by thousands of visitors and the largest media contingent to visit the campus.



The Dalai Lama addressed over 4,000 members of the Miami-Dade County Community. Behind the Dalai Lama include FIU President Modesto Maidique, Florida Governor Jeb Bush, and University Provost Mark Rosenberg.

Keynote Speakers at HBCU/OMI Symposium Target Diversity for Workforce

Two keynote speakers at the annual symposium of Historically Black Colleges and Universities and Other Minority Institutions echoed one another about maintaining diversity in the workforce of the 21st century.

Keynote speaker Ralph Peterson, president and CEO of CH2M Hill, an environmental engineering services company, said that there has been a significant drop in minority enrollments in engineering fields in the past five years. "Where do I find the talented people to grow my company?" Peterson asked. "How do I continue with a diversified workforce in the next 50 years?"

The Consortium of Historically Black Colleges and Universities and Other Minority Institutions (HBCU/OMI) held the symposium March 16-18 at the Radisson Mart Plaza Hotel in Miami, Florida. The symposium was sponsored by the U.S. Department of Energy's Office of Fossil Energy, the Federal Energy Technology Center, the Office of Economic Impact and Diversity, and Florida International University.

Speaking to approximately 225 conference attendees, Esther Aquilera, a special assistant on minority affairs at the U.S. Department of Energy (DOE), said that the pipeline of talented job candidates, especially women and minority candidates, has suffered in recent years. She said that about 25% of department personnel are at or near retirement and that the department's focus on workforce reduction due to budget constraints has contributed to this situation.

Referring to Energy Secretary William Richardson's strategic themes for the Department of Energy, Aquilera said that tapping the talents of a diverse population was not just semantics, but a matter of survival. The DOE was committed to building a talented workforce, to training and to supporting minority institutions, she said. In fact, DOE has funded the Consortium of Historically Black Colleges and Universities/Other Minority Institutions for over 10 years.

Aquilera said that the department is taking various initiatives to attract women and minorities and to move these groups into GS 13-15 or higher ranks of service. Each DOE office is required to submit a plan for building such a workforce for the 21st century.

CH2M Hill has partnerships with Clark Atlanta University, University of Texas at El Paso, and Florida International University, where, Peterson said, he finds a "treasure trove of talented people."

"We have not done enough to prevent a train wreck in terms of human resources," Peterson said. The long-term effect of an undiversified workforce, he added, will be cultural and creative weakness as well as loss of technical expertise.

HCET, FIU Participate in HBCU/OMI Consortium

Nearly 200 representatives from the 17-member Consortium of Historically Black Colleges and Universities and Other Minority Institutions (HBCU/OMI) met March 16-18 in Miami, Florida, for the group's seventh annual technical symposium, "Making a Difference in the 21st Century."

The symposium featured presentations of energy-related research by HBCU/OMI students and faculty and by energy companies and state, local, and federal government offices that are partners with various member institutions.

Sponsored by the U.S. Department of Energy and its Office of Fossil Energy, the Federal Energy Technology Center, the Office of Economic Impact and Diversity, and Florida International University, which hosted the event, the conference provided a forum for attendees to discuss areas of research that would lead to collaborations and partnerships with industry and with government agencies. Representatives from the Lawrence Livermore and Los Alamos National Laboratories, from various DOE and DOD offices, from the Plasma Physics Laboratory at Princeton University, from Lockheed Martin, CH2M Hill, from the Nuclear Regulatory Commission, the U.S. Departments of Agriculture and Interior, and from the National Aeronautics and Space Administration gave presentations about the collaborative work underway with members of the HBCU/OMI. They discussed opportunities available to minority institutions within their agencies or companies.

HBCU/OMI Symposium Participants: Top picture, from left to right: Deputy Assistant Secretary of the Office of National Gas and Petroleum Technology, U.S. DOE, Philip Vasquez; HCET Director, M.A. Ebadian; Director of FETC, Rita Bajura; FIU Provost Mark B. Rosenberg. Bottom picture, from left to right: Director of Air Force Office of Small and Disadvantaged Business Utilization, Anthony Deluca; HCET Director, M.A. Ebadian; Deputy Assistant Secretary of the Office of National Gas and Petroleum Technology U.S. DOE, Philip Vasquez; and USAF Mentor Protégé—Program Manager, Janie B. Campos.

Eighteen technical papers on numerous environmental technology projects and basic and applied research being conducted by the member institutions were presented at the symposium. An undergraduate student poster competition was also held to showcase student/professor partnership research.

Spotlight on Mobile Pipe Decontamination and Characterization System

Problem. D&D requires the disposition of miles of pipe. Pipe varies in size, material, contaminants, and coating. Large-bore pipe presents particular difficulties because it is potentially contaminated internally and externally. Current decontamination and characterization systems cannot handle this geometry. Methods are costly, labor-intensive, and do not take advantage of recycling.

Solution. The mobile PDC-624 system provides semi-automated internal and external decontamination of pipe with diameters between 6 and 24 inches and characterization according to DOE Order 5400.5 and/or Regulatory Guide 1.86. The system is self-contained and field-mobile and represents a collaborative effort between FIU-HCET and U.S. DOE-EM's Office of Science and Technology's Deactivation and Decommissioning Focus Area, Federal Energy Technology Center.

System Description. The PDC-624 system consists of three subsystems: decontamination, characterization, and material handling. The process design provides material flow-through with minimal operator involvement.

1. The entrance conveyor transfers material to a centrifugal wheel grit blast system for external surface decontamination.
2. Conveyor then goes through the compressed air-driven lance blasting system for internal surface decontamination.
3. Material is then transferred to the characterization subsystem, which is capable of meeting requirements for unrestricted reuse of reactor and uranium contaminated components and proving that material is not contaminated with transuranic contamination and can be disposed of as low-level radioactive waste.
4. System components are housed in tight containers to facilitate transportation from site to site.
5. The decontamination system has a nuclear-grade HEPA ventilation system.
6. Roll-off boxes separate contaminated material from non-contaminated with an automated kicker system.

Each sample analyzed in the characterization system is assigned a unique identifier permanently marked on the part. The identifiers reference a database, thereby providing a complete data management and tracking system.

For further information on this project, contact Rob Rose at rrose@eng.fiu.edu.

Dr. Dua Selected

Dr. Surendra K. Dua, HCET D&D Project Manager, has been named chairperson of the Radiation Control Committee for Florida International University. As part of the University's Health and Safety and Risk Management Services, the Radiation Control Committee is responsible for advising the radiation safety officer on all aspects of health and safety in relation to radiation procedures. It assists in establishing new policies and procedures to comply with any new directive. The committee recommends such administrative practices and procedures as may be considered necessary, at least semiannually, or at the request of the chairperson.

DISCLAIMER

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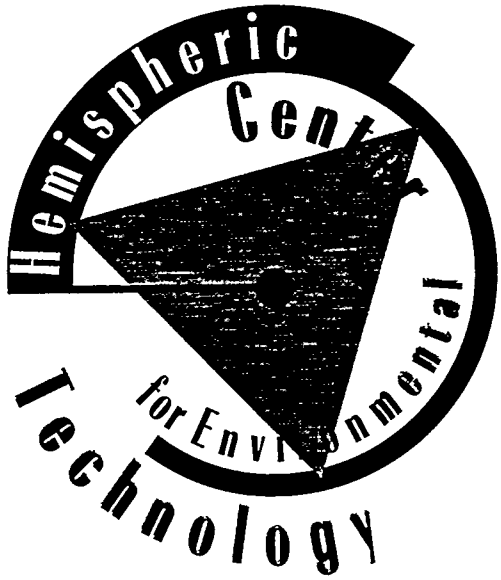
HEMISPHERIC CENTER FOR ENVIRONMENTAL TECHNOLOGY

MONTHLY PROGRESS REPORT

FISCAL YEAR 1999

DE-FG21-95EW55094



APRIL 1999

FIU Principal Investigator — M.A. Ebadian
Focus Area Technical Lead — Paul Hart
Program Officers — John Wengle
Karl-Heinz Frohne

http://www.hcet.fiu.edu

SUMMARY

- The final data package has been completed for the Mississippi State University, DIAL FTP Wall Depth Removal Characterization Technology. The package has been sent to DIAL for comments.

- Work is progressing on completing the transfer of glove boxes and tanks from Rocky Flats to FIU-HCET for the purpose of performing size reduction technology assessments. Vendors are being identified and security measures are being put in place to meet the High Risk Property criteria required by Rocky Flats.

- The FIU-HCET Technology Assessment Program has been included as one of 11 verification programs across the United States and Canada described in the Interstate Technology Regulatory Cooperation (ITRC) document, "Multi-state Evaluation of Elements Important to the Verification of Remediation Technologies," dated January 1999. FIU-HCET will also participate in a panel discussion on technology verification programs at the International Environmental Technology Expo '99.

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

MONTHLY PROGRESS REPORT

FIU Principal Investigator	M.A. Ebadian
FIU D&D Program Manager	Rob Rose
Focus Area Technical Lead	Paul W. Hart
Program Officers	John Wengle
	Karl-Heinz Frohne

http://www.hcet.fiu.edu

Deactivation and Decommissioning Technology Assessment Program

Project Number: HCET-1996-D038

Project objectives

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M1	Publication of the Technology Assessment Reports	Completion of 16 technology demonstrations and each summarized in monthly reports within 60 days after the demonstration.	Two technologies evaluated for various applications for a total of three demonstrations. Two technologies are scheduled for April. The PPPL demo is scheduled for July.

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M2	Test Plan for Characterization Technologies Assessment Program	Characterization Technology Test Plan Approved	Under development. Scheduled completion 4/30/99.
D038-M3	Test Plan for Waste Management Technologies Assessment Program	Waste Management Technology Test Plan Approved	Revised scheduled start 5/17/99. Scheduled completion 6/30/99.
D038-M4	Access to the multimedia information system web-based user interface for dismantlement	Assignment of user name and passwords to DDFA provided distribution list.	Design started 12/7/98. Scheduled completion 10/1/99.
D038-M5	Access to the information system characterization database	Assignment of user name and passwords to DDFA provided distribution list.	Scheduled start 7/6/99. Scheduled completion 10/29/99.
D038-M6	Report on the information system waste management design	Final copy of report sent to DDFA.	Scheduled start 10/1/99. Scheduled completion 10/29/99.
D038-M7	Report on the decision analysis tool for dismantlement design	Final copy of report sent to DDFA.	Scheduled start 7/6/99. Scheduled completion 10/29/99.

Significant events

- Bluegrass Concrete Cutting, Inc. is working closely with Princeton Plasma Physics Laboratory (PPPL) to revise the Test Plan and review mockup designs of the Tokamak Fusion Test Reactor. A teleconference was held on April 7th with the vendor to discuss a plan forward for the demonstration, which is scheduled for July 1999. Everything is proceeding as scheduled.
- Demonstration of the ElectroStrip™ technology by EMEC Consultants was performed on 4/12/99–4/14/99.
- Demonstration of the En-vac Blasting Systems by the MGI-ME Ltd. is tentatively scheduled for 6/7/99 – 6/11/99. The technology will be assessed on decontamination (coating and aggressive removal) of metal and masonry surfaces.
- The transfer of non-contaminated gloveboxes and tanks from Rocky Flats to FIU-HCET for the purpose of performing size reduction technology assessments was completed April 16, 1999. Work is progressing on completing the test plan and scope of work. Demonstrations are expected to begin in mid-summer.
- A test plan for assessing technologies for facility (masonry walls, floors, and ceilings) dismantlement has been completed. This assessment project is expected to evaluate technologies such as diamond wire cutting, expansive grout, etc. Demonstrations are expected to begin in early FY00.
- FIU-HCET is working with the International Union of Operating Engineers (IUOE) to identify assessment projects to be performed together at the IUOE facility in Beaver, WV. Potential assessment projects include the decontamination of interior/exterior of tanks, worker protection monitoring or retrieval systems for confined space areas, and locating underground drums or piping. FIU-HCET would evaluate the performance and cost aspects of the technologies, while the IUOE would perform the human factors evaluation.

- The Technology Assessment Program (TAP), Technology Evaluation and Assessment Summary, for the Mississippi State University, DIAL's, Fourier Transform Profilometry characterization technology is attached.

Accomplishments and technical progress

- Under this grant project, which began in FY96, and earlier technology assessment projects funded from other sources, FIU-HCET assessed over 60 innovative/improved and baseline technologies for decontamination and equipment dismantlement under standardized, non-nuclear testing conditions. Many of the technologies identified for demonstration at FIU-HCET are selected to address the needs identified in the EM-50 Needs Management System (http://EM-Needs.em.doe.gov/Home/). As a result of these assessments, directly comparable performance data related to operations and maintenance, primary and secondary waste generation, and health and safety has been compiled. This data has been valuable in assessing if 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.
- To date, three technologies have been demonstrated in multiple applications for a total of four assessments in FY99. Additional technology assessments scheduled include the following:
  - Universal Ice Blast - April 26, 1999
  - Envac - mid-June
  - PPPL diamond wire saw demonstration – end of July.

Assessment of current status

This project is on schedule. Three technologies have completed assessment, and three additional technologies are scheduled. A test plan for assessing facility dismantlement technologies has been completed.

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

Plans for the next two months

Activities for the next two months include the following:

- Continue technology search for FY99 demos. Demonstrate two technologies, Ice Blast and EnVac, by the end of June 1999.
- Complete the test plan for the Glove Box and Tank size reduction technology assessments and begin scheduling technologies for demonstration.

- Complete the test plan for Facility Characterization by April 30, 1999. Begin identifying technologies for demonstration.
- Begin drafting the test plan for Waste Management technology assessments.
- Complete the design of the multimedia information system for dismantlement and beginning programming.

FIU-HCET collaborator

Susan C. Madaris, (305) 348-3727

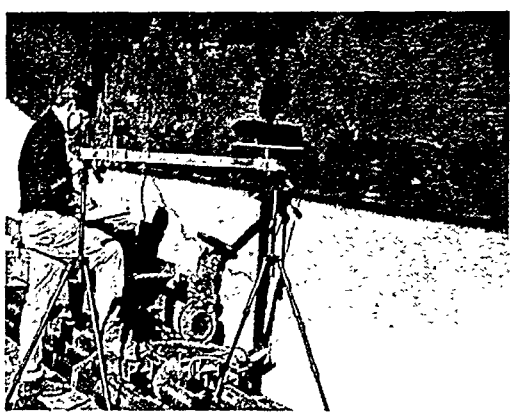
TECHNOLOGY ASSESSMENT PROGRAM (TAP)
Technology Evaluation and Assessment Summary

Fourier Transform Profilometry

DEMONSTRATION OBJECTIVE

The Fourier Transform Profilometry (FTP) was demonstrated at FIU-HCET in December 1998 by Diagnostic Instrumentation and Analysis Laboratory (DIAL) at Mississippi State University. The objective of the survey demonstration was to determine the amount of material removed from a vertical concrete wall, measuring 20 feet long by 10 feet wide and compare the results with professional surveyor's results.

TECHNOLOGY DESCRIPTION



Mississippi State University DIAL's FTP Technology System (Projector, Camera, and Laptop).

The FTP technology is a survey technique based on images, which measures the profile of a surface. The system consists of a standard slide projector, a video recorder, and a computer. The projector and the video recorder are mounted on a tripod, which can be placed anywhere from 2 ft to 30 ft from the surface in question. The FTP projects a structure light pattern onto the surface. This pattern is distorted, or warped by irregularities in the surface. Portions of the object that are closer to the camera cause the lines to squeeze together and areas farther from the camera cause the lines to spread apart. This difference in line spacing provides information on the shape, or profile, of the surface. If changes are being made to the surface, then images of the surface both before and after the change are collected. When the two images are compared, changes in depth can be determined.

RESULTS

The FTP technology characterized 33 square feet on a scabbled concrete wall, and the system was located 55 inches distance from concrete wall and 45 inches high (floor to projector). Production rates for survey on scabbled concrete wall was 9.8 minutes/image. Characterization results reported that 1.5% of the surface was scabbled to a depth equal to or exceeding 2 mm (~0.1 in) and the maximum depth of removal (pointwise) was 2.26 cm (~0.89 in).

The feedback time is relatively short; thus, critical decisions regarding surface depth can be made during the removal process. However, the technology cannot be moved once initial measurements are made, allowing only one surface to be measured at a time. The FTP technology had difficulty taking images during daylight. The sunlight interfered with the projector, and light patterns were not visible; thus, the images could not be collected.

FTP-DIAL technology was not able to survey the total area given (200 square feet) because the decontamination technology had technical problems and could not complete the wall. Due to the small sample size, a comparison to professional measurements could not be performed.

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

Integrated Vertical and Overhead Decontamination System

Project Number: HCET-1998-D023

Project objectives

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D023-M1	Selection of Industrial Partner to design and manufacture decontamination and deployment systems	Selection of a responsible and qualified vendor	In progress. See section "Assessment of current status" for detailed explanation
D023-M2	Approved Design Specifications for the Decontamination System	Approval of final design specifications for the decontamination system	Scheduled completion 4/6/99.
D023-M3	Fabrication of Decontamination System	Complete fabrication of decontamination system unit	Scheduled completion 7/30/99
D023-M4	Field Testing of Decontamination System	Completion of testing of decontamination unit at FIU-HCET Test Site	Scheduled completion 8/16/99.
D023-M5	Design Drawings for the Characterization System	Approval of final design specifications for the characterization system	Scheduled completion 6/1/99
D023-M6	Fabrication of Characterization System	Complete fabrication of characterization system	Scheduled completion 9/30/99.
D023-M7	Testing the Characterization System	Completion of characterization system testing at FIU-HCET	Scheduled completion 10/15/99
D023-M8	Final report on the Decontamination and Characterization System.	Deliver final report to DDFA-determined distribution list	Scheduled completion 11/30/99

Significant events

- Bid Opening was conducted on April 2, 1999. A total of two bids were received.

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

Accomplishments and technical progress

- Bid Opening was conducted on April 2, 1999. Two bids were received and reviewed.
- Performance Specification documents that included conceptual designs of the decontamination and deployment systems were sent for review to the DDFA Program Manager and FIU-HCET Senior Program Manager. Comments received were implemented by the end of January 1999. The reviewed documents and comments have been documented and are available.
- Vendor selection process is currently being carried out. Requisition form and Performance Specification document were sent to FIU-Purchasing on February 9. Vendors received Invitation to Bid package on March 11, 1999.
- During FY98 an extensive search for decontamination technologies was conducted. Several sources were utilized, including Remedial Action Program Information Center (RAPIC), FIU-HCET databases for decontamination technologies, and others. Eight technologies were shortlisted for comprehensive analysis to determine the optimum technology to deploy. The criteria for final selection were the following:
  - Removal capabilities
  - Production rates
  - Cost information
  - Waste generation
  - Health and safety.
- Based on the comprehensive technology analysis, the Marcrist Diamond Wheel Shaving Technology was selected for deployment.
- In addition to the selection of the optimum decontamination technology, the characterization technology and deployment platform selection criteria were determined, and screening of

potential technologies to integrate with the selected decontamination technology has commenced.

- For additional details on accomplishments and technical progress, refer to the Integrated Vertical and Overhead Decontamination System FY98 Year-End Report.

Assessment of current status

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

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

Plans for the next two months

Activities for the next two months include the following:

- Place contract with selected vendor.
- Submit PTP milestones revision to DOE-FETC.
- Start test site development and construction.

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 subtask include the following:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D039-M1	Release 1 of the TIS	User Access to the functional LSDDP-TIS via the Internet	Completed on schedule on 1/4/99.
D039-M2	Information from new LSDDPs incorporated	Screening data from new LSDDPs accessible through TIS	Scheduled completion – 3/1/99 delayed – data still being received.
D039-M3	Information on DOE's baseline technologies and FIU-HCET's Technology Assessment Program incorporated	Information on DOE baseline and FIU-HCET-assessed technologies accessible through TIS	Scheduled completion – 3/1/99 delayed. Vendor information not available and being researched.
D039-M4	Information from DOE databases incorporated	Data from DOE designated databases accessible through TIS	Ongoing – Scheduled completion – 4/30/99
D039-M5	TIS Linked to other D&D Technology Web Sites	Users of TIS provided with hyperlinks to other technology web sites	Scheduled completion –6/30/99
D039-M6	Final Report	Final report on results of the project delivered to DOE.	Scheduled completion – 10/31/99
D039-M7	DDFA decision on other Media to Access TIS	Users able to access TIS information via other media such as telephone and return fax.	If approved, scheduled for FY-00.

Significant events

Within the scope of the project, all recommendations proposed by the LSDDP-TIS beta testers have been implemented. Some of the enhancements include the following:

- New user-friendly interface
- New and faster search engine
- Composite DOE-FETC and FIU-HCET header
- More legible report layout.

The enhanced version of the LSDDP-TIS is accessible via the Internet at web site http://www.dandd.org/lsddp-tis.

Accomplishments and technical progress

- Information on all innovative and baseline technologies assessed in connection with LSDDPs at the Chicago Pile CP-5 Reactor, Hanford-C-Reactor, and Fernald Plant-1 have been collected and entered into the TIS database.
- HCET Technology Assessment Program information has been exported to the TIS database.
- Data conversion utilities have been developed for converting technology data in DOE's technology databases for export to the TIS database. Conversion will be completed by April 30, 1999.
- Technology screening datasheets from the four new LSDDPs are being collected. Summarized below is the status of datasheet collection and entry into the LSDDP-TIS database.

New LSDDP Sites	# of Technologies Reviewed at LSDDP to Date	# of Datasheets Received at FIU-HCET to Date	# of Datasheets Entered into TIS to Date
Mound Environmental Management Project (MEMP)	63	63	63
Savannah River Site (SRS)	45	45	-
Idaho National Environmental Engineering Laboratory (INEEL)	123	48	41
Los Alamos National Laboratory (LANL)	41	41	41

Assessment of current status

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

Plans for the next two months

- The new LSDDP-TIS web site will be fully implemented.
- Work will be completed on linking the LSDDP-TIS web site to other D&D technology web sites.
- The additional data from SRS and INEEL LSDDPs will be entered into the LSDDP-TIS database.

FIU-HCET collaborator

Mabel Acosta, (305) 348-6650

Ex-Situ Large-Bore Pipe Decontamination and Characterization System

Project Number: HCET-1997-D017

Project objectives

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

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D017-M1	Title III of the decontamination system complete	The completion of Title III provides for a complete decontamination system ready for a field assessment.	Ongoing. Scheduled completion 6/30/99. Delivery schedule for container has impacted the completion date. This delay does not place this item on the critical path.

Milestone No.	Milestone Description	Completion Criteria	Status
D017-M2	Field testing of the decontamination system	The decontamination system will be tested to ensure the performance specifications are met. This will be accomplished by witnessing the cleaning of five tons of pipe of various diameters.	Ongoing. Scheduled completion 4/20/99
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 completion 7/30/99
D017-M4	Title I of the characterization system complete	FIU-HCET will approve initial design details of the characterization system and the costs associated with the characterization system.	Completed 11/30/98
D017-M5	Title II of the characterization system complete	FIU-HCET will approve initial design details of the characterization system and the costs associated with the characterization system.	Scheduled completion 2/16/99*. Actual completion date 2/18/99.
D017-M6	Title III of the characterization system complete	The completion of Title III provides for a complete characterization system ready for a field assessment.	Scheduled completion 7/28/99*
D017-M7	Field testing the characterization system	The characterization system will be tested to verify that it meets performance requirements by characterizing five tons of pipe of various sizes and contaminant types.	Scheduled completion 9/14/99*
D017-M8	Close-out of characterization system	This milestone requires the completion of all required activities, including operation/maintenance procedures. Five people from FIU-HCET will be trained on the operation and maintenance of the system. The completed system will be turned over to FIU-HCET for operation and integration with the decontamination system.	Scheduled completion 11/30/99**
D017-M9	Final Report on the decontamination and characterization system	Final report detailing the technology assessment process and the design, fabrication, and testing of the system will be completed and issued. The final report will be distributed through the Remedial Action Program Information Center (RAPIC) and the DDFA mailing list database and will be available on the FIU-HCET Home Page.	Scheduled completion 11/30/99
D017-M10	Large-scale field deployment of ex-situ large-bore pipe characterization and decontamination system.	The integrated characterization and decontamination system will be deployed at an environmental restoration site.	Scheduled completion 1/19/00

* This date has slipped 18 days due to problem with procurement of conveyor.

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

Significant events

- The blast cabinet and conveyor system for the decontamination system has been fabricated. The major system component fabrication was completed in January 1999. The initial run-off of the system was a success, and the system was able to clean the internal and external surfaces of a 10-inch pipe. Final system fabrication is underway with the second run-off scheduled for the third week of March 1999. Punch list items remain for the final run-off prior to installing the equipment in the container. This run-off will take place during May 1999. The equipment will be installed in the container during the month of May 1999.
- The ventilation container was delivered to Delong Equipment on February 23, 1999, to facilitate the installation of the ventilation equipment.
- The procurement of the decontamination container is complete. The revised delivery schedule for the container is May 14, 1999.
- The Title II design documents were received on Janaury 29, 1999. The Title II design review meeting was held at Canberra on February 10, 1999. Comments were incorporated, and the FIU acceptance letter was sent to Canberra on February 18, 1999.
- Three of the four transportation trailers have been delivered. The fourth and final trailer will be delivered during May 1999.
- The contract for the material off-loading system has been awarded. Design drawings are currently being developed.
- The air cooler dryer has been delivered.

Accomplishments and technical progress

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 involve laying out the system to fit into transportation containers. All critical issues have been resolved, and the system design indicates the performance specifications will be met.

Title I and Title II design are complete. Title III design is currently being performed.

Design and Fabricate Characterization System

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

Assessment of current status

- The characterization system is on schedule. The current schedule is valid with no major concerns anticipated.
- Delays in completing the final material run-off prior to installing the system in the container are not on the critical path. The schedule will allow slippage in this final run-off without affecting the technology demonstration date.

Plans for the next two months

- The transportation container for the decontamination system will be designed and fabricated. Scheduled completion May 14, 1999.
- The final material run-off for the decontamination system will be complete prior to installing the components in the container. Scheduled completion May 10, 1999.
- The procurement for the material off-loading system is complete and the design is underway.
- All ventilation equipment will be installed and operationally checked. Scheduled completion May 30, 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.)

- The decontamination system will be installed into the decontamination container.

FIU-HCET collaborator

Joe Boudreaux, (423) 220-8844

In-Situ Pipe Decontamination System

Project Number: HCET-1999-D041

Project objectives

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

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

The objectives of the project are the following:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D041-M1	Technology selection complete	Determine optimum technology to deploy considering production rate, decontamination factor, and safety factors	Completed 2/1/99
D041-M2	Design plan complete	Peer review of design plan complete and approved	Scheduled completion 2/23/99. Deferred to 3/31/99 due to revisions in approval requirements.
D041-M3	Approved design drawings and cost-benefit analysis	Peer review of final design drawings and the cost to complete approved	Scheduled completion 6/11/99
D041-M4	Prototype system complete and demonstration test plan developed	Fabricated prototype system ready for tests and demonstration test plan approved	Scheduled completion 10/15/99

Significant events

- Construction of concept testing platform begun (CTP). A mock-up of an in-situ pipe decon system is being built to test concept models. Attachment, containment, and traversing methods will be tested.
- IPDS concept drawings are in design review.

Accomplishments and technical progress

- Candidate technologies for in-situ decontamination of pipes were screened and a list completed. (See December MPR Appendix A.)
- Candidate technology has been selected (See this MPR Appendix A.)
- Comments have been resolved and Design Plan approved
- IPDS concept drawings are 41% complete
- FIU-HCET is in discussions with national decontamination firm regarding teaming partnership.

Assessment of current status

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

Plans for the next two months

FIU-HCET will

- Perform design testing on concept testing platform.
- Continue discussion with commercial partners regarding participation in this project.

FIU-HCET Collaborators

Stan Vallidum, (305) 348-6554
S.K. Dua, (305) 348-1640

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. Florida International University's Hemispheric Center for Environmental Technology (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.	February 28, 1999 completion date rescheduled to April 15, 1999.
D042-M2	DOE-FIU-HCET decision to proceed and NPR sites to be studied	Based on level of participation, a decision by DOE and FIU-HCET on whether to proceed with the project.	April 15, 1999 completion date rescheduled to April 30, 1999.
D042-M3	Site needs assessment	Identification of key problem sets facing each NPR scheduled for decommissioning.	Scheduled to begin April 1999.
D042-M4	Technological solutions	Identification of candidate technologies for addressing problem sets identified in milestone 3.	Scheduled to begin July 1999.
D042-M5	Final report production and distribution	Report summarizing problem sets and potential technological solutions submitted to DOE and upon approval distributed to NPR sites and candidate technology providers.	To be completed before October 31, 1999.

Significant events

- Further attempts were made to contact the remaining 26 site managers who had not responded to the initial request for participation. Eight were contacted and the remaining 18 who did not respond by April 20, 1999, are assumed to be uninterested in participating in the survey (see Appendix A).

Accomplishments and technical progress

Of the 43 NPRs included in the survey (see Appendix A):

- 18 did not respond to FIU-HCET's request for participation and information.
- 10 responded that they are unable to participate in the survey.
- 12 indicated that they do not have any immediate plans for decommissioning but would be willing to work with FIU-HCET in identifying potential problem sets and technology needs that may be encountered during the D&D of NPRs and corresponding technology solutions.
- 2 (State University of New York in Buffalo and University of Virginia) have already identified specific needs and would welcome FIU-HCET's assistance in completing their needs assessment and identifying technological or process solutions.
- FIU-HCET is already providing D&D support to Georgia Institute of Technology.
- 17 of the 25 respondents have already filed, or plan to file, for extension of their licenses when they expire.

Assessment of current status

- The Phase I report on the project was due on February 28, 1999, but was delayed due to slow responses from NPRs surveyed. This report has now been completed (results are summarized in Appendix A) and a formal recommendation to continue to Phase II will be sent to DOE-FETC on April 26, 1999.
- 3 NPRs have indicated immediate and near-term needs for D&D technologies. 12 have indicated potential long-term needs. Assuredly, similar needs will exist among those NPRs that either did not respond to the survey or cannot provide information on their D&D plans at this time. Based on this need and the level of interest and participation expressed by survey respondents, FIU-HCET proposes proceeding to Phase II of this project.

Plans for the next two months

- On April 26, 1999, FIU-HCET will submit to DOE-FETC a report outlining those NPRs that have committed to participate in the study. Based on this information and the expected participation level of site managers, FIU-HCET in consultation with DOE-FETC will decide whether to proceed to Phase II of the project.

- If a decision is made to proceed to Phase II, FIU-HCET will begin working with selected NPRs in defining D&D problem sets, developing technology needs assessments, and identifying feasible technology solutions. The intent is to develop a decision model that NPR site managers will be able to use to identify feasible technology solutions for their D&D problems.

FIU-HCET collaborator

Robert Tucker, (305) 348-6181

Appendix A: U.S. NRC-Regulated Nuclear Non-power Reactors

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
Aerotest San Ramon, CA	Triga (Indus) 07/02/1965	2005	2005	Research, education and radiation services.	Mr. Richard L. Newacheck, G.B.Cozens, Supv, J.G.Adams, Mangr Phn: = 925-866-1212 (Ray) Aerotest Operations, Inc., ARRR Reactor 3455 Fostoria Way, San Ramon, CA	Has contingency decommissioning plan	**Plans to renew license. Extended invitation to FIU-HCET to visit facilities to identify future needs. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**
Armed Forces Radiobiology Research Inst. Bethesda, MD	Triga 06/26/1962	NA	2002	NA	Mark Moore, Administrator National Naval Medical Center, 8901 Wisconsin Ave, Bethesda Md 20814 Fax = 301-295-0735 Phn: 301-295-1290 Public Affairs Officer: pao@mx.afrri.usuhs.mil	NA	No Response to follow-up voice mail message
Cornell University Ithaca, NY	Triga Mark II 01/11/1962	2003	2003	Research and education	Mr. Paul I. Craven TRIGA Reactor Operations Phn: (607)255-2370 E-mail: pic1@cornell.edu **Dr. Uno or Scott Lassel**	Does not have a decommissioning plan	Plans to renew license for the next twenty years.
Cornell University Ithaca, NY	Zero Power 12/11/1962 (POL)	-	2002	-	Mr. Martin Moravek Gamma Cell Operations Phn: (607)255-9420 E-mail: mm129@cornell.edu	-	Plans to renew license for the next twenty years.
Dow Chemical Company Midland, MI	Triga 07/03/1967	NA	2007	NA	Mr. William Kocher, Reactor Supervisor Radiochemistry Research Lab, 1602 Building Midland Mi 48640 Phn: 1-517-636-0304 Fax: 517-832-1465	NA	No Response to follow-up voice mail message
General Atomics Mark I San Diego, CA	Triga Mark I 05/03/1958 (POL)	NA	1998	NA	www.gat.com triga@gat.com Junaid Rosby Phn: (619) 457-8820 Fax (619) 457-8786	NA	No Response to follow-up voice mail message
General Electric Company Pleasanton, CA	Nuclear Test 10/31/1957		1997		F. A. Arlt, Facilities Manager GE Company, Vallecitos Nuclear Center P.O. Box 460, Pleasanton Ca 94566 Fax 510-862-4516 Phn: 510-862-221		Reactor shut down 26 October 1977

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
Georgia Institute of Technology Atlanta, GA	Heavy Water 12/29/1964 (POL)		2004		Dwayne.blaylock@nnrc.gatech.edu for general information, and arlene.smith@nnrc.gatech.edu for administrative queries		**FIU-HCET already working with Georgia Tech on D&D plan.**
Idaho State University Pocatello, ID	AGN-201 #103 10/11/1967	Already expired	2007	Education	Mr. Todd Gasauge Idaho State University Campus Box 8106 Pocatello, ID. 83209-8106 Phn (208) 236-3637 FAX (208) 236-4649 E-mail: icsa@apollo.physics.isu.edu	Does not have a decommissioning plan	Intends to renew license.
Iowa State University Ames, IA	Argonaut 10/16/1959	2003	1999	Research and education	Scott Wendt Mechanical Engineering Department 2025 H. M. Black Engineering Building Iowa State University Ames, Iowa 50011-2161 Phn: 515-294-1423 Fax: 515-294-3261 E-mail: isume@iastate.edu	Has been submitted to NRC	**Currently working with Argonne National Lab in the decommissioning phase. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**
Kansas State University Manhattan, KS	Triga 10/16/1962	2001	2002	Research and education	Mr. Brendan Ryan, Reactor Facility Manager, Phn: (785)-532-6657 E-mail: ibryan@ne.ksu.edu	University only has the initial/draft NRC decommissioning plan.	**Plans to renew license. Mr. Ryan is a member of the American Nuclear Society and would be interested in the results of our inquires. Would like to see info. regarding methods chosen and remediation. Willing to work with FIU-HCET in identifying problem sets and needs.**
Manhattan College Bronx, NY	Tank 03/24/1964	Has been decom. Already.	2004	NA	Dr. Willium P. Duggan, MechEng Dept Manhattan College 4513 Manhattan College Parkway Bronx Ny 10471 Fax: 718-920-0163 Phn: 718-862-7281 1-800-Mc2-Xcel	NA	No Response to follow-up request.
Massachusetts Institute of Technology Cambridge, MA	HWR Reflected 06/09/1958	2004	2004	Research and education	O.K.Harling, Adm, John Bernard, LabDir Phn: = (617)253-4201, 4202 Nuclear Reactor Laboratory, MIT 138 Albany Street, Cambridge MA 02139	Decommissioning estimate only.	Negotiating with NRC to renew license.

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
National Institute of Standards & Technology Gaithersburg, MD	Nuclear Test 06/30/1970	NA	2010	NA	**Mr. Mike Rowe** Phn: 301 975-6210 Katharine B. Gebbie, Director Tel 301 975 4201 Fax 301 975 3038 E-mail: katharine.gebbie@nist.gov	NA	No Response to follow-up voice mail message.
North Carolina State University Raleigh, NC	Pulstar 08/25/1972	NA	2012	NA	Prof. Donald J. Dudziak, Chairperson-Nuclear Eng. Dept CAPES- Center for Applied Plasma Engineering and Sciences. Phn: 919-515-6289 Fax: 919-515-6305 E-mail: dudziak@eos.ncsu.edu **Mr. Pedro Perez**	NA	No Response to follow-up voice mail message.
Ohio State University Columbus, OH	Pool 02/24/1961	NA	2001	NA	Dr. Don W. Miller , Chairperson- Nuclear Eng. dept. 1075 Robinson Laboratory 206 W 18th Ave Columbus, OH 43210 Phn: 614-292-7979 Fax:614-292-3163 E-mail: miller.68@osu.edu	NA	No Response to follow-up voice mail messages.
Oregon State University Corvallis, OR	Triga Mark II 03/07/1967	2005	2007	Research and education	**Stephen Reese** (541) 737-2344 Office Manager-Donna Dalton (541) 737-7039 E-mail: daltondk@rc.orst.edu Appointments, initial contact & general query.	Has a contingency decommissioning plan	University plans to renew their license.
Pennsylvania State University University Park, PA	Triga 07/08/1955	2006	1995	Research and education	Sears C Frederick – Director Radiation Science and Engineering Center Address: 0101 Breazeale Nuclear Reactor University Park, PA 16802 Phn: 814 865 6351 Fax: 814 863 4840 E-mail: cfs7@psu.edu	Has been submitted to NRC	**No plans for decommissioning, even though a decommissioning plan has been submitted to NRC (will not pursue this plan). The university plans to renew their license. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
Purdue University West Lafayette, IN	Lockheed 08/16/1962	2003	2002	Education	Prof. Bement , Head of nuclear Eng. dept. Phn: 765-494-5742 E-mail: bement@ecn.purdue.edu	-	**University plans to renew license. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**
Reed College Portland, OR	Triga Mark I 07/02/1968	2007	2008	Research and education	Stephen Frantz – Director Reed College Reactor 3203 Southeast Woodstock Blvd. Portland, Oregon 97202-8199 Phn: 503-777-7222 Fax: 503-777-7274 E-mail: sfrantz@aone.com E-mail: reactor@reed.edu	Has a decommissioning plan	University plans to renew license.
Rensselaer Polytechnic Institute Troy, NY	Critical Assembly 07/03/1964	NA	2004	NA	Dr. Donald Harris Phn: (518) 899-2721 Fax: (518) 276-4832 E-mail: xug2@rpi.edu	NA	No Response to follow-up voice mail message
Rhode Island Atomic Energy Commission Narragansett, RI	GE Pool 07/21/1964	NA	2004	NA	Terry - Director Rhode Island Atomic Energy Commission Rhode Island Nuclear Science Center 16 Reactor Road Narragansett, RI 02882-1197 Phn: 401-874-2525 Fax: 401-782-4201 Tchanttchan@gsosun1.gso.uri.edu	NA	No Response to follow-up voice mail message
State University of New York in Buffalo, NY	Pulstar 03/24/1961 (POL)	2005-2010	2001	Research and education	Dave Vasbinder or Lou Henry Phn:716 829-3301 or 716 645-6844 Richard L. Jones Phn: 716 829-3281.	Does not have a decommissioning plan	**Facility has been shut down over 5 years. No decommissioning plan in phase. Fuel is still on site and not scheduled for removal until 2015. Currently in deactivation and long term storage phase. Willing to work with FIU-HCET in identifying problem sets, needs, solutions.**
Texas A&M University College Station, TX	AGN-201M #106 08/26/1957		1997		Dr. Waltar, Chairperson Texas A&M Nuclear Eng. Dept 129 Zachry Engineering Center College Station, TX 77843-3133 Phn: 409-845-7078 Fax: 409-845-6443 E-mail: waltar@trinity.tamu.edu Bob Berry Phn: #409 845-4988		No Response to follow-up voice mail messages.

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
Texas A&M University College Station, TX	Triga 12/07/1961		2001		Dr. Waltar, Chairperson Texas A&M Nuclear Eng. Dept 129 Zachry Engineering Center College Station, TX 77843-3133 Phn: 409-845-7078 Fax: 409-845-6443 E-mail: waltar@trinity.tamu.edu		No Response to follow-up voice mail messages.
U.S. Geological Survey Denver, CO	Triga Mark I 02/24/1969	NA	2009	NA	Douglas R. Posson - Director MS 150, PO Box 25046, Denver Federal Center, Bldg. 53, Denver, CO 80225-0046 Phn: 303-236-5900 x303 E-mail: dposson@usgs.gov **Tom Fouch or Elli Bracer**	NA	No Response to follow-up voice mail messages.
University of Arizona Tucson, AZ	Triga Mark I 12/05/1958		1998		John Williams - Director Phn: 520-621-9729 john-williams@ns.arizona.edu (jgw@engr.arizona.edu) Gould-Simpson 1013 Tucson, Arizona 85721-0077 Phn: 1-520-621-4064 Fax: 1-520-621-1364 Internet: arl@arl.arizona.edu		No Response to follow-up voice mail messages.
University of California/ Irvine, Irvine, CA	Triga Mark I 11/24/1969	NA	2009	NA	Dr. George E. Miller Reactor Supervisor Fax:(949) 856-6649 or Phn: 949-824-5011 E-mail:gemiller@uci.edu	NA	No Response to follow-up voice mail message
University of Florida Gainesville, FL	Argonaut 05/21/1959		1999		James S. Tulenko Professor and Chairman E-mail: tulenko@ufl.edu 202 Nuclear Sciences Center P.O. BOX 118300 Gainesville, Fl 32611-8300 Phn: (352) 392-1401 Fax: (352) 392-3380 E-mail:deptdm@server1.nuceng.ufl.edu		No Response to follow-up voice mail message

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
University of Illinois Urbana, IL	Triga 07/22/1969	1998	2009	Research, education and isotope production	Dr. Barclay G. Jones, Head Department of Nuclear Eng. 214 Nuclear Engineering Laboratory University of Illinois at Urbana-Champaign 103 South Goodwin Avenue Urbana, Illinois 61801-2984 Phn: (217) 333-2295 Fax: (217) 333-2906 E-mail: bgjones@uiuc.edu	Does not have a decommissioning plan	**Dept. of Nuclear Eng. wants to renew the license but the University will not support renewal. If not renewed, would be willing to work with FIU-HCET in identifying potential problem sets, needs and solutions.**
University of Lowell Lowell, MA	GE Pool 12/24/1974	NA	2014	NA	Lee H. Bettenhausen - Adjunct Professor, Director-University of Massachusetts Lowell Research Reactor. **Leo Bobek** Radiation Laboratory, Reactor Supervisor Phn:978 934-3365	NA	No Response to follow-up voice mail message.
University of Maryland College Park, MD	Triga 10/14/1960	June, 2000	2000	Research and education	Al Shieahly, Reactor Director A. J. Clark School of Engineering 2135 Chemical and Nuclear Eng. bldg. Phn: (301) 405-5214 Fax:(301) 314-2029 E-mail: vja@umdacc.umd.edu	Has a decommissioning plan	**Plans to renew license for the next 20 years. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**
University of Michigan Ann Arbor, MI	Pool 09/13/1957	July 29, 2005	1997	Research and radiation services	Philip A. Simpson - Acting Reactor Mgr. Phn: (734) 764-6221 Fax: (734) 936-1571 E-Mail: phils@umich.edu	Has not yet been finalized.	**University plans to renew license, although no final decision has been made. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**
University of Missouri/ Columbia, MO	Tank 10/11/1966	2001	2006	NA	Dr. William H. Miller - Group leader Professor & Chairman E2433 Eng. Bldg. East University of Missouri - Columbia Columbia 65211 Phn: (573) 882-4211 E-mail: whmiller@ecn.missouri.edu	NA	Did not provide information as promised despite follow-up calls.

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
University of Missouri/Rolla Rolla, MO	Pool 11/21/1961	2019	2001	Research and education	David Freeman Nuclear Engineering. University of Missouri - Rolla Rolla, MO 65409 Phn: (573) 341-4420 Fax: (573) 341-6033 E-mail: chem@umr.edu	Does not have a decommissioning plan	Plans to renew license after 2019.
University of New Mexico Albuquerque, NM	AGN-201M#112 09/17/1966	Jun. 30 2006	2006	Research and education	Mr. Bush or Mr. Carpenter Department of Chemical & Nuclear Engineering University of New Mexico Tel: (505) 277-8027 Fax: (505) 277-2814 E-mail: mgenk@unm.edu	Has a draft decommissioning Plan	University plans to renew their license.
University of Texas Austin, TX	Triga Mark II 01/17/1992	NA	2032	NA	Dr. Felib Y. Iskander , Nuclear Engineering Teaching Laboratory Mail Stop R9000 Austin, Texas 78712 Tel (512) 471-5787 Fax (512) 471-4589 E-mail - F.Iskander@mail.utexas.edu **Dr. Bauer**	NA	Reactor was first licensed in 1992, University will not be looking at decommissioning any time soon.
University of Utah Salt Lake City, UT	Triga Mark I 09/30/1975	NA	2015	NA	Dr. David M. Slaughter -Director RM. 104, 160 South Central Campus Dr. Salt Lake City, Utah 84112 Tel: 801-581-8499 E-mail - davids@scottie.mech.utah.edu	NA	No Response to follow-up voice mail message.
University of Virginia Charlottesville, VA	Pool 06/27/1960	NA	2000	Research and education	Mr. Bob Mulder University of Virginia Reactor Facility, Charlottesville, Virginia 22903-2442 Phn: (804) 982-5440	Decommissioning Company already in place.	**Reactor has been shut down for one year. Will start decommissioning in one year. Wants more "hands on" help, such as contacts for waste disposal and seeing available technologies. Thinks that several NPRs will shut down in the next five years because of lack of financial support. Hoping for government support.**

Licensee/ Location	Reactor Type/ OL Issue Date	License Exp. Date	Estim D&D Yr	Nature of Activities	Contact information	Decommission-ing plan	Remarks
University of Wisconsin Madison, WI	Triga 11/23/1960	June 30, 2000	2000	Research and education	Richard J. Cashwell, 141 Mechanical Engineering Building 1513 University Avenue Madison, WI 53706 Tel: 608-262-3392 Fax: 608-262-8590 E-mail: cashwell@engr.wisc.edu	Does not have a complete decommissioning plan.	**Trying to obtain a Safety Analysis Report from NRC in order to renew their license. Will know for sure in about one year. Would be willing to work with FIU-HCET in identifying potential problem sets, needs, solutions.**
Veterans Administration Omaha, NE	Triga 06/26/1959		1999	Medical research, education	Mr. John Claassen, Reactor Manager 4101 Woolworth Avenue Omaha NE 68105 Fax 402-449-0697 Phn: 402-346-8800-3002	No decommissioning plan.	**Reactor under Timely Renewal. No decommissioning plans for at least next 5 years. Already applied for 20-year renewal of license. Would be willing to work with FIU-HCET in identifying potential decommissioning problem sets, needs and solutions.**
Washington State University Pullman, WA	Triga 03/06/1961	2010	2001	Research and education	Mr. Brian Bunce or Mr. Al Ruddy Tel: 509-335-4528 Tel: 509-335-7592	Does not have a decommissioning plan	Plans to renew license when it expires.
Worcester Polytechnic Institute Worcester, MA	GE 12/16/1959	2002	1999	Research and education	Prof. Leo Bobek Phn: 508-831-5276 Fax: 508-831-5680 E-mail: bobek@wpi.edu **Steve la Flame**	10 year old plan	Plans to renew license. Would appreciate any assistance from FIU-HCET in developing a new decommissioning plan.

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 2,000,000 tons of RSM will be generated from the deactivation and decommissioning of radioactively contaminated facilities at the DOE and in the private sector.

Current waste disposal costing methodologies at DOE-managed waste disposal sites favor direct disposal of RSM in landfills over recycling. Studies commissioned by the DOE have shown that current rates for direct disposal of RSM are understated because they do not fully reflect all the costs associated with the full life-cycle of waste disposal, specifically the long-term maintenance and surveillance of disposal sites after they have been closed. A more accurate life-cycle cost analysis (LCCA) would certainly reflect higher costs for direct disposal and would lead to increased material recycling, resource recovery, and waste minimization – key goals of the DOE.

The objective of the subtask is the following:

- Update the methodology(s) currently used at DOE-managed waste disposal facilities for determining disposal costs for RSM to take into account all costs incurred over the entire life-cycle of the waste in order to demonstrate that recycling is a cost-competitive means for disposition of RSM.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D043-M1	RSM inventory	A summary of estimated current and future RSM generated from D&D activities.	The scheduled completion date of 2/1/99 has been revised to 4/30/99.
D043-M2	List of committed waste site managers	A list of waste site managers willing to provide information necessary for developing LCCAs.	The scheduled completion date of 2/1/99 has been revised to 4/30/99.

Milestone No.	Milestone Description	Completion Criteria	Status
D043-M3	Report to DOE on Phase 1 (milestones 1 and 2)	Summary of results of milestones 1 and 2 and recommendation to DOE whether to proceed.	The scheduled completion date of 3/1/99 has been revised to 4/30/99.
D043-M4	Decision on RSM disposal sites and options to be assessed	List of waste disposal sites that will be surveyed and disposal options for which LCCAs will be developed.	The scheduled completion date of 3/15/99 has been revised to 5/15/99.
D043-M5	Documentation of NRC and commercial means of costing RSM disposition	Comparative analysis of costing methodology and factors used by selected sites.	Scheduled for completion 5/31/99.
D043-M6	Documentation of DOE means of costing RSM disposition	Procedural outline of DOE's costing methodology, indicating variances with other sites surveyed.	Scheduled for completion 5/31/99.
D043-M7	Life-Cycle Cost Analyses	Revised LCCAs submitted to DOE considering variances identified in milestone 6 as well as ORNL's *Life Cycle Decision Methodology for RSM.*	Scheduled for completion 8/31/99.
D043-M8	Finalize LCCAs and update DOE handbook	Revised LCCAs incorporating DOE's comments and procedures for LCCA incorporated in DOE handbook.	Scheduled for completion 9/30/99.
D043-M9	Final report	Final report documenting results of project submitted to DOE.	Due 10/31/99.

Significant events

A meeting was convened on March 30, 1999 in Oak Ridge, Tennessee, to apprise DOE-FETC and DOE-NMR representatives of the status of the project and to coordinate efforts of all parties. Under the original scope of the project, FIU-HCET was tasked with compiling information on current and future inventories of RSM and developing an LCCA methodology for RSM. The LCCA would address various alternative disposition options, including direct disposal at DOE and/or commercial disposal sites, decontamination and free release, and recycling with restricted reuse.

In the interest of expediting the project, decisions were made, *inter-alia*, to

- collect and consolidate **existing** information on RSM inventories rather than conduct new surveys
- determine disposal costs for the direct disposal option only
- build on life-cycle costs already determined by the NMR for the first stages of the direct disposal process, rather than investigate all stages anew
- determine only an estimated cost per unit volume for disposal at DOE and commercial disposal sites rather than develop new LCCA methodologies.

These changes were formally communicated by DOE-FETC to FIU-HCET on March 31, 1999, in a revised statement of work.

Accomplishments and technical progress

- A revised PTP based on the outcome of the March 30, 1999, Oak Ridge meeting and DOE-FETC's revised statement of work has been prepared and submitted to DOE-FETC for approval.
- To facilitate collection of existing information on RSM inventories, FIU-HCET and DOE-ORR have decided to utilize baseline data from the various sites that were included in *Accelerating Cleanup: Paths to Closure*. Site managers will be requested to review their earlier RSM estimates and confirm or update them accordingly.
- FIU-HCET and DOE-ORR have identified points of contact at DOE sites to be surveyed. A memorandum formally requesting their cooperation in providing the inventory information has been prepared by FIU-HCET and submitted to Mr. Stephen Bossart, DOE-FETC, and Ms. Jane Powell, DOE-ORR,.for review and signature.
- FIU-HCET has reviewed the life-cycle decision methodology developed by Dr. Katherine Yuracko, an expert in life-cycle analysis at the ORNL and currently a consultant to the NMR. In consultation with Dr. Yuracko, FIU-HCET has conducted a gap analysis to determine the additional work required to complete the RSM LCCA by building on the decision methodology already devloped by Dr. Yuracko.

Assessment of current status

The project is proceeding on schedule per the revised statement of work and milestones agreed upon between FIU-HCET and DOE-FETC. Original budget estimates will not be exceeded.

Issues critical to the success of the project are being closely monitored, and where necessary, corrective action will be initiated through DOE-FETC and/or DOE-ORR. These include

- cooperation of all DOE site managers in providing existing information on their current and future RSM inventories
- cooperation of DOE and commercial site managers at selected disposal facilities in providing cost data necessary for the development of RSM LCCAs for their respective facilities.

Plans for the next two months

During the next two months, FIU-HCET will accomplish the following:

- Draft a request for information from DOE sites on inventories derived from the baseline disposition maps developed for *Accelerating Cleanup: Paths to Closure.*
- Consolidate existing information on quantities and properties of current and future inventories of RSM.
- Ascertain the level of cooperation expected from DOE waste site managers in providing full information necessary for development of the LCCAs.
- Compile a comprehensive list of cost elements associated with DOE commercial disposal facilities. Review and verify cost elements with facility representatives during site visits.

- Submit to DOE-FETC a report on Phase I of the project (inventory and disposal site participation), including a recommendation on whether to proceed to Phase II, the actual development of LCCAs.

FIU-HCET collaborators

Nicholas Hefty, (423) 220-8844

Robert Tucker, (305) 348-6181

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 subtask, Florida International University's Hemispheric Center for Environmental Technology (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.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D044-M1	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
D044-M2	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.
D044-M3	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.
D044-M4	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.
D044-M5	Report on performance of PM-CEMs in meeting EPA monitoring guidelines.	A statistical correlation of the performances of the two tested CEMs.	Scheduled for completion 6/30/99.
D044-M6	Final report summarizing research findings and disposal maps for various MLLW streams.	Final report submitted to Bechtel Jacobs.	Due 10/31/99.

Significant events

Recently, Bechtel Jacobs and DOE established an initiative to expedite the treatment of broad spectrum waste streams. In 1996 and early 1997, analysis of contractors' responses to a Broad Spectrum Invitation for Bid led to the development of five broad MLLW treatment categories, a make/buy study and life cycle cost analysis to evaluate onsite and offsite treatment options, and an approach for awarding contracts for MLLW treatment. In June 1998, five Broad Spectrum Treatment Contracts (BSTC) were awarded to two commercial mixed-waste TSD vendors and earmarked an anticipated expenditure of between $40 million and $260 million for TSD services. Through this vehicle, up to 36 million kilograms of MLLW will be processed at the two permitted facilities for ultimate land disposal. The BSTC initiative has also led to the development of a web site which 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.

Accomplishments and technical progress

- 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 has completed a review of, and updated, Bechtel Jacobs's BDAT database according to current RCRA/LDR regulations. The ORR MLLW BOI database was also crosschecked to ensure that all waste codes within it have been addressed and/or updated.
- FIU-HCET is currently conducting a detailed review of waste code assignments and treatability groupings for four sample waste populations in the ORR MLLW BOI database.

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

Assessment of current status

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

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

Plans for the next two months

FIU-HCET will

- continue assessing the MLLW BSTP developed by Bechtel Jacobs
- continue a detailed review of the MLLW database and of waste populations of particular interest to Bechtel Jacobs
- work with Bechtel Jacobs to assess and document the current processes and options for characterizing, transporting/handling, treating, and disposing of difficult MLLW streams

- develop the outline of a systematic approach for evaluating waste streams in the MLLW inventory.

FIU-HCET collaborators

Marshall Allen, (423) 220-8844
Robert Tucker, (305) 348-6181

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 DOE.	Completed 3/2/99.
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 DOE.	Formalize draft documents for the Statement of Work, Prequalification Criteria, and Selection Criteria.	Completed 3/22/99.

Note: Additional milestones to be determined by NMR.

Significant events

The completion of milestones 1 through 3 moved this project to an on-hold status. These milestones and their output were reviewed with the DOE and accepted as complete during March.

Accomplishments and technical progress

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

Assessment of current status

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

FIU-HCET collaborator

Ken Eudy, (423) 220-8844

II. TANKS FOCUS AREA (TFA)

MONTHLY PROGRESS REPORT

FIU Principal Investigator	**M.A. Ebadian**
FIU 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	Due date: 05/17/99
T004-M4	Characterize solid particle solubility and crystallization behavior	Perform nine solubility and crystallization tests as described in Table 3 in the PTP	Due date: 07/05/99
T004-M5	Measure particle settling velocity.	Perform 27 settling tests as described in Table 4 in the PTP	Due date: 08/15/99
T004-M6	Measure slurry viscosity	Perform 26 viscosity tests as described in Table 5 in the PTP	Due date: 09/30/99
T004-M7	Perform data correlation and documentation	Write a project final report	Due date: 10/30/99

Significant events

- Simulant particle shapes were determined as described in milestone 3 in the PTP. A Scanning Electron Microscope (SEM) was used for this purpose, and this activity was performed in conjunction with the analytical lab staff.
- Particle distribution analysis results were evaluated and correlated. The objective was to check the effect of pH on a simulant particle distribution.

Accomplishments and technical progress

- Particle shape analyses were performed to three waste slurry simulants: SRS, Hanford, and Fernald.
- The purpose of this test was to check the variability of the particle shape with mixing. Samples used were the same used for particle distribution analysis.
- Samples were dried in an oven at about 105 to 110°C. This was needed because the microscope can only handle dry samples.
- To analyze the different particle shapes, literature research was done to check the possible shapes that a slurry simulant may possess as well as the parameters to be studied. The particle smoothness is shown in Table 1, and the particle shape classfication is shown in Table 2.

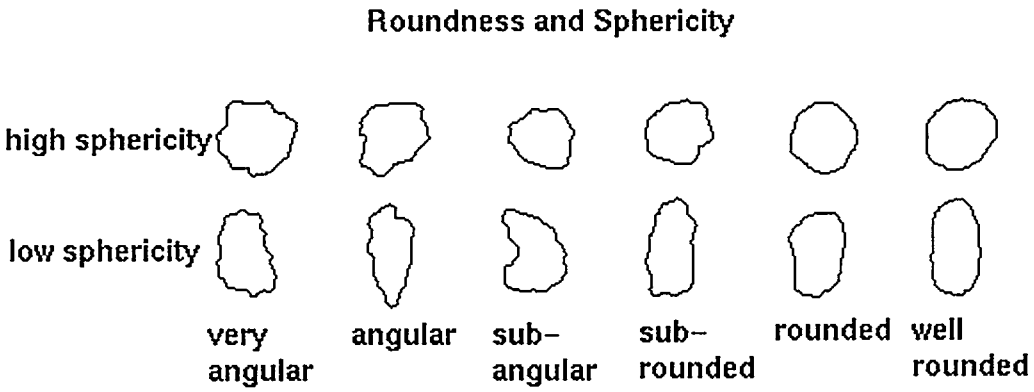


Table 1. Particle Smoothness and Sphericity

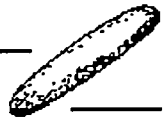
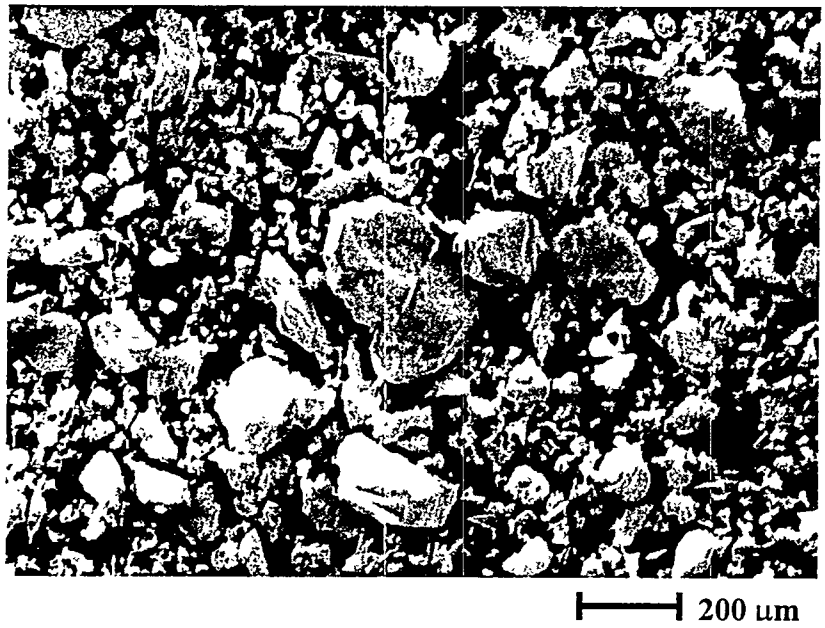
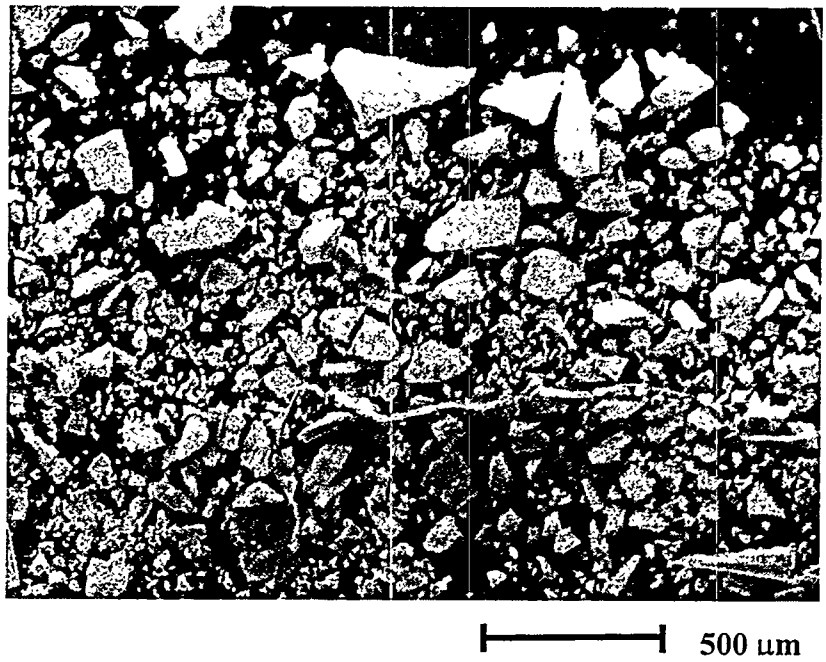
Term	Shape
Cylindrical	
Discoidal	
Spherical	
Tabular	
Ellipsoidal	
Equant	
Irregular	

Table 2. Particle Shape Classfication

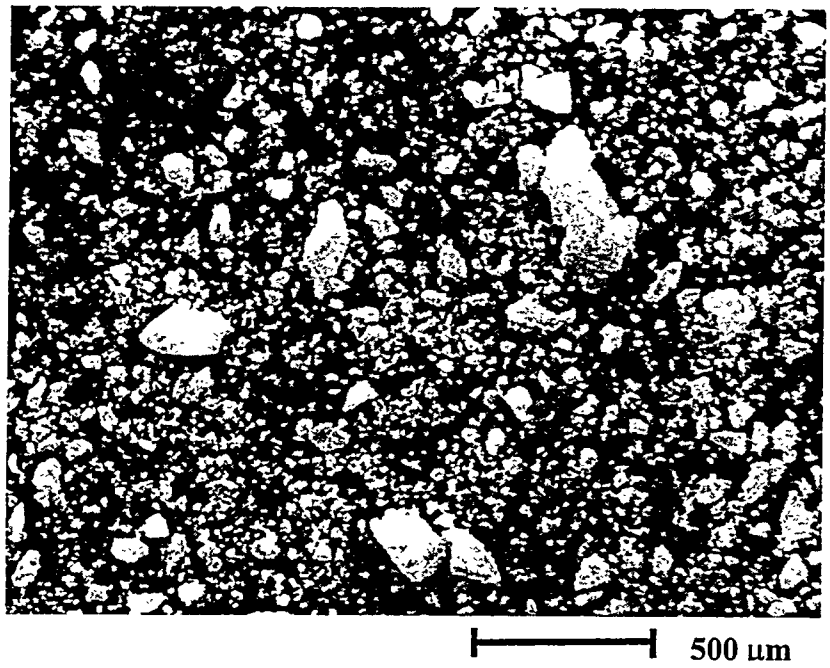
- As can be observed in the tables above, certain shapes exist that describe the slurry particle geometry. The two main shape parameters to be analyzed are smoothness and sphericity.
- Following are some of the pictures obtained when analyzing the particles in the microcope (SEM).



Picture 1. Fernald simulant particles.



Picture 2. Hanford simulant particles.



Picture 3. SRS simulant particles.

- Particle size of each simulant tested in the microscope (SEM) is consistent with the results reported in the last monthly report, which were obtained from the laser particle analyzer.
- Particle size distribution data was correlated after performing several tests with the intent of determining the effect of pH on the particle distribution of a simulant.
- The following graph shows how the particle distribution of an SRS simulant varies with pH. The trend corresponds to the population percent greater at an acidic level (2.30) and at a basic pH (10.38).

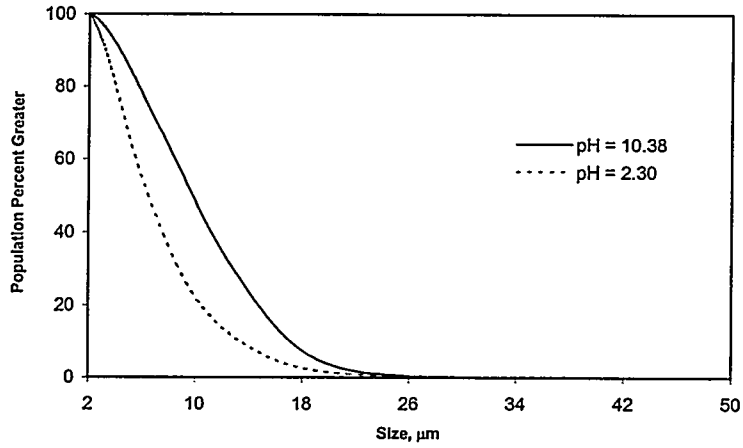


Figure 1. Effect of pH on the particle size distribution of an SRS simulant.

Assessment of current status

The data agreement between particle distribution analysis using a laser particle analyzer and particle shape analysis using a scanning electron microscope (SEM) tells that both tasks were satisfactorily performed. Results obtained in the first task were graphically validated with the second one.

Plan for the next two months

- Future work on task 4 as described in the PTP is planned for the next two months. This task corresponds to characterization of solid particle solubility and crystallization behaviors.
- The first activity corresponding to task 4 will be preparing a sample for analysis. These tests will be performed at different temperatures and pH.
- Analyzing particle shape results obtained this reporting period will also begin. A free imaging processing and analysis program called UTHSCSA *ImageTool* will be used for this purpose. This program can acquire, display, edit, analyze, and process over 22 common image formats.

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 the pipe plugging caused by settling, pipe plugging and unplugging phenomena induced by gelling will also be studied by both experimental and theoretical methods. Some key aspects of particle deposition associated with pipe plugging will be addressed. These will include particle agglomeration leading to larger particles that fall out of suspension and particle deposition in the pipe at the end of the transfer as a function of pipe slope or dip depth. The experimental setup used for settling-induced plugging will be modified for the study of gelling-induced plugging and unplugging. The core-annular flow technology, which may be used to unplug the gel-caused blockage, will be examined.

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

The objectives of this work include the following:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T005-M1	Issue project technical/test plan for pipeline plugging and unplugging activities	Planned activities, tasks, and milestones of slurry transport experiments in a flow loop, and construction of full-size test beds for demonstration of blockage locating and pipe unplugging technologies	Completed 2/15/99; met the schedule
T005-M2	Develop systematic methods for characterization of slurries for transport experiments	Documentation and application of slurry characterization method for slurry preparation, rheology measurement, and data presentation of slurry transport experiments.	Completed 3/20/99, met the schedule
T005-M3	Modification of flow loop setup for additional slurry transport experiments with horizontal pipeline	Set up the flow loop with a higher capacity pump, improved sampling system, and an additional pressure transducer.	Scheduled completion 3/30/99.
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
T005-M5	Perform additional slurry transport experiments in flow loop with horizontal pipeline	Obtain reasonable data by data acquisition system and video recording system at one additional slurry concentration. Some critical velocity data will be repeated by varying slurry flow rate from very high level to low level.	Scheduled completion 5/28/99
T005-M6	Plan, design, and modification of flow loop with inclined pipelines	Set up a flow loop with inclined pipelines that have the same geometrical layout as those used at DOE sites.	Scheduled completion 6/25/99.
T005-M7	Construction of the test beds for equipment tests and demonstrations	Three test beds representing gravity pipeline, long pipeline, and buried pipeline will be fabricated with the specified material and dimensions.	Scheduled completion 9/15/99.
T005-M8	Perform slurry transport experiments in flow loop with two inclined pipelines	Obtain reasonable 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

- The modification of the slurry mixing tank has been completed. To enhance the mixing strength and the concentration uniformity, four baffles were installed in the slurry tank. Experimental results indicated that the mixing performance was significantly improved and the mixing speed was reduced by the modification.
- The testing loop has been modified to contain a high capacity slurry pump. The test results showed that slurry velocity in the loop can reach 8 ft/s using the new pump. An additional differential pressure transducer has also been installed in the developing section of the loop to determine the pressure gradient difference between the developing section and the fully developed section of the flow loop.
- Two thermistors have been purchased and received. Isokinetic sampling tests will be conducted using the thermistors when the electronic instrument, such as the hot-wire annometer, is available.
- The drawings of the large-scale test bed has been finalized, reported to DOE program leader, and presented in this monthly report.
- The CBD for large demonstration test bed #2 is under preparation by Dr. Fadel F. Erain at PNNL.

Accomplishments and technical progress

Part 1 Flow Loop Research on Pipeline Plugging and Unplugging

1.1 Slurry sampling measurements in the slurry tank

To verify and improve the slurry mixing characteristics in the slurry tank, experiments were performed using slurry with 20 wt% solid particles in water (half Fe_2O_3 solids and half SiO_2 solids). The density ratio, particle size, and weight concentration are similar to those that have been used in the previous experiments. The rotating speeds were chosen to be 715 rpm for tests without baffles and 520 rpm for tests with baffles. Samples were taken from four different locations, which are shown in Figure1. The measurement results are illustrated in Table 1 without baffles and Table 2 with baffles.

Table 1.
Weight concentration measurement versus vertical coordinate without baffles

Sample point	Vertical distance from the tank bottom, inch	Solid weight concentration	Relative error
A	18	18.67 %	-6.65 %
B	9	19.56 %	-2.2 %
C	3	19.67 %	-1.65 %
D	0.5	20.02 %	0.10 %

Table 2.
Weight concentration measurement versus vertical coordinate with baffles

Sample point	Vertical distance from the tank bottom, inch	Solid weight concentration	Relative error
A'	15	19.82 %	-0.90 %
B'	9	20.04 %	-0.20 %
C'	3	20.03 %	-0.15 %
D'	0.5	20.23 %	1.15 %

The relative error shown in the above tables is defined as

$$\text{Relative error} = \frac{\text{measured weight concentration - average weight concentration}}{\text{average weight concentration}}$$

The experimental results show that when the baffles were installed in the mixing tank, the mixing performance and the solids concentration profile in the tank are greatly improved. It was observed that the slurry surface is flatter than that without baffles. The solids concentration distribution across vertical direction is more uniform with baffles than that without baffles. The maximum error of the solids concentration with baffles is less than 1.2 %. Figure 2 shows the comparison of the concentration distribution versus vertical direction.

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

2.1 Introduction

FIU-HCET has been designing and will construct a Large-Scale Industrial Equipment Test Bed of Plug Locating and Unplugging Technologies. The concept design of the test bed has been performed and continuously revised in the past months. Three revised simulated cases (test beds) have been produced from the five original cases, based on the discussions with Peter Gibbons of NHC, Dr. Fadel F. Erian at PNNL, and the document "Functions and Requirements for Blockage Locating and Removal Methods in Waste Transfer Lines" provided by Peter Gibbons.

In FY99, the designs of the large-scale test bed will be finalized, followed by the construction and demonstration of the test bed and its equipment at FIU-HCET.

2.2 New Design of Pipeline

There has been a change of plan, and Test Bed #2 will be constructed first instead of Test Bed #3. Space allocation has been approved for setting up all three test beds by the Space Committee of FIU. The construction of Test Bed #2 will be started after the arrival of bids from contractors at the end of April.

Figure 3 shows the schematic diagram of Test Bed #1. Figure 4a and Figure 4b show Test Bed #2. Support system of Test Bed #1 and #2 are described in Figure 5 and Figure 6, respectively. Railroad ties will support pipes every 20 ft (10 ft or 15 ft) where necessary. One more turn was created to test the technology and to save some space.

Test Bed #3 is shown in Figure 7. One ramp has a less steep inclination than the other in order to accommodate the vehicle inspection

Plans for the next two months

The modified testing loop will be calibrated using water to identify the loop performance. After the water calibration, slurry simulant will be run in the loop.

- Data will be obtained by measuring pressure drop, critical velocity, and so on with slurry simulants flowing in horizontal pipelines.
- Construction of large-scale test bed #2 (horizontal pipeline) shall be completed in June. CBD announcement for test bed #2 will be made in order to solicit the technology application.
- Construction of large-scale test bed #3 (buried bed) will be started after the completion of bed # 2. A testing plan for bed #2 will be developed.
- Potential candidate technologies for pipe plugging inspection and removal will be identified.

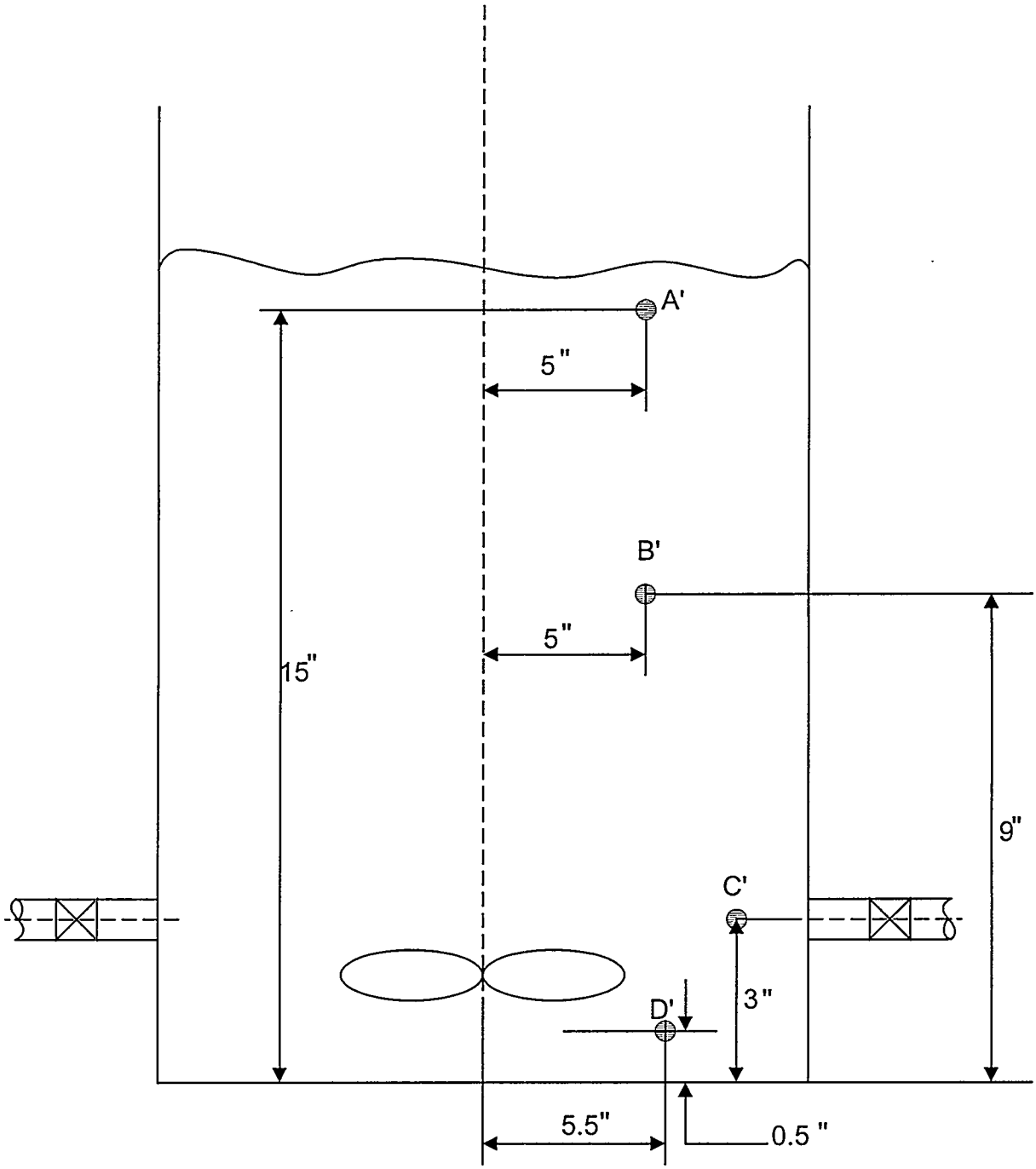

Figure 1. The locations where the samples were taken (with baffles).

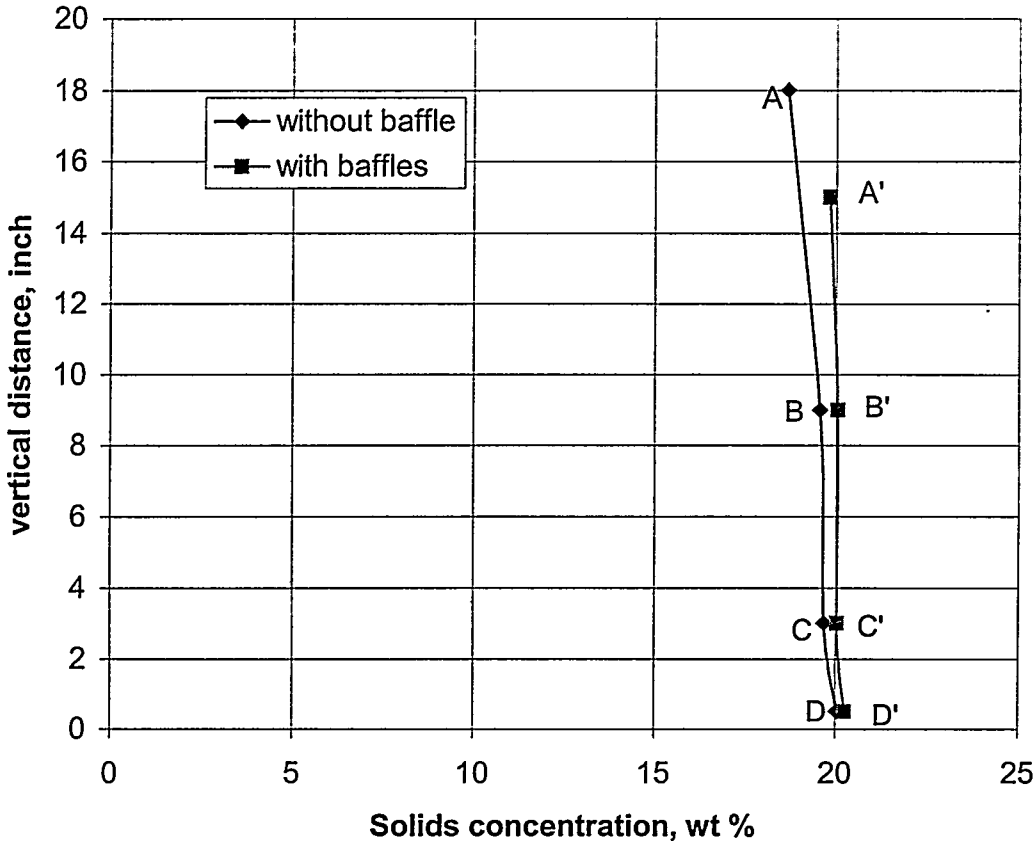

Figure 2. Comparison of weight concentration with baffles and without baffles in the mixing tank.

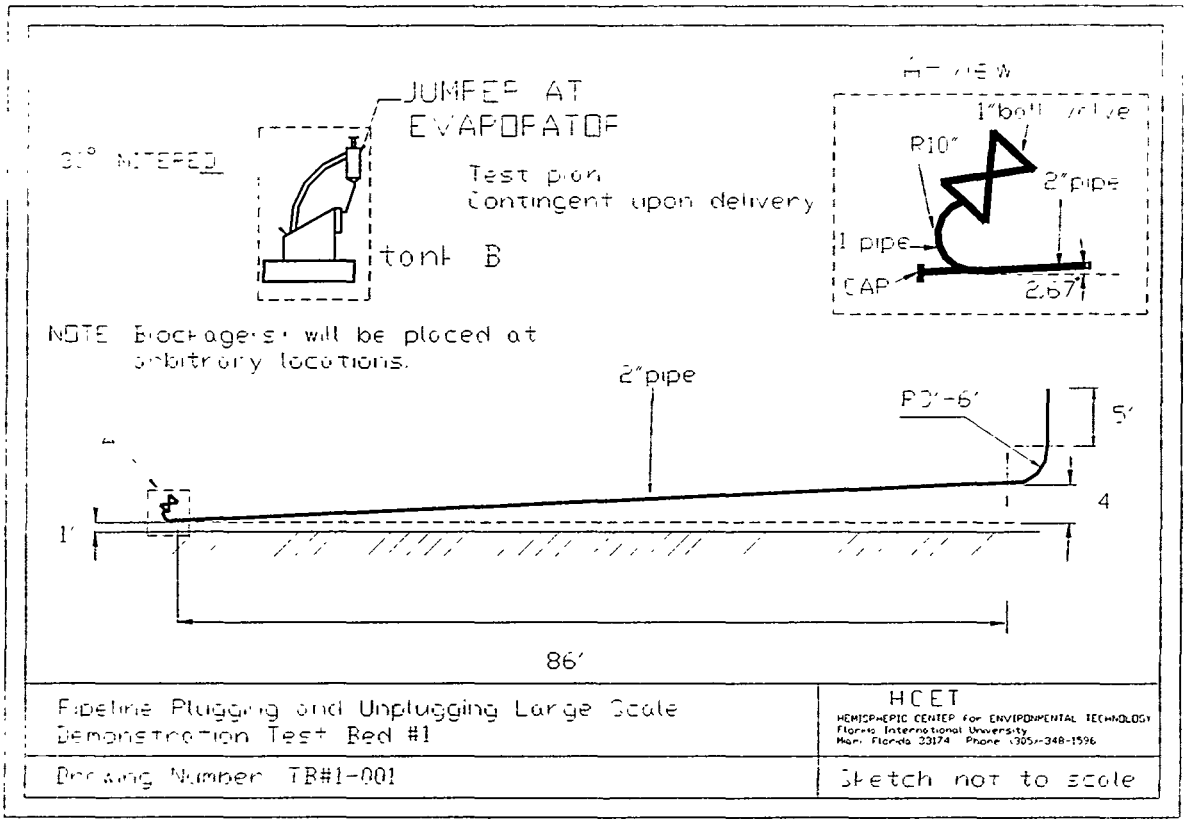

Figure 3. Schematic diagram of large-scale test bed #1.

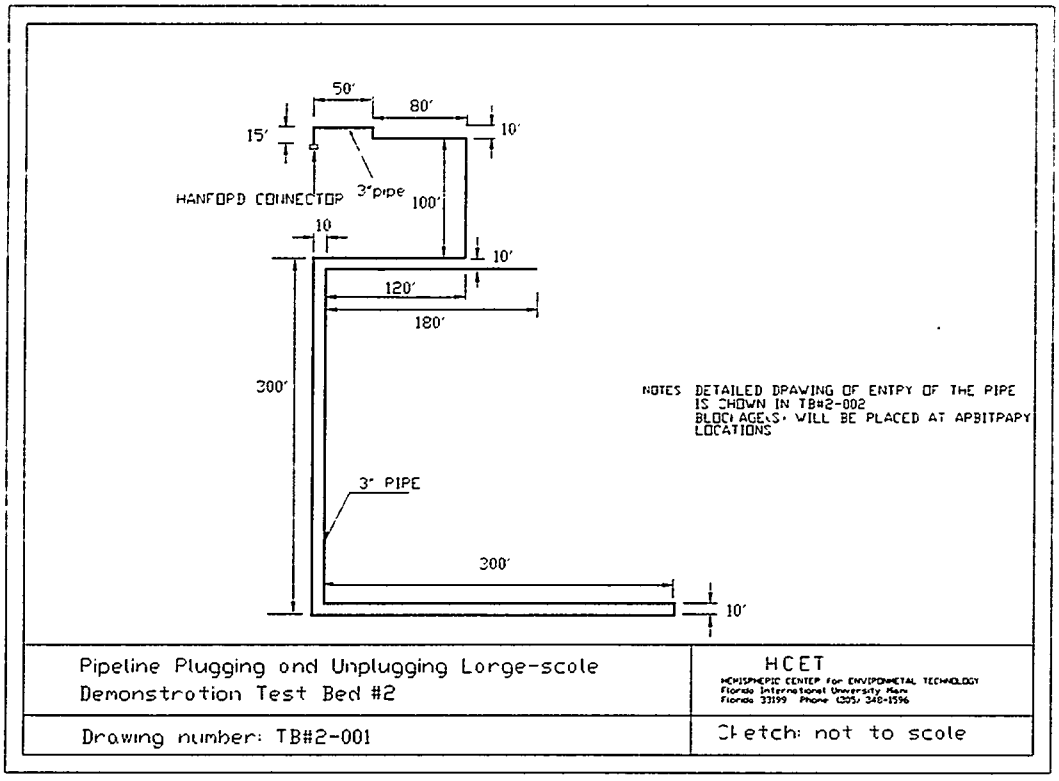

Figure 4a. Schematic diagram of large scale test bed #2: plan view.

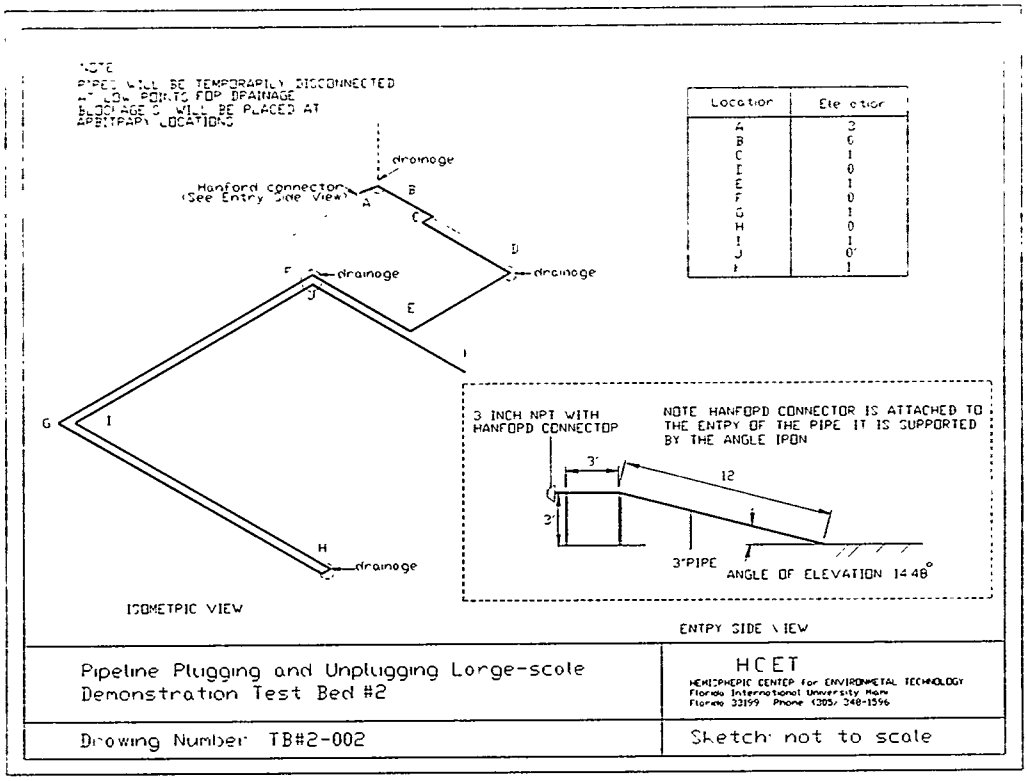

Figure 4b. Schematic diagram of large-scale test bed #2: isometric view.

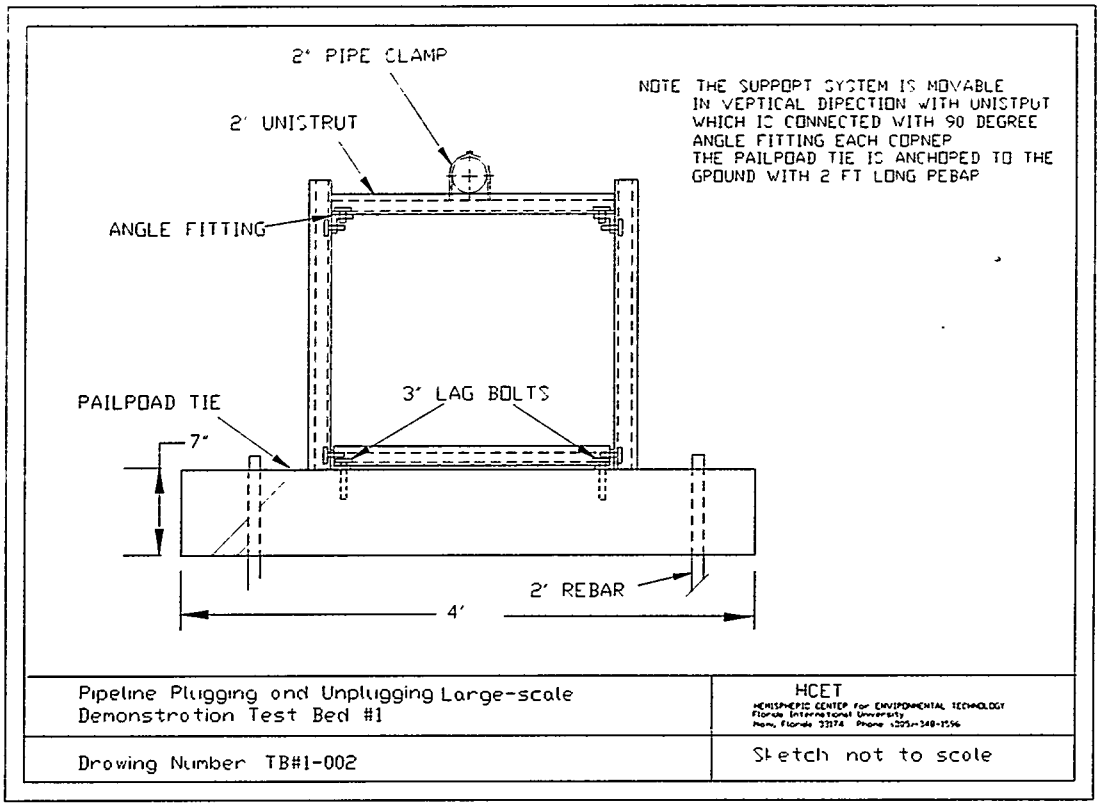

Figure 5. Support system for elevation of pipe for large-scale test bed #1 and #2.

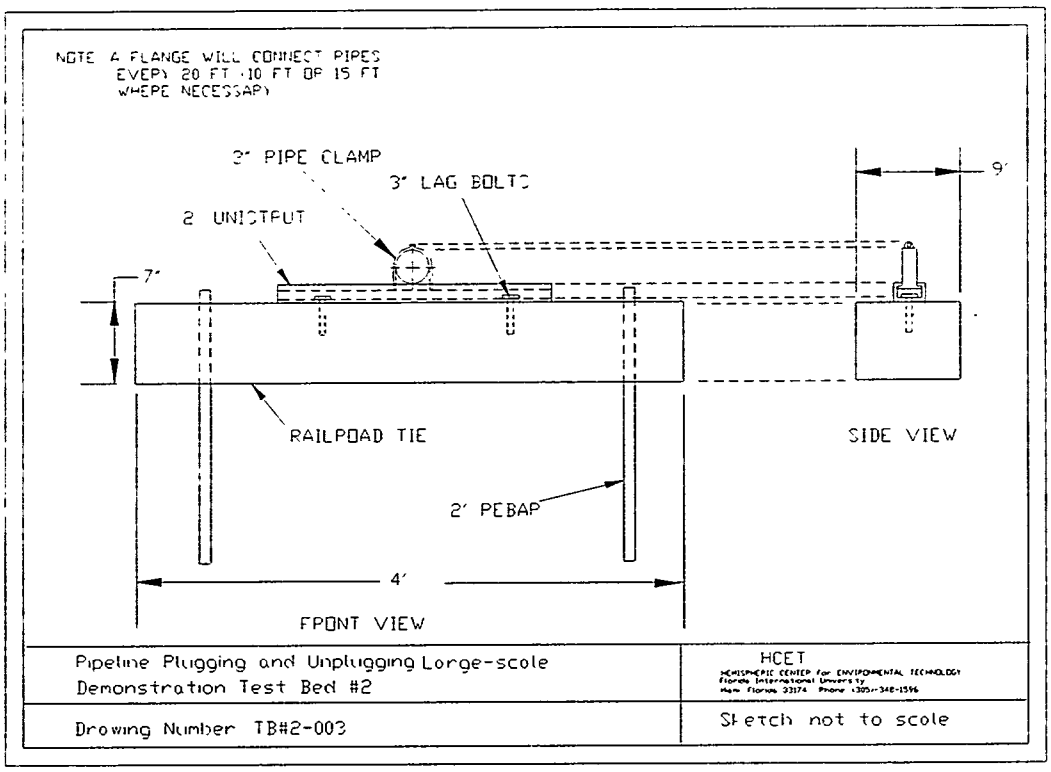

Figure 6. Support system for large-scale test bed #2.

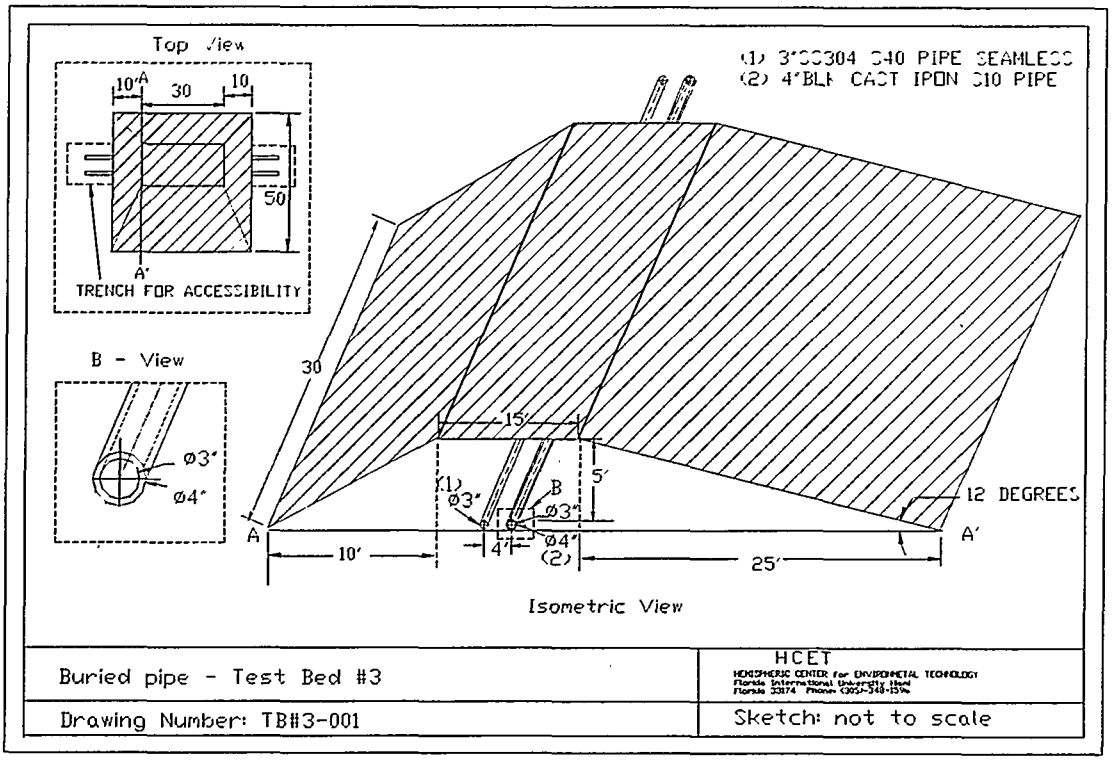

Figure 7. Schematic diagram of large-scale test bed #3.

FIU-HCET collaborators

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Investigation of Waste Glass Pouring Process Over a Knife Edge

Project Number: HCET-1997-T003

Project objectives

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

The work to be performed at FIU-HCET in support of the 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 on schedule. Due date: 1/31/99
T003-M2	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: 3/31/99
T003-M3	Report the effect of crud deposits on the back side of the knife edge	Experiments ES-1, ES-2, ES-3, and ES-4	Due Date: 4/30/99
T003-M4	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: 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

Milestones have been revised. Changes have been made to the PTP for FY99 after consultations with SRTC. Transient glass flow experiments with eroded knife-edge and the study of the effect of

impurities deposits have been moved ahead, and the glass chemistry experiments have been scheduled toward the end of the fiscal year. The logic behind this change is to obtain comprehensive test results using glass with a specific chemistry before switching over to a new glass composition.

Accomplishments and technical progress

For the Pulsating Flow, two experiments have been carried out. The data is being analyzed for results.

- Film thickness according to frame-by-frame.
- Statistical analysis will be performed on the film thickness data.
- A copy of the video will be provided to SRTC.

The SEM analysis of the glass chemistry has been completed.

- Since the glass has been used for the past year, the SEM analysis was performed to investigate the changes in glass composition from the original surrogate provided by SRTC.
- The report is attached as Appendix A.
- SRTC has been contacted and asked to provide the original glass surrogate composition at a later date.

Assessment of current status

The project is on schedule as per the revised PTP.

Plans for the next two months

The project will perform 3-4 transient glass flow experiments every week in the coming months. The transient glass flow experiments have shown the "wicking" phenomenon that is causing problems for the DWPF melter operation. The data obtained from these transient runs will be of extreme importance to SRTC and may shed light on the cause of the phenomenon, which in turn may lead to a solution.

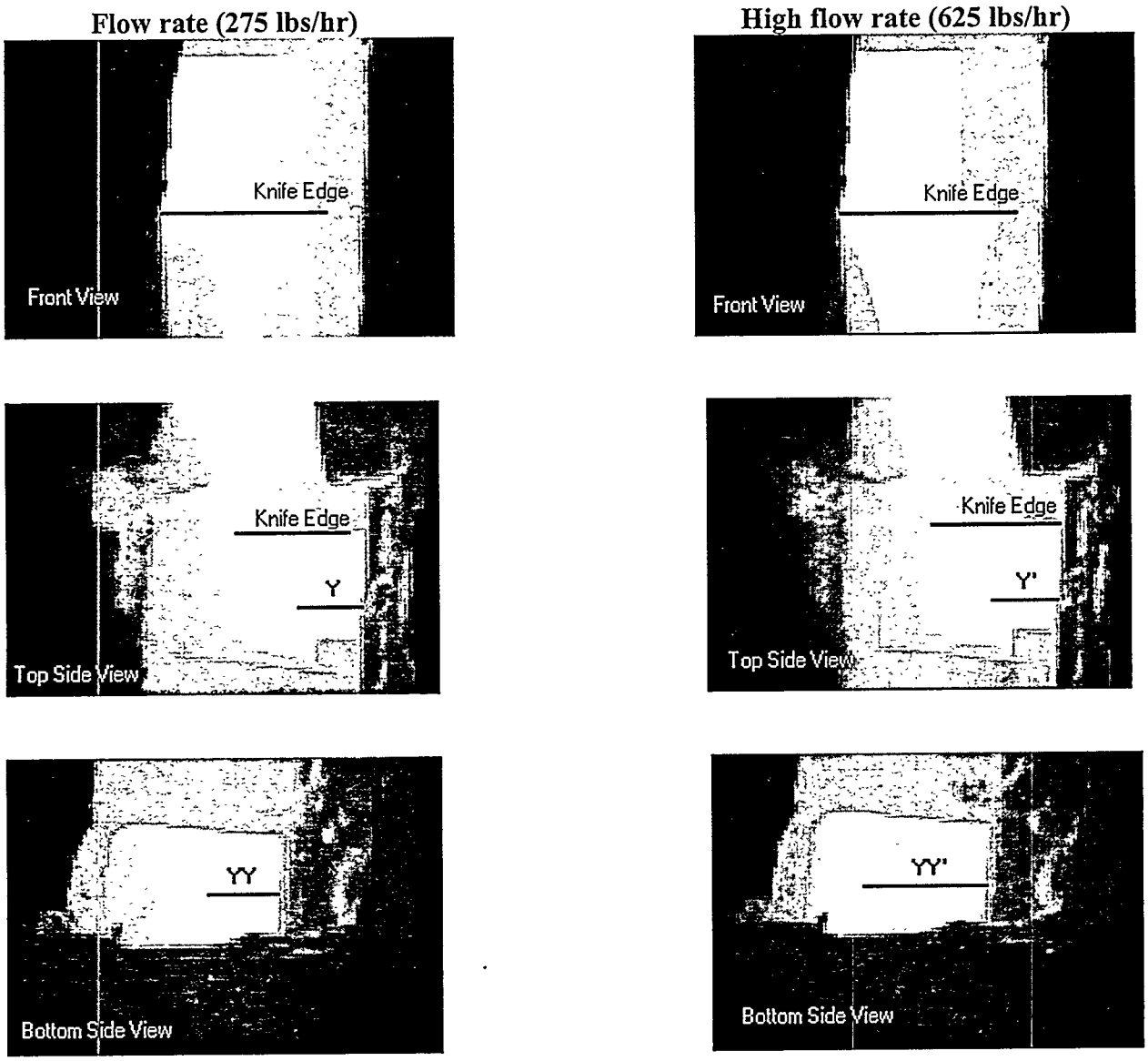

Figure 1. Wicking phenomena observed during the transient glass flow experiment. The deflection (from the arbitary axis) of the glass stream is denoted by Y-Y' and YY-YY', respectively.

FIU-HCET collaborators

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Appendix A

Compositional analysis of waste glass from Savannah River Site's (SRS) Defense Waste Processing Facility (DWPF).

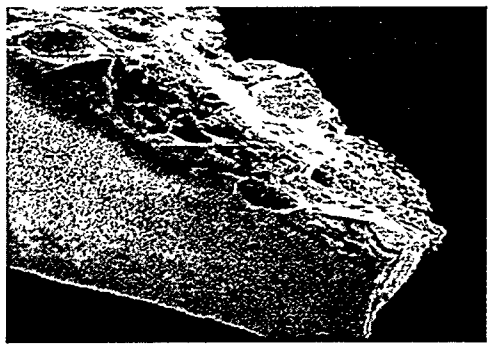
PROCEDURE

The Remelted and Fresh Glass samples were ground to small pieces to obtain better representative pictures. For the Remelted Glass, three different regions were analyzed (shiny, opaque, and cross-section). For the Fresh Glass, two regions were studied: shiny and cross-section. Duplicate spots were compared from each region.

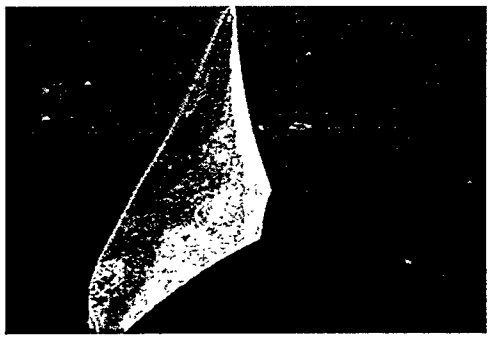
The samples were analyzed using a Phillips XL/DX4I Scanning Electron Microscopy with an EDAX X-Ray Dispersive Spectrometer. All images were collected without any preparation or coating. The accelerating voltage was 15.0 kV, the beam spot size was 6.0, and the detector was secondary electron. The images were printed to a Polaroid camera. The quantification method was standard-less using copper to calibrate the instrument.

RESULTS and DISCUSSION

Picture 1 and 2 show the shiny and opaque regions, respectively, from Remelted Glass. Duplicate analysis numbered 1 and 2 are studied for each side. The corresponding spectra are exhibited in Figures 1 through 4. The quantitative elemental analysis, determined on the basis of the elements expressed as the oxides, is reported in Table 1.



Picture 1. Shiny surface.



Picture 2. Opaque surface.

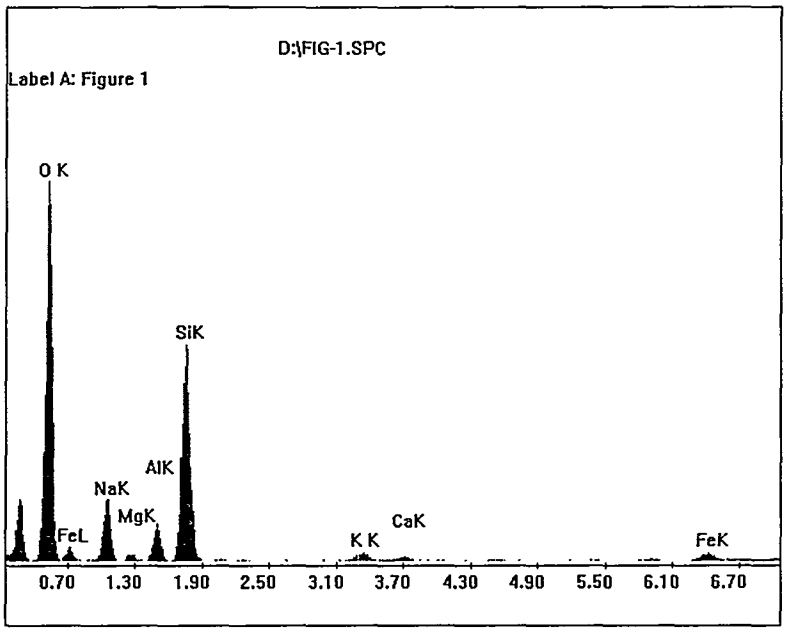


Figure 1. Shiny surface from remelted glass region 1.

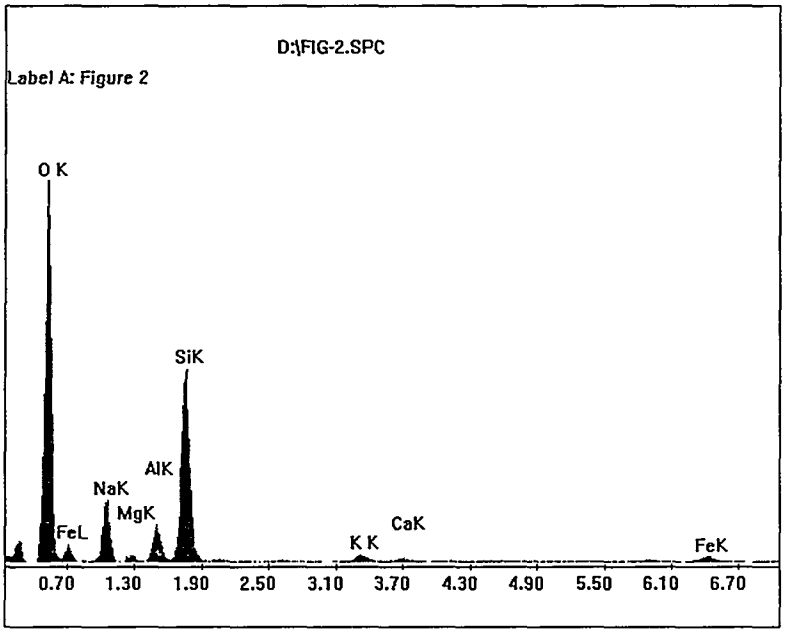


Figure 2. Shiny surface from remelted glass region 2.

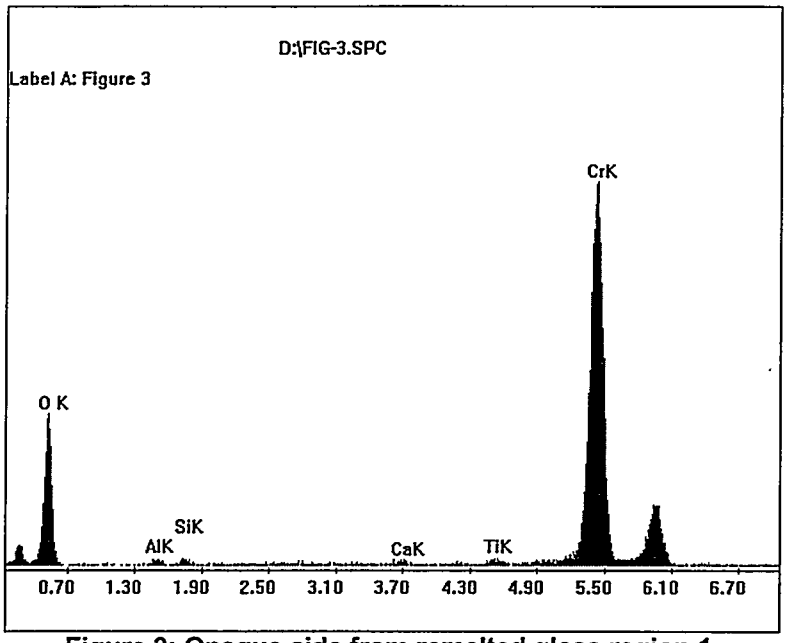


Figure 3: Opaque side from remelted glass region 1.

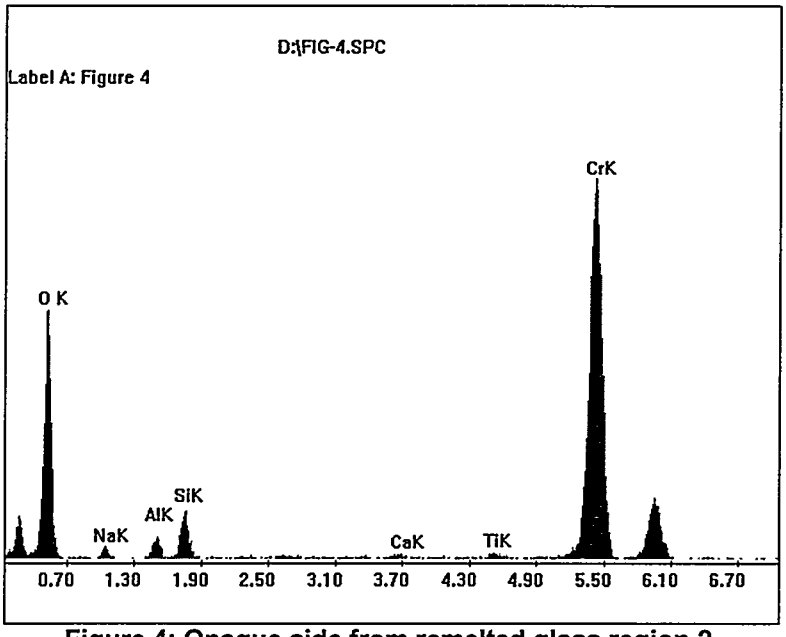


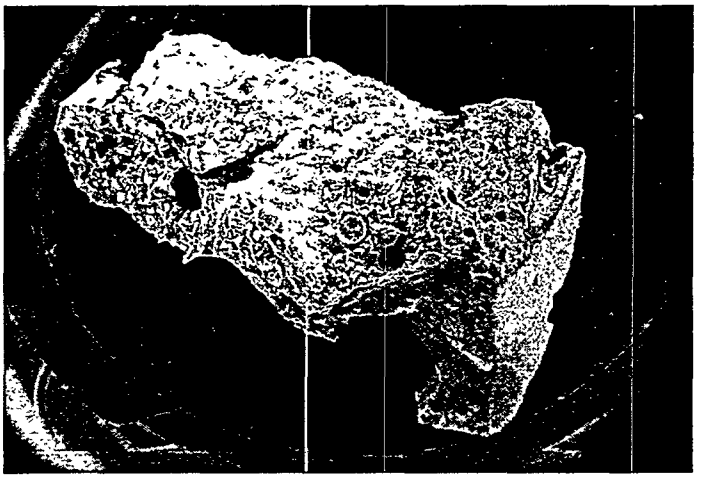
Figure 4: Opaque side from remelted glass region 2.

Table 1:
Compositional analysis of opaque and shiny sides from remelted glass.

Region	SiO_2	Cr_2O_3	Fe_2O_3	Na_2O	MgO	Al_2O_3	K_2O	CaO	TiO_2
Shiny side1	62.15		11.14	13.68	1.37	8.45	2.22	0.99	
Shiny side2	59.16		12.57	14.20	1.62	9.33	2.10	1.02	
Opaque side1	0.54	97.6				0.55		0.35	0.87
Opaque side2	3.77	92.7		0.97		1.70		0.24	0.62

The shiny surface of the remelted glass contains mainly silica (62.15% and 59.16% for regions 1 and 2, respectively), demonstrating the glass is the principal component. Iron, sodium, magnesium, aluminum, potassium, and calcium are present. Nevertheless, for the opaque side, the results are quite different. The principal element is chromium (97.69% and 92.70% as oxide form for regions 1 and 2, respectively), having small amount of silica 0.54% and 3.77% for regions 1 and 2, respectively. This result could be due to the contact of this side with chromium. In addition to chromium and silicon, the opaque side exhibits aluminum, sodium, calcium, and titanium.

In an attempt to corroborate the results, the dull and shiny sides from the cross-section area were analyzed (Picture 3). The cross-section was spotted as well. The spectra are presented in Figures 5 to 10, and the compositional analysis is reported in Table 2.



Picture 3. Cross-section from remelted glass.

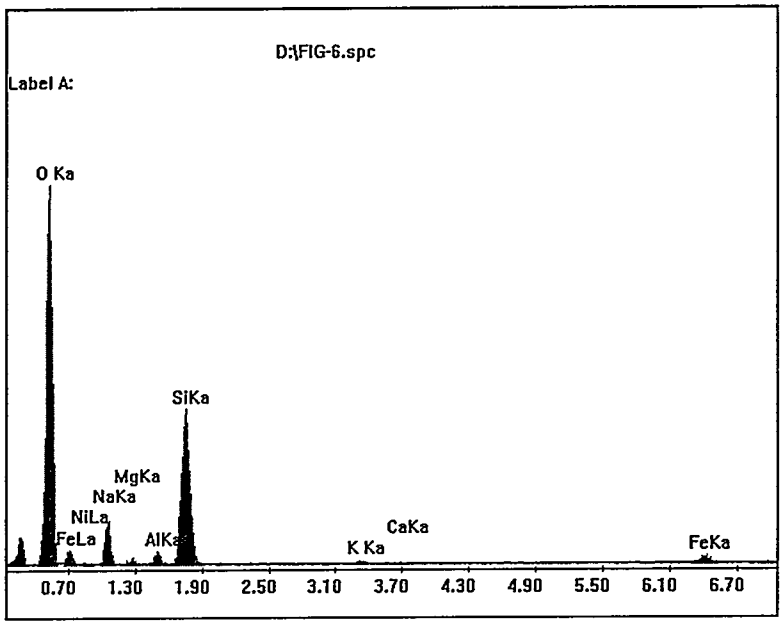


Figure 6. Shiny part from cross-section of remelted glass (region 2).

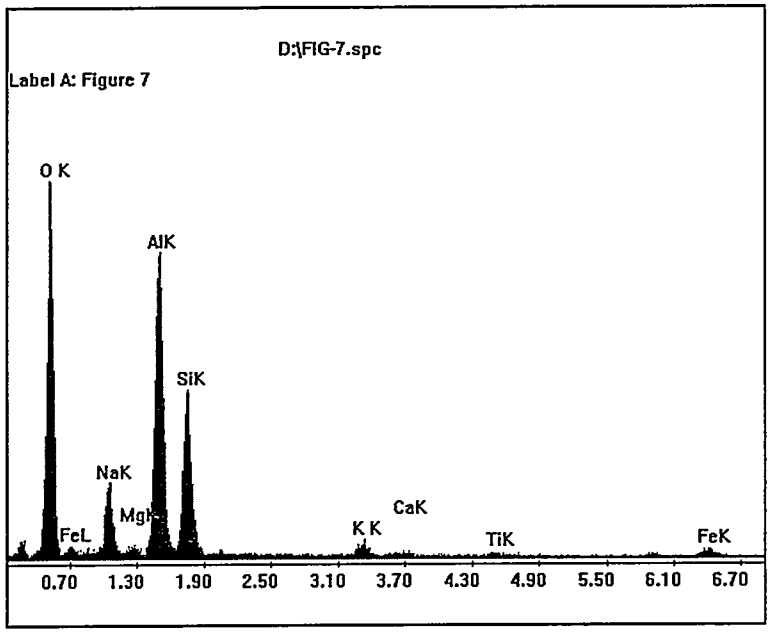


Figure 7. Cross-section from remelted glass (region 3).

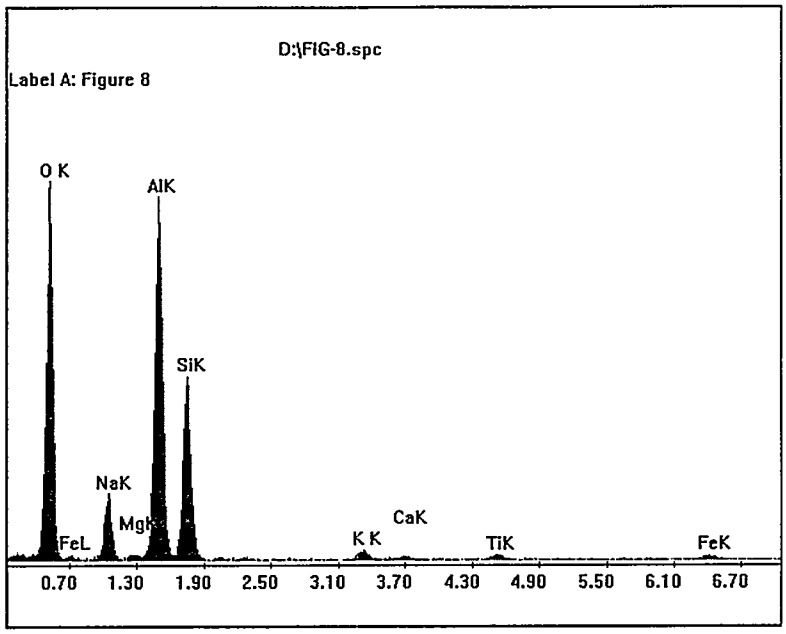


Figure 8. Cross-section from remelted glass (region 4).

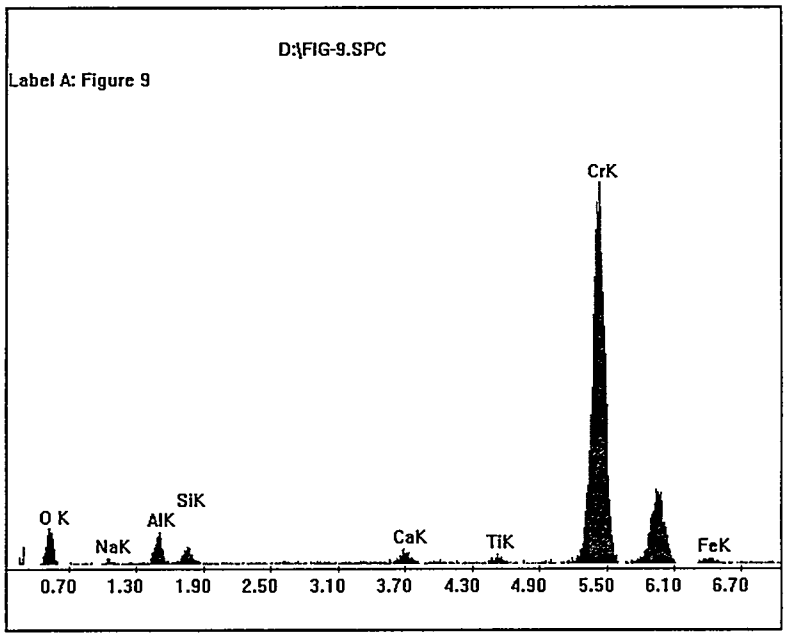


Figure 9. Opaque side from cross-section of remelted glass (region 5).

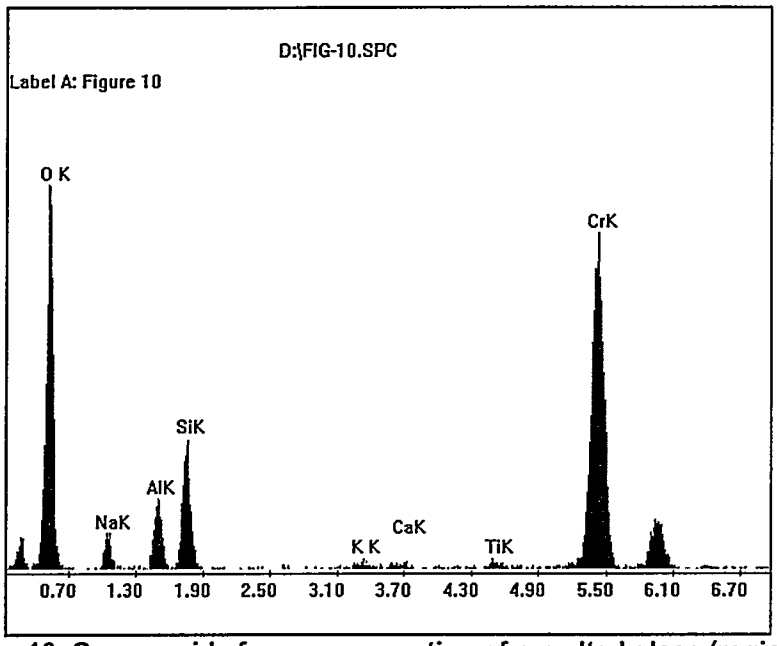


Figure 10. Opaque side from cross-section of remelted glass (region 6).

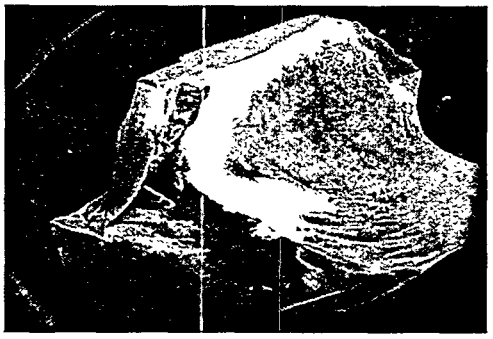
Table 2.
Compositional analysis of the cross-section from remelted glass

Region	SiO2	Al2O3	Cr2O3	Fe2O3	MgO	K2O	CaO	TiO2	Na2O	NiO
1	45.11	12.23	-------	18.53	1.54	1.61	0.53	-------	13.62	6.82
2	52.68	5.08	-------	19.13	2.96	0.88	0.38	-------	16.34	2.58
3	32.98	47.38	-------	4.50	1.00	1.81	0.58	1.01	10.80	-------
4	34.28	49.96	-------	2.69	0.85	1.29	0.57	1.28	9.08	-------
5	3.54	6.88	84.46	1.53	-------	-------	1.40	1.00	1.19	-------
6	10.46	5.80	78.97	-------	-------	0.49	0.31	0.93	3.03	------

The shiny and opaque sides from a cross-section of remelted glass show similar components to the shiny and opaque surfaces. There are differences in composition, but silica and chromium for the shiny and opaque regions from the cross-section area are maintained as the main phases in the opaque and shiny surfaces. The shiny part from the cross-section presents less silica and more iron than the shiny surface, and the presence of nickel is observed for the shiny cross-section. On the other hand, the opaque area from the cross-section contains more silica, more alumina, and less chromium than the opaque surface. The cross-section presents more alumina than silica (47.38% and 49.96% of alumina for the regions 3 and 4, respectively).

The fresh glass does not exhibit a dull side. The cross-section and shiny sides (Pictures 4 and 5, respectively) are analyzed. Figures 11 through 14 exhibit the corresponding spectra, and Table 3 shows the compositional analysis.

Picture 4. Shiny section from fresh glass.



Picture 5. Cross-section from fresh glass.

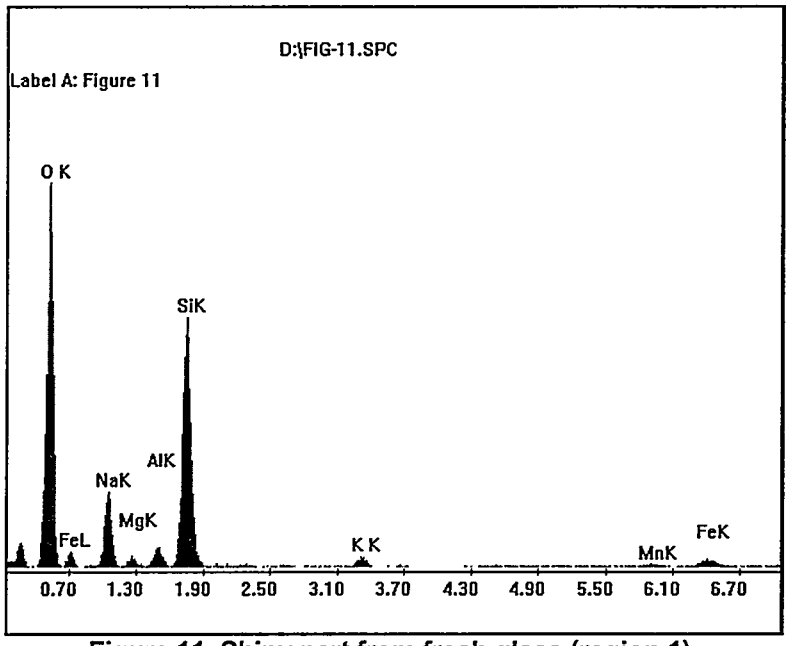


Figure 11. Shiny part from fresh glass (region 1).

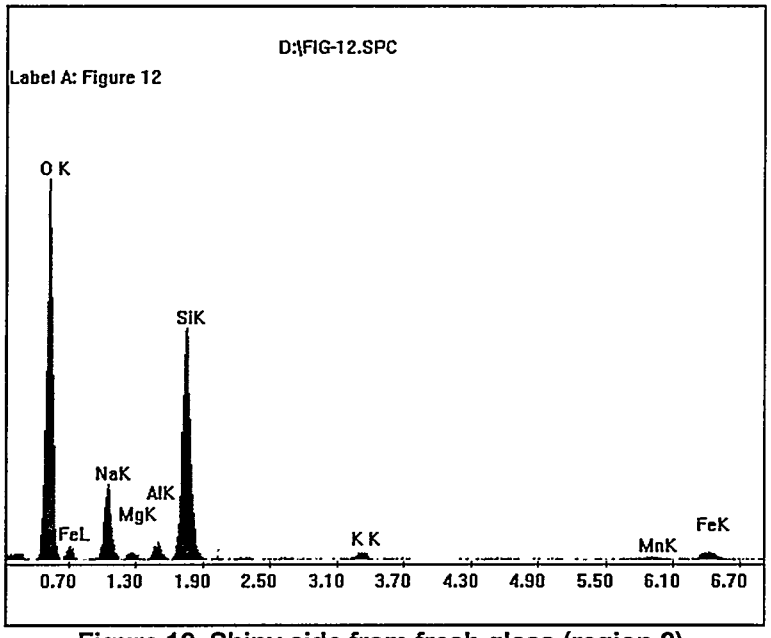


Figure 12. Shiny side from fresh glass (region 2).

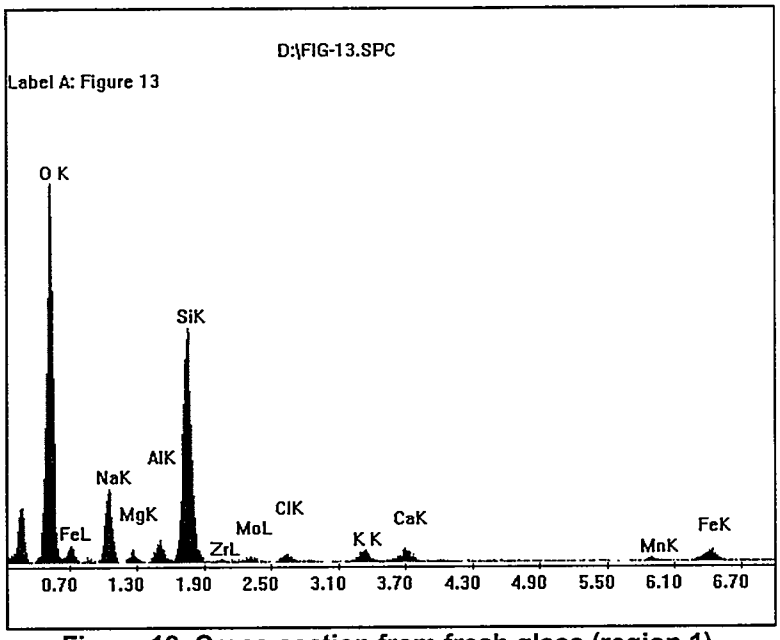


Figure 13. Cross-section from fresh glass (region 1).

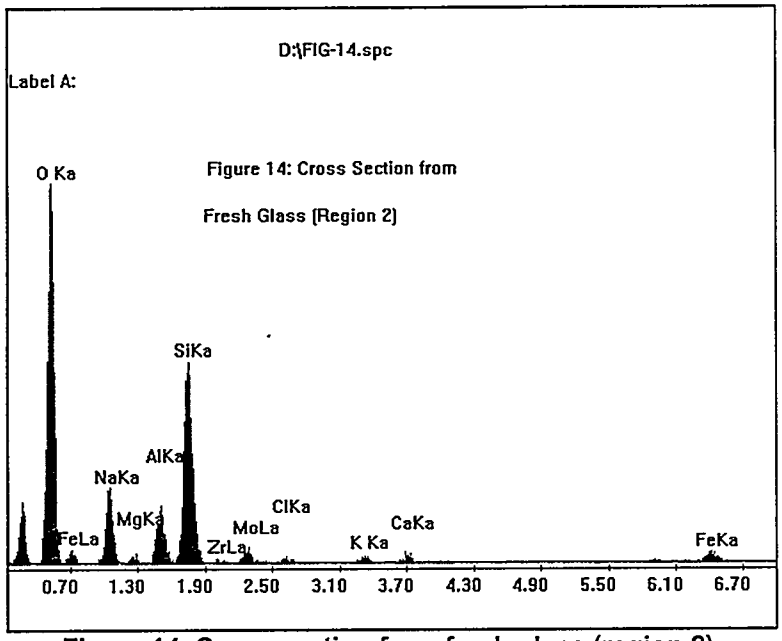


Figure 14. Cross-section from fresh glass (region 2).

Table 3.
Compositional analysis of the shiny and cross-section areas of fresh glass

Aspect	SiO2	Al2O3	Fe2O3	MgO	ZrO2	Mo2O3	Cl2O	K2O	CaO	MnO	Na2O
Shiny side-1	59.34	5.02	12.45	2.29	-------	-------	-------	1.60	-------	1.00	18.30
Shiny side-2	59.64	4.49	12.08	2.25	-------	-------	-------	1.60	-------	1.01	18.93
Cross-section 1	51.37	4.68	14.26	2.62	0.87	1.86	1.31	2.03	2.70	1.20	17.10
Cross-section 2	46.88	13.04	10.77	2.11	1.55	4.83	1.01	1.21	2.00	-------	16.60

The shiny surface contains silica as the principal phase (59.34% and 59.64% for regions 1 and 2, respectively). Alumina, iron, magnesium, potassium, manganese, and sodium are also present. The cross-section shows similar composition as the shiny part, observing the presence of small amounts of zirconium, molybdenum, chlorine, and calcium.

CONCLUSIONS

The compositional elemental analysis of the remelted and fresh waste glass samples were determined. The fresh glass exhibits a more uniform composition (silica is the main component) over the cross-section and the surface than the remelted glass in which the analysis varies from the shiny, opaque, and cross-section regions, containing silica, chromium, and alumina as the major components, respectively.

III. CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY

MONTHLY PROGRESS REPORT

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http://www.hcet.fiu.edu

Online Measurement of the Progress of Decontamination

Project Number: HCET-1998-C005

Project objectives

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

The specific aims of this subtask include the following:

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

Major milestones

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

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

Significant events

- Detailed mechanical design of surface characterization detector carriers has begun.
- Design of effluent characterization detector carrier including tooling for generation of disposable tube section has begun.
- Control electronics detailed design has begun including generation of pseudo-code and control structures.

Accomplishments and technical progress

- Began detailed component design of the detector mechanical arrangements implementing
  - 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 colored indicator light arrays
  - Selectable limit calibration, either absolute engineering units through industrial digital switch or placement of the sensors over known condition of clean and contaminated ('background' and 'release level standard surface')
  - Preliminary operational procedures generated for creation of control coding.
- Pursuit of an applicable commercial 3D position-determining system while continuing preliminary design of a proprietary system:
  - Combination angulation/range relational geometry
  - Mixed source technologies
  - Single stationary station required
  - No RF links necessary.
- Specific contacts have been established with representatives directly involved with DOE site demonstration and deployment to ascertain a scheduled demonstration.

Assessment of current status

- Review of conceptual design and proposed implementation, as required by FY99 PTP, revealed discrepancies between design and specified equipment with original scope and plan. A revised design and requisition is in process with any additional schedule time being absorbed within the

previous intervals between tasks. Minimal disruption of the initial milestone and task procession will result, and the deployment should take place as scheduled.

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

Plans for the next two months

- Continue design/development activities on position determination system.
- Complete mechanical design and fabrication of mechanical components to integrate sensors and indicators to decon machine.
- Continue electronic design including control software.
- Continue negotiations for DOE facility deployment.
- Continue development of an FIU-HCET demonstration plan.
- Perform and document design reviews to meet FIU-HCET QA standards specified in the HCET QA Program Manual.
- Complete presentation for DDFA midyear review meeting.

FIU collaborator

Richard Musgrove, (305) 348-6622

Remote Surveillance of Facilities Awaiting Deactivation and Decommissioning

Project Number: HCET-1998-C006

Project objectives

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

Following are the objectives of the project:

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C006-M1	Testing at FIU-HCET	Components and integrated unit tested at FIU-HCET	Due: 1/11/99 *. Rescheduled for 7/31/99
C006-M2	Testing at a DOE site	Tested at a DOE site for site-specific parameters	Due: 4/16/99 * Rescheduled for 8/30/99
C006-M3	System Improvement	Modifications completed.	Due: 5/17/99 * Rescheduled for 10/30/99
C006-M4	Performance evaluation	Performance evaluated under ambient environmental conditions	Due: 8/27/99 * Rescheduled for FY00
C006-M5	Deployment plan	DOE site deployment plan created.	Due: 10/1/99
C006-M6	Commercialization plan	Industrial partner interested in commercialization of the system identified	Due: 10/30/99
C006-M7	Year-end report	Report completion	Due: 11/30/99

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

Significant events

- Specific protcols have been selected for communication of sensor transducer data to the data acquisition electronics, local and remote.
- Particular sensor transducers are being procured for inclusion in the prototype.
- Distinct interest has been shown by Fernald representatives for adapted versions of remote sensor pacakage for existing needs.

Accomplishments and technical progress

- Additions to and condensation of the matrix of anticipated sensors, power sources, event controllers, and communication modules continues:
  - Low-power sensors for radiological, physical, and chemical status
  - Power sources: commercial/facility line, photovoltaic, thermoelectric (dynamic ambient and induced heat source), and static electrochemical
  - Continuous, integration, abnormal event, conditional interrupt, and fixed interval sample and reporting convention
  - Communication linkage: satellite, cellular, RF, dedicated connection
  - Interrogated, self-initiated, continuous; unidirectional and bi-directional data communication.

- Power management is critical for modules with integral power source. Hardware and control systems are in development for micro-power event timing, standby maintenance, and data collection. The allowable selectable schemes include
    - Intermittent sensing to ascertain status without data logging or transmission (regular or on-demand function confirmation)
    - Intermittent sensing with data logging for non-synchronous transmission
    - Intermittent sensing with immediate transmission
    - Some combination of above with exception reporting.

  Specific micro-power controllers and interface electronics have been identified to minimize effective duty cycle of power-hungry operations involving sensors and communication.
- Contact continues with commercial entities capable of providing components and subsystems.

Assessment of current status

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

Plans for the next two months

- Continue detailed electronic design of sensing modules.
- Further purchase of system components and test at FIU-HCET.
- Continue to provide FIU-HCET's site liaisons with detailed design information to aid their site participation solicitation efforts and to clarify the details of system design in light of actual needs expressed.
- Finalize designs to meet FIU-HCET QA standards.
- Complete presentation for DDFA midyear review meeting.

FIU collaborator

Richard Musgrove, (305) 348-6622

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

Project Number: HCET-1998-C008

Project objectives

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C008-M1	Cost-benefit analysis	Data showing performance of EIC vs. baseline technologies	Scheduled for completion by 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 on 2/26/99. The reason for delay addressed in section "Assessment of Current Status" of this report.

Milestone No.	Milestone Description	Completion Criteria	Status
C008-M2	Deployment Plan and Demonstration	Integration with D&D Focus Area's Large Scale Demonstration and Deployment Program (LSDDP). Commitment for use of EICs for alpha contamination measurement from one or more DOE sites	Originally scheduled for completion by 2/8/99. Delayed due to slow response from DOE site users. 1. HCET will support DDFA for LSDDP at Savannah River, including evaluation of EICs and preparation of the Innovative Technical Summary Report (ITSR). LSSDP for EIC is scheduled for Summer 1999. 2. Deployment plan for Oak Ridge completed on April 17, 1999 and is being evaluated. Test will be performed on approval of the test planned. Tentative completion date is May 1999.
C008-M3	Deployment	Deployment of the EIC system at one or more DOE sites	Scheduled for completion by 5/17/99. On schedule. Site for first deployment: Oak Ridge (K-1420) for characterization of floor. Main source of contamination: depleted and enriched uranium.
C008-M4	Information flow	Availability of procedures, instructions, manuals, and information on developments and improvements to DOE	Scheduled for completion before 10/30/99
C008-M5	Final report	Report completed and issued	Scheduled for completion by 11/30/99

Significant events

- SRS-LSDDP suggested FIU-HCET to submit an abstract on electret ion chamber for alpha contamination measurement to American Nuclear Society's meeting at Knoxville, Tennessee, to be coauthored by HCET personnel and LSDDP team at SRS.
- FIU-HCET received the LSDDP, SRS Test Plan on use of electret ion chambers for alpha contamination measurement for review. It was reviewed and suggestions made to improve it.
- Discussions were held with Fernald representative for demonstration of EICs at Fernald, Ohio.
- A test bed has been established at FIU-HCET. Measurements made with 100 cm^2 area alpha probe show that FIU-HCET ceramic test-bed tiles have uniform alpha emanation over all cross-sections of the tiles (type A: 13-inch x 13-inch; type B: 15-inch x 15-inch), thus confirming FIU-HCET's configuration as an excellent, inexpensive, large-area radioactive test-bed for evaluation, comparative assessment and calibration of instruments.

Accomplishments and technical progress

- Asses Coordination activities to support DDFA with the SRS LSDDP continued. An abstract entitled "Evaluation of electret ion chambers for measurement of surface alpha contamination in preparation for SRS-LSDDP" coathored by FIU-HCET and SRS-LSDDP, was submitted to American Nuclear Society's 2nd Topical Meeting on Decontamination, Decommissioning and Reutilization of Commercial and Government Facilities, Knoxville, Tennessee.
- FIU-HCET reviewed the LSDDP test plan. SRS-LSDDP plan for comparison of EICs and base-line technology involves simultaneous measurements on a test surface, and for confirmation, measurements on collected smear samples. Smear samples will be counted in a gas flow proportional counter to determine activity. Then measurements on these smears will be made using EICs. Usually smears are of smaller area (< 4 cm^2) than EIC opening (48 or 180 cm^2). EIC calibration factors are different for source areas smaller than that of its window. Comparative assessment was done at FIU-HCET by collecting smears from its Rad. Lab. (K-65 Silo material) by using factors appropriate to smear sample dimensions. These factors will appear in a FIU-HCET paper in June 1999 issue of Health Physics Journal (Health Physics 76(6):1-11). Following comments were made on the SRS-LSDDP test plan:
    - Response of electret depends on the energy of alpha radiation, which means source of radiation should preferably be known and appropriate calibration factor should be used.
    - Electret Ion Chambers (EICs) measure total alpha contamination and comparison with the baseline technology should be performed for total alpha contamination.
    - If comparison of removable contamination is to be performed, wipe should be counted in a standard counting set up, such as gas flow proportional counter or ZnS (Tl) scintillation counter measuring only alpha radiation. The same wipe should be counted with electret ionization chamber. Since response of the EIC depends on the position of the source of radiation and since wipe samples are usually smaller than the area of the EIC opening, the wipe should be placed inline with chamber center and appropriate calibration for this position should be used.

A sample data collection sheet used by FIU-HCET for measurements using EIC and a list of references were also sent.

Assessment of current status

- The system has been calibrated and is ready for demonstration and deployment. FIU-HCET is working with representatives from Fernald, Oak Ridge, Rocky Flats, and Savannah River for demonstration and deployment of the technology. Among these sites, LSDDP is scheduled at SRS. FIU-HCET has begun to support DDFA in SRS LSDDP and in preparation of ITSR. Test plan for Oak Ridge has been submitted for review.
- Milestone 1 was completed on February 26, 1999. Milestone 2 is nearing completion because user involvement has occurred and DDFA has committed to using EICs at SRS LSDDP. Based on recent progress and existing commitments, Milestone 3 and all other activities planned for FY99 expect to be successfully accomplished on schedule.

Plans for the next two months

- To complete review of the test plan for floor characterization at K-1420, Oak Ridge.
- To continue supporting the SRS-LSDDP and prepare for demonstration.

FIU-HCET collaborator

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

Review of Current Characterization and Monitoring Practices at DOE Sites

Project Number: HCET-1999-C009

Project objectives

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

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

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

Major milestones

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

Significant events

- Substantial amount of cost and performance data was obtained from Hanford site personnel.

Accomplishments and technical progress

- Continued obtaining cost and performance data for the baseline technologies used at the Hanford site from Hanford personnel.
- Continued discussions with the University Program Coordinator for Fluor Daniel Fernald concerning adding Fernald to the list of DOE sites being reviewed. If Fernald is added to the list, then cost and performance data will also be obtained from end-users at Fernald.
- Initiated searching and reviewed various documents (Innovative Technology Summary Reports, Environmental Technology Verification Reports, Venor literature, Site websites, and others) for cost and performance information for both Oak Ridge and Hanford.
- Continued developing and designing the database.

Assessment of current status

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

Plans for the next two months

- Complete Milestone 3: a description for each baseline technology and current practice.
- Discuss with the FIU-HCET manager of the field office at Oak Ridge concerning Oak Ridge cost and performance data. The site personnel identified in these discussions will be contacted for further information.
- Continue searching and reviewing information from various sources: site personnel, vendors, and reports.
- Continue work on developing database.

FIU-HCET collaborator

Hans Weger, (305) 348-6620

Demonstration and Deployment of CMST-CP Technologies

Project Number: HCET-1998-C010

Project objectives

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

The purpose of this project is to assist CMST-CP with the final steps of this process. In short, it will help take the technologies developed by CMST-CP to their ultimate use in the field. It is also a goal of this project to strengthen CMST-CP relationships with the users with the idea of deploying technologies more quickly and efficiently. To that end, FIU-HCET will help coordinate some of the deployment and related activities between the CMST-CP and the site users. In addition, this activity will directly support CMST-CP's D&D coordinator.

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C010-M1	Schedule & number of demonstrations and/or deployments	Definitive list of activities generated.	Completed on schedule 3/15/99
C010-M2	Choose sites	Deployment/demonstration sites identified.	To be completed by 3/31/99
C010-M3	Demonstrations	Complete scheduling and organization	Due 3/31/99
C010-M4	Deployment	Site commitment to deploy a selected CMST-CP technology(ies).	Due 10/30/99
C010-M5	Marketing	Site commitment to deploy	Due 10/30/99

Significant events

- Milestone 2 completed. The Fernald and Oak Ridge sites have been identified as the focus for demonstration and deployment activities. This does not preclude demonstrations at other sites.
- Milestone 3 was not completed on schedule. Establishing the schedule of demonstrations requires discussions with several personnel, which requires more time than was scheduled. Rescheduling of the milestone is in progress and will be reported in the next monthly report.

Accomplishments and technical progress

- Efforts for demonstrating the technology at Fernald included reviewing the history of the demonstration of LIFI at Fernald and discussions with the University Coordinator for Fluor Daniel Fernald.
- Discussions were held with the Principal Investigator (PI), project engineer from Special Technologies Laboratory (STL), of LIFI concerning performance data, history of previous demonstrations, technical specifications. He agreed to send this information to FIU-HCET.
- Attended technology demonstration of LIFI at Oak Ridge that has been tentatively arranged by STL with a contractor. The demonstration was insufficient in achieving all objectives. A further demonstration will be necessary. One of the main objects not fulfilled is the need to determine potential false positives and their corrections that can be found in the field.

Assessment of current status

Due to funding cuts from CMST-CP, the project scope has been reduced. Discussions about scope with the CMST-CP representatives continued during the first quarter of FY99. The project work began in the second quarter. Milestones 1 and 2 have been completed. Rescheduling of milestone 3 is in progress. The new date to be chosen is dependent on discussions with the FIU-HCET manager of the field office at Oak Ridge, Oak Ridge site personnel, and the University Coordinator at Fluor Daniel Fernald.

Plans for the next two months

- Obtain and review information from the PI of the LIFI project concerning technical specifications and performance data. This information will be used to write a brochure describing the technology.
- Discuss with site personnel at Oak Ridge and FIU-HCET manager of the field office at Oak Ridge concerning future demonstrations at Oak Ridge.
- Discuss with personnel at Fernald concerning a technology demonstration.
- New date will be set for milestone 3 dependent on discussions with the FIU-HCET manager of the field office at Oak Ridge and the University Coordinator at Fluor Daniel Fernald.

FIU-HCET collaborator

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

Project Number: HCET-1998-C011

Project objectives

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

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

The current and evolving post-closure monitoring requirements at DOE-EM sites must be determined, documented, and tracked to provide the Characterization, Monitoring, and Sensor Technology Crosscutting Program (CMST-CP) with information to guide its post-closure technology development and deployment efforts. As part of this subtask, Florida International University's Hemispheric Center for Environmental Technology (FIU-HCET) will

- Determine and track post-closure monitoring needs at the Hanford, Savannah River, and Fernald sites (FY98) and the Oak Ridge (OR) and Rocky Flats (RF) sites (FY99).

Major milestones

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

Significant events

- Completed the review of the Oak Ridge site (milestone 1) ahead of schedule.

Accomplishments and technical progress

- Completed the review of the Oak Ridge site. A draft report concerning the results has been written and will be part of the final report.
- Initiated review of the integrated monitoring plan for Rocky Flats.
- Continued the identification of technologies, either available or being developed, that are capable of meeting post-closure needs of DOE sites.
- Distributed the post-closure review of the Fernald site (Fernald section in FY98 Year-End Report) to appropriate site personnel at Fernald for comments.

Assessment of current status

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

Plans for the next two months

- Conclude the review of Rocky Flats (milestone 2).

FIU-HCET collaborator

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IV. INTERNATIONAL TECHNOLOGY INTEGRATION (ITI)

MONTHLY PROGRESS REPORT

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

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.

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.

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

Open-ended 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.	Sent out surveys to all on line environmental companies. Those responding incorporated in database. Will continue to identify organizations to incorporate. Will discuss with DOE's Office of Policy, the possibility of incorporating database with energy web site. Due date: 4/10/99. Date was postponed due to Secretary of Energy's travel schedule.

Milestone No.	Milestone Description	Completion Criteria	Status
I001-M2	Interactive Communication Web site: Maintain the Energy web site for the members/participants of the Western Hemisphere Energy Initiative	Identify funding mechanism for the support of the Interactive Communication Web site.	A tentative meeting was proposed by DOE's Office of Policy to discuss funding the Web site. Office of Policy is in the process of opening a direct funding vehicle between FIU-HCET and DOE-PO. The Office of Policy to support the Energy web site has allocated additional funding. Due date: TBD (Note: The due date has been postponed at the request of DOE Office of Policy.)
I001-M3	Participate at the next Hemispheric Energy Steering Committee meeting in Lima, Peru.	Make a presentation of the 'Virtual Secretariat' and introduce FIU-HCET to participants of the Steering Committee.	Completed: 2/11/99
I001-M4	Enterprise Florida: Identify U.S. companies who would be interested in participating in the next Export Marketing Mission to Argentina, April 10-16, 1999.	Identify a minimum of 20 companies for mission. Enterprise FL has suggested that FIU-HCET participate.	Responses by companies were forwarded to Enterprise Fl. Completed: 3/2/99 ahead of schedule.
I001-M5	ITI Year End Report	Letter by EM/OST to accompany report needs to be sent to FIU-HCET publications.	Report was completed and a draft letter to accompany report was sent. Report is being reviewed by EM/OST. Once review by EM is complete, report will be sent out to international representatives and Milestone will be completed. EM/OST has communicated they are in the process of completing review. Due Date: 3/99

Significant events

- The preliminary funding meeting for website proposed by DOE for March 1999 has been postponed. New date will be determined by DOE representative. The date was changed due to Secretary's Richardson extensive travel schedule to Latin America. However, additional funding to support the website until a meeting can be scheduled has been identified by the Ofiice of Policy, DOE.
- FIU-HCET brought a cross-section of academic, state, and private entities throughout the State of Florida to meet at the office of the Mayor of Miami-Dade County, Alex Penelas, to discuss the possibility of Miami-Dade County co-hosting the next Western Hemisphere Ministerial Conference with the U.S. Department of Energy, July 1999.

- A white paper with a budget to co-host the Western Ministerial Conference was submitted to Mr. Calvin Humphrey, Principal Deputy Assistant Secretary, Office of Policy and International Affairs. Mr. Humphrey has been appointed by Secretary Richardson, U.S. Department of Energy (DOE), to chair the search committee that will choose the co-hosting city of the next Western Hemisphere Ministerial Conference.
- FIU-HCET representative met with Mrs. Elena Leticia Mikusinski de Rossi, Deputy Council General of the Argentine Republic. This was a preliminary meeting to introduce the new International Coordinator to the Council General.

Accomplishments and technical progress

- The Interactive Communication Website information is being updated. The Final Report/Meeting Minutes of the Lima, Peru, trip has been incorporated on the site in both English and Spanish. FIU-HCET continues to get requests for passwords to use the member area of the site. To date, the following countries are registered and have password authorization: Argentina, Brazil, Canada, Chile, Colombia, Mexico, Nicaragua, the United States, and Venezuela.
- Working on identifying the international participants for the Fourth USDOE International Symposium, June 2000. This has included targeting international organizations and industries for promotional purposes.
- Made preliminary contact with Scott Smouse, International Coordinator, FETC. Sent Mr. Smouse general information on FIU-HCET. He asked that he be kept abreast of the international activities pursued by FIU-HCET. There was discussion on climate change and clean technologies. Information was forwarded on these two areas for Mr. Smouse's review and possible collaboration.
- FIU-HCET has been contacted by Universidad de la Marina Mercante in Argentina. They are interested in identifying collaborative work with FIU-HCET and in signing an MOU. Information was forwarded on HCET and reciprocal information was requested from them.

Plans for the next two months

- FIU-HCET personnel will continue to assist the DOE-EM international program manager in activities with the CNEA of Argentina.
- FIU-HCET personnel will continue to send bi-weekly e-mails to DOE-EM on the Center's Latin American initiatives on behalf of DOE.
- FIU-HCET will aid in the identification of technologies for the countries of the Caribbean represented at the CTI meeting and aid in the diffusion of these technologies.

FIU-HCET collaborator

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