The Millennium's First Issue

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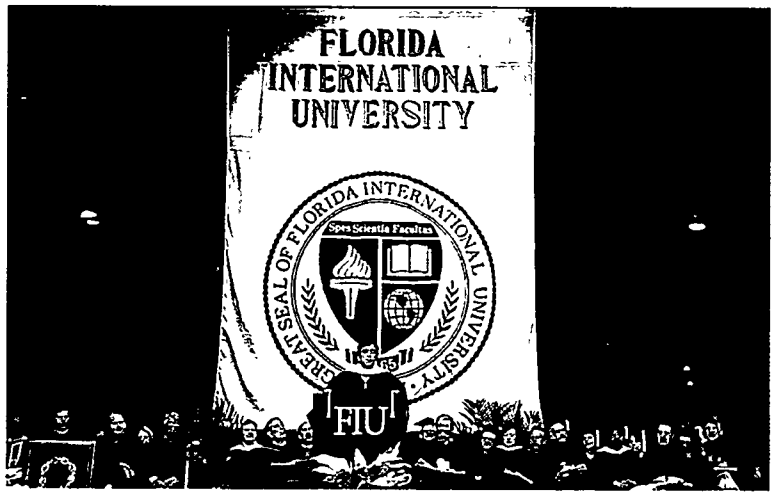
Energy Secretary Addresses the 20th Century's Final Graduates



Secretary of Energy Bill Richardson attended commencement exercises at Florida International University on December 13, 1999, where he received an honorary doctorate degree in engineering.

President Modesto Maidique conferred the doctorate *honoris* causa upon the Secretary in recognition of his accomplishments in environmental cleanup and long-standing commitment to minorities in engineering. Citing in his address FIU's predominantly minority student population, the Secretary emphasized the importance of diversity in the coming years.

"The energy needs of Central and South America are expected to double in the next 20 years. FIU is excellent because it focuses on science, engineering and research, domestically as well as internationally."

The Secretary related his concern over the lack of women and minorities in senior positions at DOE's national labs. "We have 14 national laboratories; not one is headed by a woman or minority. We must change that. This great land of ours must do more to engage women and minorities in fields that will lead us to the frontiers of the new century."

Nevertheless, DOE has been a major supporter of the education of minorities in underrepresented fields of study. "One of our partnership's success stories has been right here at FIU. In 1995, the Department of Energy helped launch the Hemispheric Center for Environmental Technology. More than 200 students have trained at FIU-HCET and contributed to its work... to clean up the Cold War that we won." The Secretary mentioned two of FIU-HCET graduating students: Anil Bommakanti, who just earned a Master's in Systems and Industrial Engineering; and Onix Musibay, who completed her studies this summer in Mechanical Engineering and moved on to a distinguished appointment in her profession.

"Every graduation speaker has to give you a little advice, and I am old enough to do it. *Tengan orgullo en lo que son* (be proud of who you are). You are the new millennium generation, and I know that this next century is going to be yours."

FIU President, Modesto Maidique, Secretary Richardson, and FIU-HCET's Director, M.A. Ebadian, pose with FIU-HCET staff members.

Students play active roles in finding remediation technology solutions at FIU-HCET

Students working as project coordinators at FIU-HCET acquire hands-on experience researching environmental technologies aimed at solving critical remediation problems. Applied research and development affords students the opportunity to be responsible for real-life projects, from beginning to completion.

Center from left, FIU President, Modesto Maidique, Secretary Richardson, and FIU-HCET's Director, M.A. Ebadian, pose with FIU students, most of whom are engineering majors working at FIU-HCET's research facilities.

Rodrigo Silva *"The design of the medium-bore pipe decontamination test site will undoubtedly support FIU-HCET's goal of continuous growth by adding new testing capabilities and bringing new vendors to perform technology demonstrations. By challenging project coordinators with such designs, FIU-HCET enables its project managers to pursue even more challenging tasks as well as providing project coordinators working experience in the environmental field."*

As an undergraduate project coordinator for the Deactivation and Decommissioning Program Area, Rodrigo Silva expanded FIU-HCET's research capabilities by designing a medium-bore pipe decontamination test bed used to test pipe cleaning or characterization technologies that may be deployed at DOE facilities; performing extensive research in the areas of pipe decontamination and/or characterization technologies, disposal, recycling and decontamination costs, and physical attributes of piping systems currently present at DOE facilities; performing a cost study to compare pipe decontamination and disposal costs; performing a cost estimate for the construction of the test site; and constructing proposed test site designs using Auto-CAD.

Rodrigo Menezes *"My work has contributed to the continuous development of the TAP and my personal career growth, which motivates me to continue dedicating myself to this great program."*

Rodrigo Menezes is an undergraduate project coordinator working in the Technology Assessment Program (TAP) that evaluates technologies for use by the DOE in cleaning up their facilities. Rodrigo facilitates the exchange of environmental technology information between FIU-HCET and its clients by searching for innovative technologies and collecting technology demonstrations data; inputting evaluation results as well as photographs in the new D&D Program Area's technology information database system; and ensuring dissemination of consistent and precise information to the international community.

Onix Musibay *"I have been working with FIU-HCET since it opened its doors in 1995, where I have had the opportunity to be an integral part of the projects to which I was assigned."*

As an undergraduate project coordinator for the Deactivation and Decommissioning Program Area, Onix Musibay specialized in developing R&D facilities for vendor use by researching and designing test bays for characterization technology demonstrations; ordering equipment for and supervising the construction of test bays, using high quality construction materials, and engineering the cut-outs for housing radioactive sources; working closely with visiting vendors to ensure safe and successful testing of their radioactive survey equipment; and gathering and collecting research data to be included in federal reporting.

Jose Varona *"Without the knowledge and experience of FIU-HCET, solutions for problem sets would be a very arduous task for facility engineers. With the help of FIU-HCET, no problem has been left unsolved."*

As an undergraduate project coordinator, Jose Varona supports Large-Scale Demonstration and Deployment Projects at DOE facilities by performing technology research and screening; proposing new technologies to multiple DOE facilities (including INEEL, Fluor Fernald, and Los Alamos) and to the private sector; and facilitating on-site testing of technologies for use in the decommissioning of nuclear buildings and toxic waste sites.

Anil Bommakanti *"I have had the privilege of being associated with technology demonstrations at FIU-HCET since August 1997. These activities have given me tremendous insight into project management."*

As an undergraduate project coordinator, Anil Bommakanti enhanced the performance of the Technology Assessment Program (TAP) by developing a test plan, writing up proposals from different vendors, scheduling demonstrations at the FIU-HCET facility, collecting and analyzing the data, and preparing a final report.

#76

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HEMISPHERIC CENTER FOR ENVIRONMENTAL TECHNOLOGY

MONTHLY PROGRESS REPORT

FISCAL YEAR 2000

DE-FG21-95EW55094

JANUARY 2000

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

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SUMMARY

- The Online Measurement of Decontamination project team received a commitment for a demonstration in May from the Sacramento (California) Municipal Utility District (SMUD) Rancho Seco site. Since this site is a member of the DOE Commercial Utilities Consortium, the demonstration will fulfill the DOE and commercial technology demonstration requirements.
- Discussion on deployment of the Integrated Vertical and Overhead Decontamination (IVOD) System at Rancho Seco was conducted; date for deployment tentatively scheduled for early spring.
- Based upon functional requirements from SRS for a slurry monitor in a high-level waste tank, FIU-HCET developed and delivered a draft slurry monitor design and draft test plan.
- Experiments measuring slurry settling time for SRS slurry simulant at 10 wt% have been completed on FIU-HCET's flow loop with SRS dip.
- The completed design package of the test mockup for evaluating Non-Intrusive Location of Buried Items Technologies was sent to Fluor Fernald and the Operating Engineers National Hazmat Program for review. Comments are due at the end of January.
- Preliminary experiments to determine size distribution of aerosols generated during metal cutting were performed. A ¼-inch-thick iron plate was cut using a plasma arc torch, and the size distribution of airborne particles was measured using a multistage impactor.
- Per request of DOE-Ohio, FIU-HCET participated in a weeklong value engineering study for the characterization, decontamination, and dismantlement of their critical path facility.

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MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET D&D Program Manager	**Rob Rose**
Focus Area Technical Lead	**Paul W. Hart**
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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 deactivation and decommissioning. The objectives for this project include the following:

- Determine technology needs through review of the Site Technology Coordination Group (STCG) information and other applicable websites and needs databases.
- Further develop the Technology Assessment Program in the areas of equipment and facility dismantlement, facility characterization, integrated D&D technologies, and waste management.
- Evaluate at least 12 baseline and innovative technologies under standard test conditions at Florida International University's Hemispheric Center for Environmental Technology (FIU-HCET) and other locations and collect data in the areas of performance, cost, health and safety, operations and maintenance, and primary and secondary waste generation.
- Continue to locate, verify, and incorporate technology performance data from other sources into the multimedia information system.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D038-M1	Publication of the Technology Assessment Reports. Publish summary reports upon completion of individual technology assessments.	Assessment appears in FIU-HCET monthly progress report.	Due Date: Sixty days following completion of technology assessment

Significant events for this reporting period

- Framatome Technologies has been contracted to demonstrate their technologies for glove box and tank size reduction. The demonstration has been scheduled for May 1 – 16, 2000.
- Keibler Thompson Corporation is scheduled to demonstrate their robotic equipment (KT-30) for structural and equipment dismantlement at FIU-HCET in early March 2000.
- Seven companies have responded to the Requests for Expressions of Interest (EOI) published in the Commerce Business Daily (CBD) for Integrated D&D Technologies. These companies offer various combinations of characterization, decontamination, and facility and equipment dismantlement technologies.

- The completed design package of the test mockup for evaluating Non-Intrusive Location of Buried Items Technologies was sent to Fluor Fernald and the Operating Engineers National Hazmat Program for review. Comments are to be received by the end of January.

Accomplishments and technical progress to date

Under this grant project and earlier technology assessment projects funded from other sources, FIU-HCET assessed over 60 baseline and innovative 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 have been compiled. This data has been valuable in assessing whether a technology meets the screening criteria for those DDFA LSDDPs where these technologies are being considered, as well as assisting EM-40 project managers in making decisions on the deployment of innovative technologies. Technology assessment data is managed using a Microsoft Windows-based multimedia information system.

Assessment of current status and issues

- Project is on schedule and without impacts.
- A linkage document for Integrated D&D Technology Assessment has been completed and reviewed. This document links individual Scopes of Work for multiple technology demonstrations and will be used in technology solicitations.
- Negotiations with RedZone Robotics, Inc., and NUKEM Nuclear Technologies continue, to determine the most cost-effective scope of work to bring these technologies to FIU-HCET for demonstration.
- The search for facility dismantlement technologies for building materials continues. Currently, eight (8) potential technologies have been identified, including crawler demolition machines and mechanical demolition tools, concrete cutting and sawing tools, explosives, bulldozing, and non-explosive demolition agents.
- Demolition Technology Inc. has submitted a proposal for demonstration of its Diamond Wall Shaver for coating removal and the aggressive removal of concrete walls and ceilings.
- The completion of the mockup for the Glove Box and Tank Size Reduction technology assessments has been postponed until the PermaCon is relocated in the new High Bay. The move is scheduled for the end of January 2000.
- In support of D052 (Size Distribution & Rate of Production of Smoke & Particulates During Cutting of Metals), the Micro-Orifice Uniform Deposit Impactor (MOUDI™) was used to collect particulate generated during the plasma arc torch cutting of a mild steel plate. Data was collected for two different sampling distances and collection times. This information will be used to design sampling protocol for particulate collection during the glove box and tank size

reduction demonstrations. Figure 1 below shows the 11 size fractions, ranging from 18μm down to 0.056μm, collected during the cutting tests.

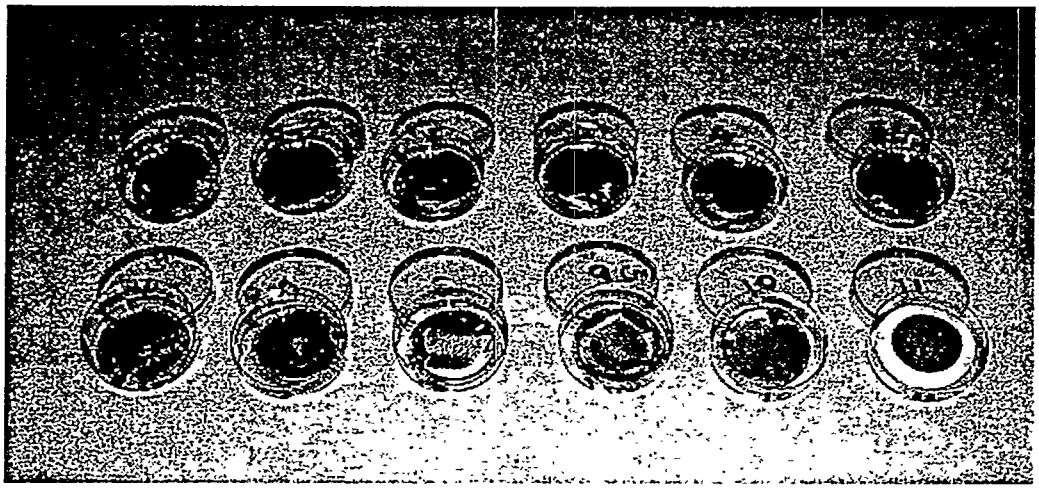

Figure 1. Fume size fraction samples collected during cutting of metal plate with plasma torch.

Plans for the next two months

Activities for the next two months include the following:

- Host a cost-shared field assessment of the Three Dimensional Integrated Characterization and Archiving System (3D-ICAS) by Thermo Electron Research & Development Center in mid-February.
- Demonstrate the Robotic Dismantlement Equipment (KT-30) by Keibler Thompson Corporation in March 2000.
- Relocate and complete mock-up for glove box and tank size reduction demonstrations.
- Continue the search for additional potential technologies for assessment in the areas of facility and equipment dismantlement, facility characterization, waste management, and integrated multi-capability combinations.
- Work with the OENHP to construct the test facility for Non-Intrusive Location of Buried Items Technologies in Beaver, West Virginia, and write the Test Plan for this project.

FIU-HCET collaborators

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Integrated Vertical and Overhead Decontamination System

Project Number: HCET-1998-D023

Project objectives

The overall objective of this project is to fabricate and test an innovative technology for the purpose of characterizing and decontaminating vertical and overhead structures and to transfer this technology to industry for use in reducing the cost to perform decontamination operations. This innovative technology will be capable of removing thick layers of coatings from smooth metal surfaces and will scabble ¼ to ½ inch of concrete from concrete floors, walls, or ceilings. The following are required to meet the overall objective:

- 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.

In addition to the objectives listed above, the following have been identified and will be performed during FY00:

- Make entire system self-contained and ready for field deployment.
- Demonstrate system at other DOE or commercial nuclear sites. Potentially, this technology may be tested at a LSDDP.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D023-M1	Decontamination/Deployment System Completed	Delivery of a field-ready system from contractor to FIU-HCET. System shall be ready for testing at FIU-HCET.	Due Date: 1/3/00 Rescheduled Date: 1/27/00. Delayed See "Current Status and Issues" below.
D023-M2	Characterization System Completed	Delivery of a field-ready system from FIU-HCET's CMST group to FIU-HCET's D&D group. A characterization system ready for testing and integration into the decontamination/deployment system.	Due Date: 2/29/00
D023-M3	In-House Field Testing of Integrated System	Completion of a successful field-testing of the integrated system at FIU-HCET. The field test will be considered a success if the test shows that the integrated system meets the performance specification requirements.	Due Date: 5/31/00
D023-M4	Testing of Integrated System at a DOE Site	Completion of a successful field-testing of the integrated system at a DOE site.	Due Date: 9/30/00

Significant events for this reporting period

Meeting at Rancho Seco was conducted on January 13. Representatives from EPRI, DOE, and FIU-HCET attended this meeting. Discussion on deployment of Integrated Vertical and Overhead Decontamination System (IVOD) was conducted, and a date for deployment will be scheduled for early spring.

Accomplishments and technical progress to date

- Four quotes from air compressor vendors have been obtained. A selection was made based on specification, equipment quality, lead-time, and price. A requisition request has been initiated.
- Platform/decontamination unit has been assembled. Redzone Robotics has provided FIU-HCET pictures and a video for review.
- Delivery of a field-ready system from Redzone Robotics is expected by end of January. One-day visits may be scheduled to Redzone prior to shipment of the technology to FIU-HCET. During this visit the equipment will be inspected, and an acceptance test will be conducted. A technical presentation on the IVOD was conducted at Rancho Seco.

Assessment of current status and issues

- This project is on schedule and delay in delivery of the platform and decontamination unit will not impact overall delivery schedule.
- Delivery of a field-ready system from Redzone Robotics (M1) was expected by January 24, 2000, according to Redzone's project schedule. Based on recent conversations with Redzone, they are running about three weeks behind schedule. Redzone will start in-house testing of the system on floor surfaces and then move on to testing the system on wall and ceiling. Redzone has promised to identify a new firm delivery date for the unit. This milestone will be considered completed once the system is delivered to FIU-HCET.
- Additional system components have been identified for making the system totally field-deployable, and conceptual design drawings including the required components were completed on December 20, 1999. Possible vendors for the components are being contacted, and the design is being refined as a result. Procurement of these items will start on January 15, 2000. Once purchasing is completed, these items will be integrated with developmental components and final system.

Plans for the next two months

Activities for the next two months include the following:

- Complete purchase orders/purchase new system components. Procurement of these items started on January 15, 2000.
- Receive Title III review package for decontamination/deployment system from Redzone Robotics, for milestone M1.

- Delivery of IVOD unit to FIU-HCET (M1).
- Start in-house testing of IVOD at FIU-HCET.

FIU-HCET collaborators

Leo Lagos, (305) 348-1810

Richard Musgrove, (305) 348-6622

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 exist 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 overall objective is to fabricate and test a horizontal in-situ pipe decontamination system for pipes ranging from 10 to 50 ft long. Detailed objectives for the completion of this project include the following:

- Complete the design and fabricate a prototype system for horizontal pipes.
- Design, fabricate, and prepare a test site.
- Assess decontamination system performance.
- Commercialize the system.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D041-M1	Design of System	Complete design of in-situ pipe decontamination system.	Due Date: 1/28/00 Completed 1/12/00
D041-M2	Development of FIU-HCET Test Site	Successful development of a test site at FIU-HCET. This site will meet the criteria as specified in the test plan that will be developed.	Due Date: 4/24/00
D041-M3	Delivery of Completed System	Fully developed system ready to be tested.	Due Date: 8/25/00
D041-M4	System Assessment	System demonstration at FIU-HCET will be completed. Performance data will be analyzed to provide information on system performance.	Due Date: 9/22/00

Significant events for this reporting period

Milestone number D041-M1 achieved. Design modifications incorporated into machine drawings.

Accomplishments and technical progress to date

- A comparison of commercially available technology was compiled and presented in the Year-End Report for FY99. The majority of these technologies use water either as the blast medium or as a means of propulsion. The difficulties in containing water, and its potential for cross-contamination, limit these technologies as potential candidates for consideration.
- Two designs utilizing grit blast were considered. The first, a self-propelled blast-head, was bulky, heavy, and expensive. The second, a manually deployed system, is smaller, lighter, and less costly. The testing prototype, based on the second system described above, is presently being fabricated. During testing, the issues of concern will be maneuverability in piping geometry and the potential to get hindered on obstructions.
- Centering ring prototype of the pipe deployment mechanism has been fabricated. Additional components of the deployment mechanism continue to be fabricated.
- Test plan for design prototype was completed in mid-December.
- Preliminary design of test site presented for review. Comments will be resolved by next reporting period.

Assessment of current status and issues

This is the second 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

Activities for the next two months include the following:

- A decision will be made as to whether to design and build the decontamination technology or to subcontract these activities.
- Continue fabrication of the prototype of the deployment mechanism.
- Continue fabrication of a test site.

FIU-HCET collaborators

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Technology Information Management and Dissemination

Project Number: HCET-2000-D051

Project objectives

The Department of Energy's Deactivation and Decommissioning Focus Area (DDFA) concentrates on developing, demonstrating, and deploying new and/or improved decontamination systems. The DDFA also facilitates acceptance, approval, transfer, commercialization and implementation of the selected technologies. All of this information is then made available to project managers who must determine the best technological solution for a specific contamination problem. DDFA was faced with the challenge of finding the best way to organize and present the large amount of information it has accumulated.

The DDFA required an efficient and reliable system to store D&D technological cleanup information for easy user access. The system had to assimilate DOE's wealth of D&D information as well as incorporate information from outside the organization. FIU-HCET was selected to be the central repository of all this D&D technology information.

The objective of this project is to further develop, update, and maintain the DOE-DDFA's D&D technology information repository to provide users with quick, easy access to reliable, up-to-date technology information needed to support cleanup decisions.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D051-M1	Cost and performance data from Innovative Technology Summary Reports (ITSRs) extracted and incorporated into the technology database	Cost and performance data extracted from all D&D LSDDP ITSRs published before the end of FY99 incorporated into the technology database and available for comparison with other technologies	Due Date: 6/30/00 Started: 11/01/99
D051-M2	Investigation of other feasible access media and implementation of selected media	Information in the repository accessible to the D&D community by one alternative medium other than the Internet	Due Date: 8/31/00
D051-M3	Incorporation of additional technologies to the database	Information on 150 additional technologies added to the information repository.	Due Date: 9/30/00
D051-M4	ITSR electronic library	ITSR text-searchable electronic library accessible to D&D community	Due Date: 9/30/00
D051-M5	Implementation of new features to the database	Systems development completed and accessible by users. New features added: technology subcategory; links to news, developments, and regulatory issues; vendor/manufacturer remote input.	Due Date: 10/6/00 Started: 11/01/99

Significant events for this reporting period

No significant events to report for this period.

Accomplishments and technical progress to date

- The TIS database platform was upgraded from MS Access to an Internet-enabled database. Enhancements to the TIS database include modification to the table structure and addition of new fields.
- Innovative Technology Summary Reports (ITSRs) were collected and analyzed to begin extraction of cost and performance data.
- Researched existing indexing software to develop a searchable library of ITSRs.
- All vendors from the TIS database are being contacted to update the data and receive new technology information to provide the users with new, accurate, and reliable information.

Assessment of current status and issues

The project is on schedule and has no issues.

Plans for the next two months

Activities for the next two months include the following:

- Extract cost and performance data from the ITSRs.
- Investigate other possible media for users to access the technology information.
- Select an indexing software to use for the searchable ITSR library.
- Research and collect new technology information to incorporate into the TIS.

FIU-HCET collaborator

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Robert Tucker (305) 348-6181

Size Distribution and Rate of Production of Smoke and Particulate Matter During the Cutting of Metals

Project Number: HCET-2000-D052

Project objectives

In the nuclear industry, thermal cutting tools (laser, plasma torch, and gasoline torch) are used to cut metals. These tools generate smoke and airborne particulate matter that may pose an inhalation risk to workers, especially when working within a radioactive environment. It is known that different particles are deposited in different parts of the human respiratory tract and may, in time, cause illness. By testing selected cutting tools on metals of varying thicknesses, FIU-HCET will determine the characteristics and quantities of smoke and particulate matter. Understanding the characteristics of smoke and particulates, especially when contaminated with radionuclides, will help researchers develop protective procedures and gear for workers in the future.

This project seeks to determine characteristics of the smoke and the airborne particulate matter generated by thermal cutting tools used to cut metal in the atomic industry. The data gathered will help assess potential risk to workers.

The amount and type of smoke/particulate matter that thermal cutting tools produce will be determined by this project. Potential health risks will also be assessed based on the data. Once this information is gathered and analyzed, appropriate filtration systems and remediation practices will be designed to protect workers' health.

The overall objective is to determine cutting rates of tools used for cutting various metals and to measure the rate of production of airborne particulates and their size distribution. The completion of this project will include the following:

Reviewing information about

- Tools used in DOE for cutting metals
- Metals used and cut by these cutting tools
- The cutting rates of different metals by these cutting tools
- Selecting a cutting tool and cutting different metals to determine
    - Cutting rates for metals
    - Particle generation rate
    - Size distribution of the generated particles.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D052-M1	Review of Metal Cutting Technologies	Purchase of chosen technology and metals	Due Date: 4/2/00 Started: 11/01/99
D052-M2	Design of Test Chamber	Test chamber will be built.	Due Date: 6/5/00 Started: 01/12/00
D052-M3	Experimental Study	Completion of one set of experiments	Due Date: 7/17/00 Started: 01/12/00

Significant events for this reporting period

Preliminary experiments to determine size distribution of aerosols generated during metal cutting were performed. An iron plate (thickness 0.25 inch) was cut using a plasma arc torch, and the size distribution of airborne particles was measured using a multistage impactor. Measurements revealed a bimodal particle size distribution and mass median aerodynamic diameters of about 7 μm and 0.1 μm.

Accomplishments and technical progress to date

- A literature review about important parameters of the technologies, specifically, metal cutting rates, particle generation rates, and particle size distribution, was performed.
- The sampling duct was designed.
- Procedure for analysis of data was written.
- For initial testing of cutting technologies, the FIU-HCET plasma arc unit, PermaCon enclosure and ventilation unit were identified. Equipment and utilities needed for the experiments were ordered.
- Instruments needed for aerosol sizing (multistage impactor, weighing balance, and optical particle counter) were tested.
- Preliminary measurements on the size distribution of aerosols generated during cutting of a 0.25-inch-thick iron plate with a plasma arc torch were performed.

Assessment of current status and issues

The project is on schedule and without impacts.

Plans for the next two months

Activities for the next two months include the following:

- Receive and set up the ordered equipment/utilities.

- Build sampling duct.
- Set up the equipment in a PermaCon enclosure in new building and start cutting different metals using the plasma arc torch. Collect data on size distribution, cutting rate, and particle generation rate at different power levels.
- Participate in the technology assessment program in which vendors will demonstrate their metal cutting technologies at FIU-HCET and collect data.
- Continue collecting information about metal cutting technologies, their costs, and aerosol size distribution data.

FIU-HCET collaborator

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

Mercury Contaminated Material Decontamination Methods Investigation and Assessment

Project Number: HCET-2000-D053

Project objectives

Elemental and speciated forms of mercury are present in many DOE waste streams, and over 38,000 cubic meters of low-level and transuranic waste containing mercury have been identified in the DOE complex. Statements of need addressing technology deficiencies for removing and treating mercury contamination have been expressed in both the D&D and Mixed Waste Focus Areas, including the need for mercury removal from metal and porous surfaces and more effective mercury amalgamation processes. However, major deficiencies associated with current mercury treatment/removal processes have been identified. To correct these deficiencies, governmental and commercial investigators have been working together on various studies to collect information to enhance current removal and treatment technologies. To a large degree, these studies have pursued directly opposite ends: to enhance the mercury's solubilization and removal from a liquid or solid waste matrix or, oppositely, to strongly fix and immobilize it on the waste's surface or within the waste. While these investigations pursue opposite ends, they have manipulated the same chemical and physical properties of mercury. Any incompleteness or ineffectiveness in manipulating the chemical or surface properties of the mercury in a treatment to one end may harbor information that could provide an enhancement to the other end. Thus, information from treatability studies with mercury wastes, especially about their "failures," might therefore provide valuable insight for mercury decontamination efforts.

The overall objective of this project is first to identify technical information within current mercury waste treatability studies of potential usefulness in enhancing the effectiveness of mercury removal from metal and porous media using routine (albeit, modified) decontamination methods and then, if modified decontamination process strategies (MDPSs) of sufficient potential are identified, to evaluate them under controlled test conditions.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D053-M1	Detailed literature review complete	Detailed literature review complete and decision whether to proceed to Phase II made	Due Date: 3/31/00 Started: 11/01/99
D053-M2	Development of selected MDPS complete	Development of selected MDPS complete and evaluation test plan(s) drafted	Due Date: 4/30/00
D053-M3	Evaluation of selected MDPS complete	Evaluation of selected MDPS complete and potential for field success addressed	Due Date: 9/30/00

Significant events for this reporting period

No significant events to report in this reporting period.

Accomplishments and technical progress to date

- Major sources of mercury decontamination literature have been identified.
- A detailed review of mercury decontamination literature has been initiated.

Assessment of current status and issues

- The project is on track and has no issues.
- Expertise in mercury chemistry has been enlisted from the FIU Southeast Environmental Research Center to elucidate the chemistry being applied in the major types of mercury treatment technologies.
- Additional expertise is being enlisted from a D&D field experience perspective to provide review and analysis of mercury decontamination literature.

Plans for the next two months

Activities for the next two months include the following:

- Continue review of both mercury treatability and mercury decontamination literature.
- Investigators and vendors of mercury decontamination processes will be identified, and communication with them will be initiated.
- Prepare outline of Phase I Report

FIU-HCET collaborator

Marshall Allen, (305) 348-1696

PCB Contaminated Coatings Treatment System Development

Project Number: HCET-2000-D054

Project objectives

As buildings in the nuclear power industry are decommissioned, a large quantity of pipes, surfaces, and equipment coated with polychlorinated biphenyl (PCB)-contaminated paint must be disposed. PCBs were used to enhance the paint's ability to adhere to surfaces. EPA rulemaking in 1979 prohibited any further use of PCBs in commerce due to their toxicity. EPA also ruled that waste streams contaminated with PCB required special disposition within strict time frames. In 1998, EPA issued a final ruling that made it more difficult to dispose of mixed low-level wastes contaminated with PCBs. Many facilities currently in the process of decommissioning are at a standstill for lack of acceptable disposal facilities.

Using research done by utilities and commercial researchers, FIU-HCET will develop a new chemical dechlorinization process capable of destroying PCB molecules. Once the PCB is removed, the rest of the waste stream will not require special permitting or handling for disposal. FIU-HCET intends to develop this technology as a mobile process.

The overall objective of this project is to develop, demonstrate, and deploy a chemical process through which PCB contaminated paint waste from D&D activities can be destroyed.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
D054-M1	Completion of Benchtop Treatability Studies	Laboratory demonstration of chemical dechlorination of PCB in sample matrix.	Due Date: 01/15/99 See Issues.
D054-M2	Final Design of Process Equipment Complete	Final approved design drawings and specifications inclusive of bid package for fabrication	Due Date: 3/30/00
D054-M3	Selection of Contractor for Fabrication	Contract placement for fabrication of mobile unit with successful bidder.	Due Date: 3/30/00
D054-M4	Completion of Demonstration and Disposition of all Processed Related Waste	Extraction of PCBs from shot blast paint matrix resulting from pipe decontamination and chemical destruction of the PCB molecule, neutralization of secondary aqueous waste stream, and solidification of secondary solid waste stream.	Due Date: 8/31/00

Significant events for this reporting period

No significant events for this reporting period.

Accomplishments and technical progress to date

- Review of literature on other alternative technologies for the chemical destruction of PCBs has been initiated.
- Receipt of R&D Permit from Region 4 EPA.
- Received response from the State of Florida regarding the submitted amendment to the radiological license. The State requested that the authorized user obtain Radiation Safety Officer training.
- Project collaborator successfully completed a 40-hour Radiation Safety Officer training course; certification forwarded to the State of Florida.
- Purchase order issued for a Shimadzu gas chromatograph configured with an electron capture detector.
- State of Florida has indicated that they have no issues with granting the Radiological License Amendments.
- Review of 40 CFR 761 new rule completed, and relevant sections germane to radioactively contaminated PCB waste streams (specifically, paint) have been noted.
- Additional literature review in the areas of alternative disposition methodologies for PCBs completed.

Assessment of current status and issues

The project is behind schedule, due to the following impacts:

- The timeliness of receiving a representative sample for research and development of the process chemistry treatability study (D054-M1) has impacted the project. Part of the delay has been due to submission for license amendment to the State radiological license. Additional delays have been encountered from requirements submitted by sample supplier.
- Delay on receipt of PCB paint samples will impact milestone D054-M1. Subsequent milestones, M2 through M4, will be influenced by the completion date of the treatability study. Samples are expected by the third week in February.
- Laboratory set-up began 01/07/00.

Plans for the next two months

Activities for the next two months include the following:

- Obtaining a representative PCB paint sample for R&D activities.
- Completing the benchtop treatability studies.
- Obtaining the necessary Bureau of Alcohol, Tobacco, and Firearms (BATF) permit for regulated substances. This license is not required until the project end.
- Implementing process simulation software for process flow evaluation.

FIU-HCET collaborator

Nicholas Hefty, (305) 348-6627

Technical Assistance and Response Development

Project Number: HCET-2000-D055

Project objectives

The objective of this project is to provide real-time support to D&D project managers on a broad range of technology issues as directed by the DDFA. These services will provide valuable short-term resources to address immediate problems and develop sound technical solutions.

Major milestones

Milestones will be established as specific support functions, and activities will be identified through contacts with STCGs and site project managers.

Significant events for this reporting period

There were no significant events during the reporting period.

Accomplishments and technical progress to date

- FIU-HCET personnel met with representatives of EPRI and the Sacramento Municipal Utility District to discuss performing integrated demonstrations of the Integrated Vertical and Overhead Decontamination system and the On-Line Decontamination & Monitoring System at the Rancho Seco Nuclear Generating Station.
- Discussions with RFETS are continuing to determine potential scope for future technology development.

Assessment of current status and issues

Progress is on schedule no issues to report.

Plans for the next two months

- Continue the categorization and filtering of needs into specific technology matches and end-user opportunities.
- Carry on discussions with the site technology end users.

FIU-HCET collaborators

Robert Rose, (305) 348-6623
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Online Measurement of the Progress of Decontamination

Project Number: HCET-1998-C005

Project objectives

The principal objective of the project is to integrate commercially existing characterization and decontamination technologies into one prototype system capable of decontaminating concrete floors and measuring the extent to which contamination has been removed. In support of this main objective, the following are goals for the project:

- Survey commercially available radiation detection and concrete decontamination technologies in order to select those that will satisfy the objectives of the project when integrated into one final unit.
- Integrate radiation detection instruments with a concrete decontamination unit, without significantly impacting the performance characteristics of the decontamination unit.
- Provide the decontamination unit operator with data measuring the extent to which the unit has performed its task.
- Provide the option to transmit the data to a remote monitoring station so that both the equipment operator and personnel at a remote station may assess the extent of contamination removal.
- Provide the option to store data regarding contamination removal in an electronic device for subsequent downloading and/or post-processing activities.
- Successfully measure beta and gamma radiation while in motion.
- Make the final integrated unit as user-friendly as possible; this includes ease of calibration, ease of physical operation, and ease of data interpretation and manipulation.
- Select reliable technologies available in the D&D marketplace.
- Demonstrate the prototype unit at the FIU-HCET testing facility.
- Deploy the prototype at a DOE or commercial facility in FY00. Plan for additional deployments of the system, which are funded by D&D contractors, at DOE sites in FY01.
- Commercialize the final integrated system.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C005-M1	Deployment Plan. Develop detailed deployment work plan.	Submittal of Deployment Plan to DOE for approval	Due Date: 1/15/00 Rescheduled to 2/29/00. See Assessment of Current Status
C005-M2	Deploy Technology. Deploy technology at a contaminated site.	Complete deployment of prototype at a contaminated site	Due Date: 3/30/00
C005-M3	System Improvement. Perform and document engineering design changes. Remanufacture and reassemble as required.	Modifications complete and documented	Due Date: 4/30/00
C005-M4	Commercialization Plan. Cost-benefit analysis and creation of a framework for commercialization of product.	Presentation complete for commercialization	Due Date: 6/30/00

Significant events for this reporting period

Received a commitment for a demonstration in May from the Sacramento (California) Municipal Utility District (SMUD) Rancho Seco site. Since this site is a member of the DOE Commercial Utilities Consortium, the demonstration will fulfill the DOE and commercial technology demonstration requirements. This demonstration, and resulting visibility, should significantly enhance prospects for deployment and commercialization at other sites.

Accomplishments and technical progress to date

- Completed refinement of interrupt handlers for the data acquisition modules of radiation detectors.
- Assembled controller prototype unit and initiated the task of testing the alpha version of unit control software to determine the practicality of existing algorithms designed for radiological characterization.
- Completed testing of the High Speed Interface and Line Scanner. Both pieces of hardware are to be utilized for the distance-determining system.
- Identified communication protocols and software library functions that will be utilized to facilitate interface between each sensor module and the primary controller.
- Began calibration and testing of PMI-30 and Aptec SP detectors. Set up a test station to simulate movement of unit during decontamination to determine sensitivity of radiation sensing device during characterization.
- Began research of alternate design circuitry to drive LED gauge radiation indicators. From testing it was determined that it will be necessary to the overhead of resource management of the

PC104 by providing an auxiliary circuit to drive the LED-based meters rather than have the PC104 process the information needed to drive the LEDs.

- Reviewed methods of device polling for accessing many devices attached to multiple communication ports.
- Acquired RS232 to RS485 converter module to facilitate long distance data transfer over standard data cable.
- Evaluation of chassis cutting of blast unit for mounting sensors was finalized and will take place next month.
- Plans for fiscal year 2000 are complete.
- Initiated integration of the online system into the Idaho LSDDP.
- Completed detailed component design of the detector mechanical arrangements:
    - Vibration, shock, and debris isolation suspension for pre- and post-decontamination
    - Replaceable shields (brush) and "tear-off" windows
    - Radiation shielding for background from room and mechanical shields also affecting collimation
    - Shot-blast suspension modifications
    - Low-cost disposable pneumatic tube section for effluent (waste stream) sensor array liner.
- Operator interface and associated components design refined:
    - Simple indication using commercial circular colored indicator light arrays with absolute value indication
    - Simplified limit calibration, either absolute engineering units or placement of the sensors over calibration surfaces
    - Preliminary operational procedures generated for creation of control coding.
- 3D position-determining system preliminary design complete: with combination angulation/lateration relational geometry; single stationary station required with no RF links; system has added benefit of providing detailed topographic map revealing actual removal depths following decontamination as well as radiological characterization survey maps.
- Characterization sensor subsystem has been tested, and modifications to optimize sensitivity to obtain final release radioactivity levels are being considered.
- Errors in the commercial compiler were identified with FIU-HCET, and the manufacturer is rewriting code to fix errors.
- Completed unit prototype controller assembly and began testing controller software with sensors.
- Identified algorithm design for 3D position-determining system based on the behavior of the controller prototype and distance-determining hardware.

Assessment of current status and issues

Overall, the project is on schedule.

- Milestone C005-M1 has been delayed, as the commitment for a demonstration was not received until January 2000. The milestone has been rescheduled for February 29, 2000. The delay is not expected to affect the remaining milestones of the project.
- FIU-HCET continues to pursue deployment of the system at a DOE site with radioactively contaminated floors.

Plans for the next two months

Activities for the next two months include the following:

- Continue testing and refining prototype assembly.
- Continue refinement of control software.
- Deliver deployment plan to DOE, completing M1.
- Test software for 3D system for position determination.
- Mount characterization hardware onto blast unit.
- Continue with pursuit of deployment site.
- Complete plans for demonstration at an EPRI site, Rancho Seco in California.
- Develop Rancho Seco demonstration schedule.

FIU-HCET collaborators

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Richard Musgrove, (305) 348-6622

Remote Surveillance of Facilities Awaiting Deactivation and Decommissioning

Project Number: HCET-1998-C006

Project objectives

The principal objective of this project is adoption and integration of commercially available sensors into a remote monitoring and surveillance system. The system should provide cost-effective surveillance and reduction in worker exposure to radiation. The detailed objectives are as follow:

- Define specific surveillance needs among the facilities awaiting Deactivation and Decommissioning (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 at FIU-HCET.
- Demonstrate 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	Prepare for testing at a DOE site. The system will be available for testing at a DOE site for site-specific need parameters.	Draft copy of test results sent to DOE.	Due Date: 12/15/99 Revision Date: 02/15/00
C006-M2	System improvement. The results of demonstrations will be analyzed. Improvements in the system components or integrated unit will be made if required.	Documentation of any modifications completed and sent to DOE	Due Date: 1/31/00 Revision Date: 03/31/00
C006-M3	Deployment plan. Plan for deployment of the system at a rad-contaminated site will be completed.	Draft site deployment plan completed and submitted to DOE	Due Date: 12/31/99 Revision Date: 03/31/00
C006-M4	Commercialization plan. Presentation will be complete for an industrial partner interested in commercialization of the system.	Presentation for an industrial partner	Due Date: 2/20/00 Revision Date: 04/30/00

Milestone No.	Milestone Description	Completion Criteria	Status
C006-M5	Performance evaluation. System and component performance will be evaluated and the effects of environmental conditions determined.	Performance evaluated under ambient environmental conditions	Due Date: 6/30/00

Significant events for this reporting period

In a meeting at SRS, discussed the remote surveillance project with the STCG representative for D&D at Savannah River Site and a likely end-user for system deployment. Potential deployment sites were discussed, and action items for FY00 deployment were developed jointly.

Accomplishments and technical progress to date

- Working with DOE-Idaho staff, reviewed site documents related to a potential deployment of the remote surveillance system at INEEL.
- Continued analysis of the software modules and programming requirements for the Supervisory Control and Data Acquisition (SCADA) microcontroller on the remote surveillance system for controlling various types of sensor outputs.
- Continued the test plan and safety analysis plan for testing of sensors with the remote surveillance system.
- Tested radiation sensor for applicability to the remote surveillance system.
- Initiated test of the SCADA unit with a radiation sensor and temperature sensor.
- The surveillance needs for shutdown facilities (pre-deactivated and deactivated) were reviewed and analyzed for planning component selection for the remote surveillance system.
- Initiated contact with personnel at DOE sites in Savannah River Site (SRS) and Idaho National Engineering and Environmental Laboratory (INEEL). The INEEL Point-of-Contact expressed interest and sent information on several facilities. FIU-HCET is continuing discussions with INEEL and SRS for possible demonstration and deployment of the remote surveillance system.
- Prior to FY00, this project researched post-closure monitoring needs at DOE sites, initiated preliminary contact with D&D and facility operations personnel at DOE sites, determined the fundamental core requirements of the system, selected and purchased TeleSAFE SCADA microcontrollers and appropriate software development modules.

Assessment of current status and issues

- Project is approximately two months behind schedule. The project will be back on schedule by February 2000. Initial contacts with DOE have resulted in possible demonstration sites, but several weeks are needed to finalize any commitments. Testing of the SCADA unit has begun and will be completed in February 2000.
- The meeting at SRS and the recent involvement from INEEL has the potential to identify a site in February allowing the project to be back on schedule by the end of the month. Otherwise,

milestones M1 – M4 are expected to all be adversely effected by the delays in commitment to a demonstration site. Detailed system component requirements must be available to complete preparation for testing at a DOE site (Milestone C006-M1). Demonstration must be performed to enable result analysis and resultant system improvement (Milestone C006-M2). Commitment for deployment must be made to enable construction of detailed deployment plan (Milestone C006-M3). Confirmation of functionality and rationalization of commercial potential are dependent upon demonstration and commitment to deploy (Milestone C006-M4).

Plans for the next two months

Activities for the next two months include the following:

- Continue interaction with INEEL and SRS to get their commitment to a deployment at their site in exchange for free remote surveillance system tailored to their needs.
- Complete programming of newly procured SCADA controllers using C and Relay Ladder Logic Programs.
- Complete testing of radiation and other sensors with the TeleSAFE SCADA controllers.
- Continue procurement of components (sensors and imaging instruments) which will later be systems-integrated into a custom remote surveillance system for a committed DOE site.

FIU-HCET collaborator

David Freeman, (305) 348-6761

Volumetric Lead Assay

Project Number: HCET-2000-C013

Project objectives

A full-scale system for rapid, cost-effective, field radiological screening of large quantities of lead bricks and other shaped lead material is needed at INEEL and is the focus of this project. An accelerated real-time volumetric radioassay of lead forms will be carried out to make a cost-effective determination of

- How much lead has measurable radioactive contamination due to use by DOE, and
- How much lead may be free released for recycling into the scrap metal industry.

For FY00, project tasks include the following:

- Evaluate current technologies for characterizing lead contamination.
- Describe performance range and suitability of characterization technologies to meet the DOE's needs.
- Identify technology performance uncertainties. Identify how these uncertainties can be mitigated, including technology assessment.
- Recommend characterization and handling technologies for integration into a system to address the DOE's lead characterization needs.
- Deliver a system design of evaluated, commercially available modules with some customized data analysis software.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C013-M1	Draft interim report including results of detector selection and testing, system component testing, and cost savings analysis to allow determination by DOE for FY01 funding to build full-scale system and deploy at DOE sites	Submittal of report to DOE	Due Date: 6/1/00
C013-M2	Year-End Report including optimal design of a full-scale system able to assay large quantities of lead brick quickly and effectively.	Submittal of report to DOE	Due Date: 9/6/00

Significant events for this reporting period

No significant events this reporting period.

Accomplishments and technical progress to date

- Continued discussions with INEEL managers and technical experts, which were initiated in October 1999 when FIU-HCET visited the site and met with the Site Technology Coordination Group (STCG) and several other key personnel. In December 1999, based upon the preliminary discussions and site materials reviewed, FIU-HCET developed a detailed list of questions to INEEL to obtain information about the quantity of lead in different forms at INEEL and about the method previously used for detection of contamination in lead bricks. The answers to these questions are necessary for the design on the volumetric lead assay system. The response to the questions was promised by INEEL by January 5. The response was not received as promised.
- Project baseline summary shows that LANL, Los Alamos Office, is also in need of "Accelerated Real-Time Volumetric Radioassay of Lead Forms." LANL points of contact were contacted. Response is awaited.
- From discussion with INEEL representatives, it was ascertained that lead is currently handled manually and that there is a need for technologies that provide easy handling of large quantities of lead in addition to detection of contamination. A search of companies that sell equipment for handling, storing, stacking, and banding materials, including lead, was performed. The vendors were contacted, and catalogs of the products were obtained.
- Suppliers of gamma spectrometers were contacted, and price quotes for their products were obtained. Conceptual design for the assay part of the system was completed. Discussions were held with instrument suppliers to have their inputs.
- FIU-HCET personnel became familiarized with the operation of the gamma spectrometric system for large bore pipe radioassay system and use of data for assessment of contamination. This is a $1M, three-trailer system, developed by FIU-HCET. The radioassay trailer will be useful as a test bed for this project and will be similar to the expected final lead assay system design. Instead of running a large number of large bore pipes on a conveyor belt through a radioassay trailer to determine if the pipes are clean, the characterization system will convey lead bricks and other lead forms through to determine whether there is any radioactivity added to the lead material.
- A meeting was held in October 1999 with technical experts and program managers from INEEL to discuss in detail performance requirements for a lead assay system.

Assessment of current status and issues

Project is on schedule. FIU-HCET is awaiting literature from INEEL regarding past assay efforts, quantities of lead in different forms, and detailed information that would permit an analysis of baseline costs for lead assay. The response from INEEL to the list of detailed questions submitted in December was not received as scheduled. INEEL delayed their delivery date to January 24. Although no milestones are currently in jeopardy, a response is needed to keep the project on schedule.

Plans for the next two months

Activities for the next two months include the following:

- Review technologies for handling heavy equipment and plan for design of a system that can be used for lead, which is heavy as well as soft (ductile and able to contaminate equipment and air).
- Select optimal radiation detector, procure, and optimize gamma spectroscopy software for this specific application.
- Support INEEL in getting necessary analyses and paperwork completed to recycle the small quantity of assayed lead.

FIU-HCET collaborator

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II. TANKS FOCUS AREA (TFA) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET TFA Program Manager	**R. Srivastava**
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

The overall objective of this project is to study waste slurry transfer behavior, obtain technical data, and develop methods to prevent transfer lines from plugging. This activity will be done according to the slurry transfer specifications of the corresponding DOE sites and will be performed both at lab scale and in a flow loop. Special attention will be put on the particle characteristics, the settling behavior, and the gelation properties of the different simulants. In this form, experimental data and analysis results will be provided for a safer and more efficient waste transfer. In addition, this project will also serve as a support for the large-scale test beds and the plugging-and-unplugging projects, providing waste characterization data and simulant recommendations.

The specific objectives are as follow:

- Develop waste simulants as specified by each site for waste conditioning and plugging-and-unplugging testing.
- Characterize slurry particle properties by measuring particle size distribution and particle shapes before, during, and after transfer.
- Determine effect of solid particle properties on slurry rheology and transfer behavior.
- Measure particle settling behavior before, during, and after transfer. Determine the settling effects on pipeline plugging.
- Investigate solids formations such as gelation, crystallization, or precipitation during slurry transfer and identify conditions that cause such formations.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T004-M1	Develop tank waste slurry simulants.	Waste slurry simulants created based on DOE sites specifications for lab and flow loop experimental testing.	Due Date: January 2000. Completed as scheduled.
T004-M2	Develop and characterize pipeline blockages.	Pipeline blockages developed for testing in the large-scale test bed demonstrations.	Due Date: February 2000
T004-M3	Measure particle size distribution and determine particle shapes.	Particle size distribution and particle geometry determined for slurry samples taken from the flow loop before, during, and after transfer.	Due Date: April 2000
T004-M4	Measure particle settling rate.	Particle settling rate measured for slurry simulants tested in the flow loop. Measurement will be performed in graduated cylinders by testing each particle size range separately.	Due Date: June 2000

Milestone No.	Milestone Description	Completion Criteria	Status
T004-M5	Characterize solids formation behavior and its effect on waste transfer.	Several tests performed to determine if crystallization, precipitation, gelation, or any other solid formation occurs when testing simulants at low temperatures.	Due Date: August 2000
T004-M6	Correlate waste conditioning and transfer data.	Waste conditioning lab test results correlated with the slurry transfer data obtained from flow loop testing to predict potential plugging in pipelines and to avoid such plugging.	Due Date: September 2000

Significant events for this reporting period

No significant events this reporting period.

Accomplishments and technical progress to date

- (NHC) and Dr. Erian (PNNL).
- Water running tests and strength tests were performed on pipeline plug simulants created in the lab. The purpose of the water tests was to check how much water (300 ml), if any, filtered through the plugs in the pipe and at what rate. Old blockages (more than 72 hours) and fresh plug simulants were tested.
  - It was observed that no water had filtered through a sand and bentonite blockage. The same was observed in both old and fresh bentonite and sand blockages. See Figures 1 and 2.
  - As opposed to the sand and bentonite mixture plug, the plaster of Paris and china clay mixture plug simulant showed a different behavior in fresh and old plugs.
  - In a one-month-old and very compact blockage, all water filtered through right as it was poured in the pipe. However, in the fresh plugs, only 20% of the water filtered through in a 4-day period. See Figures 3 and 4.
- Several viscometer vendors were identified. An oscillating rod viscometer is intended to be used for gel testing. The device would ideally have a vibrating rod instrument whereby viscosity causes the vibration amplitude to be damped. The magnitude of the damping is sensed as the level of the dynamic viscosity.

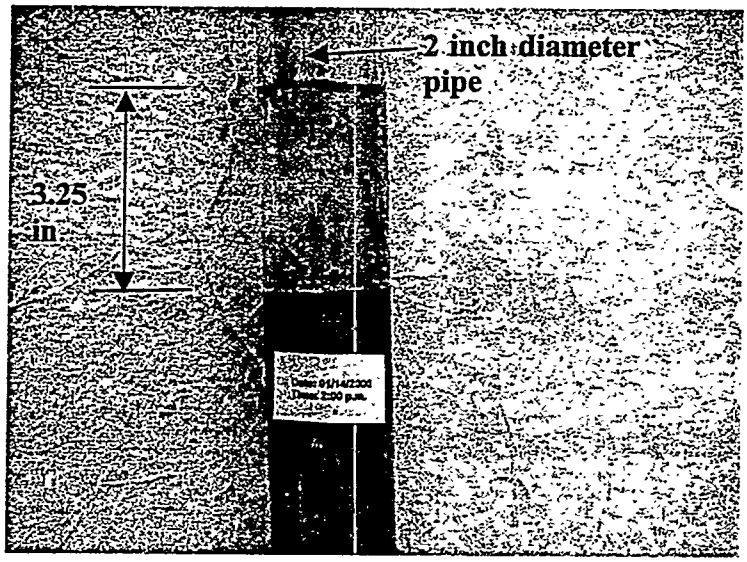

Figure 1. Sand and bentonite pipe plug simulant. Fresh sample.

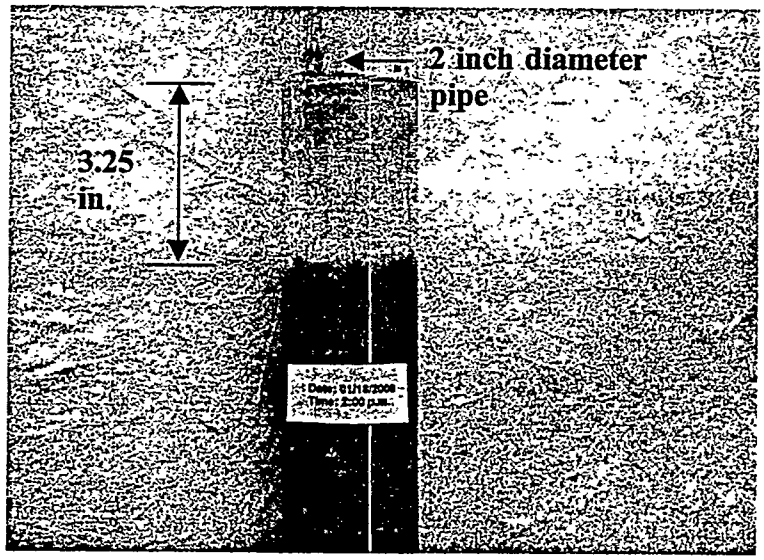

Figure 2. Sand and bentonite pipe plug simulant. One-month-old sample.

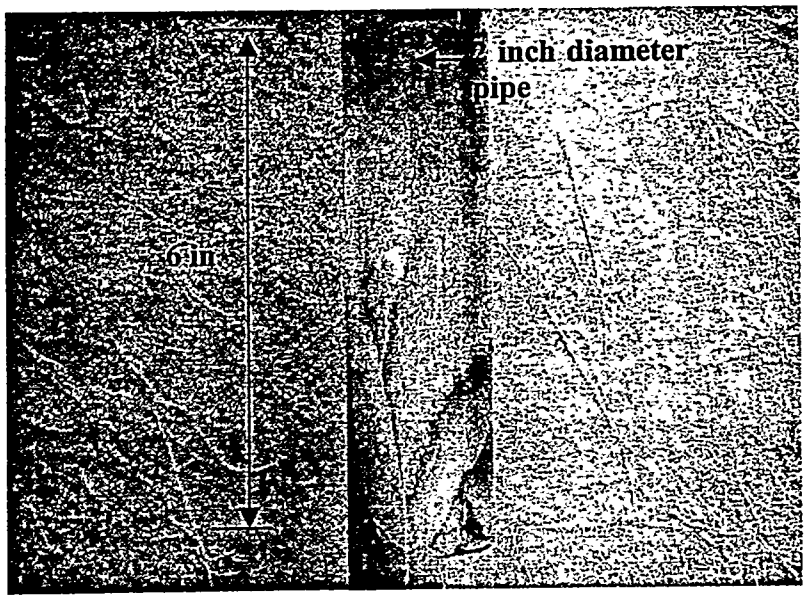

Figure 3. Plaster of Paris and china clay pipe plug simulant. Fresh sample.

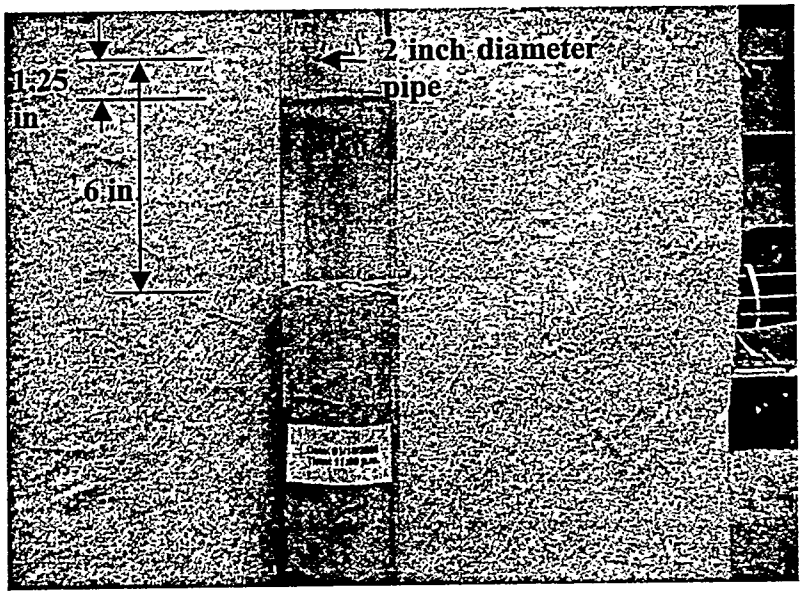

Figure 4. Plaster of Paris and china clay pipe plug simulant. Four-day-old sample.

Assessment of current status and issues

Project is on schedule.

Plans for the next two months

Activities for the next two months include the following:

- Preparation of physical waste blockages for the large test bed demonstrations (T004-M2).
- Gel plugs testing (T004-M2).

FIU-HCET collaborators

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Plugging Prevention and Unplugging of Waste Transfer Pipelines

Project Number: HCET-1998-T005

Project objectives

DOE needs safe and efficient technologies for its tank waste retrieval and disposal activities. The waste transfer lines, however, may become plugged and unable to transport wastes from one tank to another or from the mixing tank to processing facilities. Plugged pipelines represent a considerable hazard and loss of time and money.

FIU-HCET's work includes the industrial equipment tests for reaching, dislodging, and blockage locating technologies. FIU-HCET will also perform research and development on the mechanism and behavior of pipe plugging and unplugging phenomena in the waste transfer pipelines. Based on the investigation of slurry flow and plugging phenomena in pipelines in FY99, the following project objectives are proposed for activities in FY00:

- Further understand the pipeline plugging and unplugging mechanism caused by particle settling through systematic slurry transport experiments.
- Conduct pipeline unplugging and blockage locating equipment tests in the three full-size test beds.
- Determine future changes needed in the three test beds for pipeline inspection.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Due Date
T005-M1	Selection of companies and technologies for equipment tests	Information on companies and their technologies	1/28/00
T005-M2	Conduct SRS slurry transport experiments with inclined pipes	Data of blockage formation and power requirement	3/15/00
T005-M3	Conduct validation tests of full-size test beds	Two technologies tested at the test beds	3/30/00
T005-M4	Conduct single-species slurry transport experiments with inclined pipes	Data of blockage formation, power requirement	4/28/00
T005-M5	Conduct single-species slurry transport experiments with horizontal pipes	Visualization of particle settling	5/31/00
T005-M6	Conduct double-species slurry transport experiments with horizontal pipes	Visualization of particle settling	6/30/00
T005-M7	Conduct Hanford slurry transport experiments with horizontal pipes	Data of pressure drop versus flow velocity	8/31/00
T005-M8	Analyze and correlate slurry transport experimental data	Model development and data correlations	9/29/00

Milestone No.	Milestone Description	Completion Criteria	Due Date
T005-M9	Conduct equipment tests of blockage locating and pipeline unplugging	Demonstration results from full-size test beds	10/13/00
T005-M10	Evaluate the technologies in the equipment tests	Results of performance analysis	10/20/00
T005-M11	Determine needed changes in the test beds for pipeline inspection	Specifications of changes for pipe inspection	10/31/00

* This proposed technical plan was revised based on the discussions with Mr. P. W. Gibbons and Dr. F. F. Erian during the meeting on December 16 - 17, 1999, at FIU-HCET. Tasks and milestones are subject to change based on changes in needs from DOE sites.

Significant events for this reporting period

- The experiments of slurry settling time measurements in the flow loop with SRS dip have been finished for SRS slurry simulant at 10 wt% (2.4% volume concentration).
- Additional blockages have been tested for equipment tests on large-scale test beds.
- The homepage of the plugging project on the FIU-HCET website has been updated.

Accomplishments and technical progress to date

Part 1. Flow Loop Research on Pipeline Plugging and Unplugging

1.1 Experimental investigation of slurry settling time in SRS dip

Experiments have been performed to measure slurry settling time in SRS dip for SRS slurry simulant at 10 wt% (2.4% volume concentration). The procedure for these experiments was reported in a previous monthly report. First, the loop was run at a fixed flow rate until all parameters got to steady state. Then, the pump was shut down, and a stopwatch was started to record the time until all solids totally settled. At the same time, a video camera and VCR were employed to record the particle settling process. After the solids totally settled, pictures were taken with a digital camera to show the particle layer thickness in the pipe.

Directions (X1, X2) to the right and left of the dip along which the particle layer thickness was measured are defined Fig. 1.

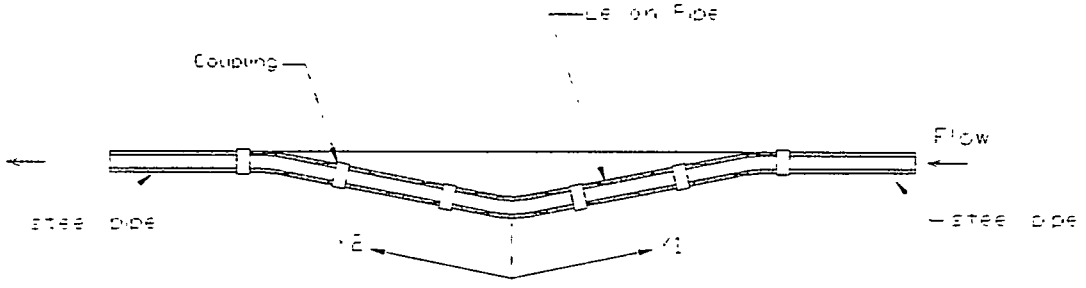

Figure 1. Definition of directions X1 and X2 of measurements of particle layer thickness along the SRS dip.

All the collected data are shown in Table 1, Table 2, and Table 3.

Table 1.
Experimental results for slurry settling time investigation for SRS slurry simulant at 10 wt% (average slurry flow velocity = 1.65 m/s, slurry pressure after the pump P_1= 6.66 Psi, slurry pressure at the loop outlet P_2=1.21 Psi)

No.	Settling time (s)	Distance to the right of the dip (ft), X1	Particle layer thickness (right side) (mm)	Distance to the left of the dip (ft), X2	Particle layer thickness (left side) (mm)
1	133	0.0	11.0	0.0	11.0
2	133	0.5	8.5	0.5	9.0
3	133	1.0	8.0	1.0	8.0
4	133	2.0	8.0	2.0	8.0
5	133	3.0	8.0	3.0	8.0
6	133	4.0	8.0	4.0	8.0
7	133	5.0	8.0	5.0	8.0
8	133	6.0	8.0	6.0	8.0

Table 2.
Experimental results for slurry settling time investigation for SRS slurry simulant at 10 wt% (average slurry flow velocity = 2.22 m/s, slurry pressure after the pump P_1= 10.43 Psi, slurry pressure at the loop outlet P_2= 1.89 Psi)

No.	Settling time (s)	Distance to the right of the dip (ft), X1	Particle layer thickness (right side) (mm)	Distance to the left of the dip (ft), X2	Particle layer thickness (left side) (mm)
1	229	0.0	10.0	0.0	10.0
2	229	0.5	8.0	0.5	8.5
3	229	1.0	8.0	1.0	8.0
4	229	2.0	8.0	2.0	8.0
5	229	3.0	8.0	3.0	8.0
6	229	4.0	8.0	4.0	8.0
7	229	5.0	8.0	5.0	8.0
8	229	6.0	8.0	6.0	8.0

Table 3.
Experimental results for slurry settling time investigation for SRS slurry simulant at 10 wt% (average slurry flow velocity = 2.87 m/s, slurry pressure after the pump P_1= 17.34 Psi, slurry pressure at the loop outlet P_2=4.33 Psi)

No.	Settling time (s)	Distance to the right of the dip (ft), X1	Particle layer thickness (right side) (mm)	Distance to the left of the dip (ft), X2	Particle layer thickness (left side) (mm)
1	292	0.0	11.0	0.0	11.0
2	292	0.5	9.0	0.5	9.0
3	292	1.0	8.0	1.0	9.0
4	292	2.0	8.0	2.0	8.0
5	292	3.0	8.0	3.0	8.0
6	292	4.0	8.0	4.0	8.0
7	292	5.0	8.0	5.0	8.0
8	292	6.0	8.0	6.0	8.0

From data in Tables 1, 2, and 3 the following can be seen:

1. With the increase of SRS slurry simulant flow velocity, the particle settling time increases. For example, with the increase of the flow velocity from 1.65 m/s to 2.87 m/s, the settling time increased from 133 s to 292 s (about 218%).
2. After particles totally settled, the particle layer thickness on the left side of the dip (downstream) is a little thicker than that on the right side (upstream).
3. No significant effect was found of the variation of SRS slurry flow velocity on the particle layer thickness.
4. The particles settled along the inclined sections of the pipeline nearly uniformly except for the bottom section.

Figure 2 shows particle layer thickness at the bottom of the dip after the slurry was pumped with average velocity of 2.22 m/s. It can be seen that for SRS slurry simulant at 10 wt% (2.4% volume concentration), complete plugging does not occur when the pump is shut down.

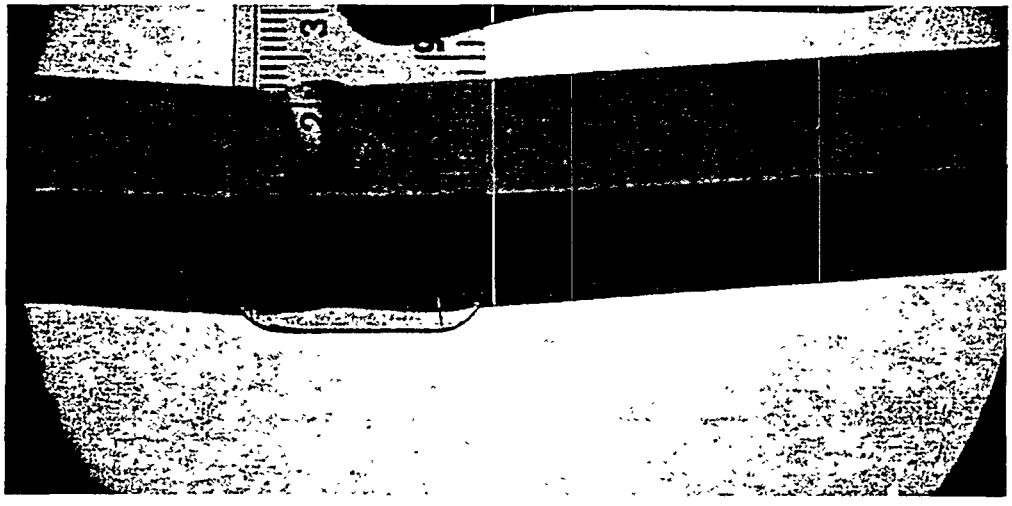

Figure 2. Particle layer thickness measurement at the bottom of the dip after the slurry was pumped with average velocity of 2.22 m/s.

2.1 Equipment Test on Large-scale Test Beds

Companies with snake-type or high water pressure unplugging technologies will be invited to demonstrate their equipment at FIU-HCET in order to validate the test beds and the test plan. Several local companies have been contacted and given the information regarding the test beds, including the pipeline configurations. Two companies will be selected to perform validation tests. FIU-HCET will work with the companies to prepare a test plan and identify needed changes on the test beds for best demonstration of the performance of the two technologies. The performance data on the technologies will be included in the report submitted to DOE-TFA.

The homepage of the lab-scale and large-scale plugging project on the FIU-HCET website has been revised and updated. Monthly reports and other documents can be viewed at <http://www.hcet.fiu.edu/r&d/tfa/unplugging/default.asp>. In the future, monthly reports will be posted as soon as they are finalized by FIU-HCET's Publications Department.

2.2 Blockage Testing

There were two types of blockages tested in this reporting period: the first type is epoxy, wax, or rough and adherent coating on the inner surface of the pipeline. This type of mixture will be used as a blockage on the Evaporator Gravity Drain Line. The second type is clay-like material, which produces a bulk blockage. This type of blockage will be used in the Horizontal Long Pipeline and in the Buried Pipelines.

1) Epoxy, wax, or rough coating blockage

Epoxy (PC-11® by Protective Coating Co.) was mixed with 30 wt% sand and coated on the inner surface of the carbon steel pipes. First, the pipe section was coated with paint. After the paint dried, the epoxy mixture was applied on the inner surface of 3" carbon steel pipe. The purpose of mixing epoxy with sand was to make epoxy more brittle so that its properties will be closer to that of actual deposits.

The picture of the pipe with epoxy coating is shown in Figure 3. As expected, 30 wt% of sand added more brittleness to the blockage. The blockage was easily broken into pieces.

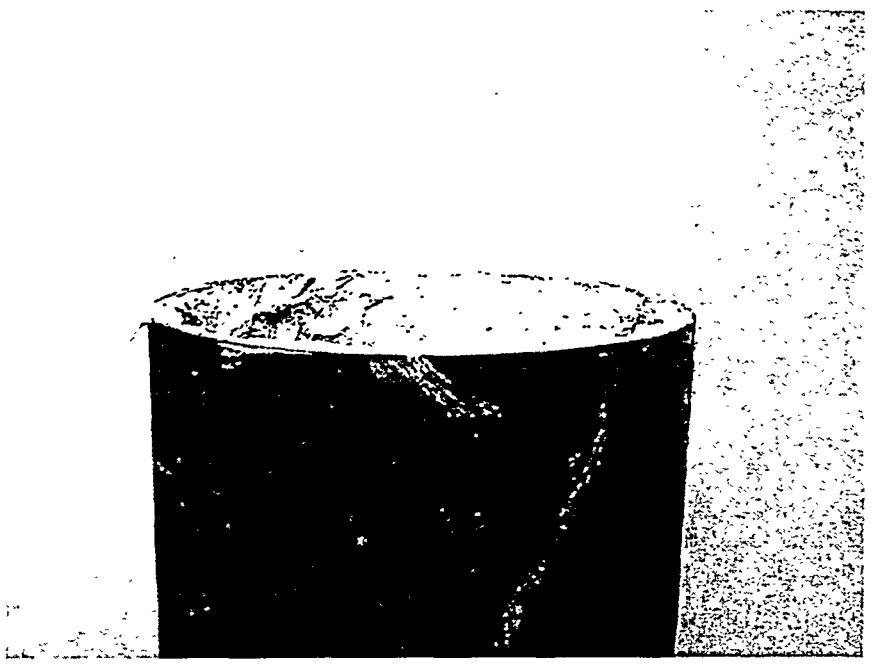

Figure 3. Epoxy (70 wt%) with sand (30 wt%) mixture.

Part 2. Large-scale Demonstration Test Beds for Equipment Test of Blockage Locating and Pipeline Unplugging

2) Clay-like blockage

The Bentonite (50 wt%) and sand (50 wt%) mixture of total 60 wt% was placed in a plastic pipe in a vertical position. Pictures of the blockage, as shown in Figs. 4(a) and 4(b), were taken four days apart. Water was not absorbed into the entire blockage. As can be seen in Fig. 4(b), the water affected only the interface of the blockage in four days.

A mixture (57.5 wt%) of Kaolin Clay (27.5 wt%) and plaster of Paris (30 wt%) was tested in a water-filled pipe. After the mixture cured for three hours, the pipe was flooded as shown in Fig. 5(a). The picture in Fig. 5(b) was taken four days after the first. About 20.6 vol% of the total water went around the blockage. A puddle of water was observed at the bottom of the plastic pipe.

As can be seen in Fig. 5(b), the interface of the blockage was not affected under the flooded condition. This confirms that after the blockage material cures, the blockage does not absorb additional water.

Another mixture of Kaolin Clay and plaster of Paris with the same weight concentration was tested in water-filled pipe. This blockage was prepared and then left for 30 days. During this period of time, the material seemed to shrink after the water was vaporized from the blockage. When the pipe was flooded, the blockage did not absorb the water but let the water run through the space between the blockage and the pipe wall. It was also found that, after it was dried up, the blockage became more brittle. This material is known to weaken after it cures to the maximum strength.

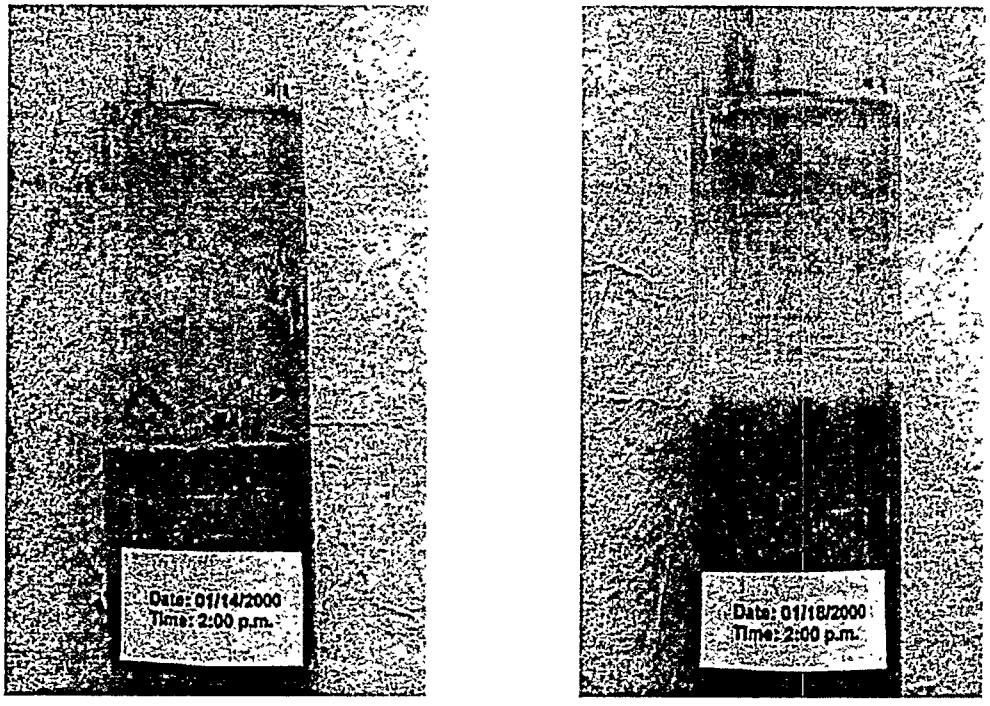

Figure 4. Bentonite and sand mixture in a vertical pipe filled with water on 01-14-00 (left) and on 01-18-00 (right).

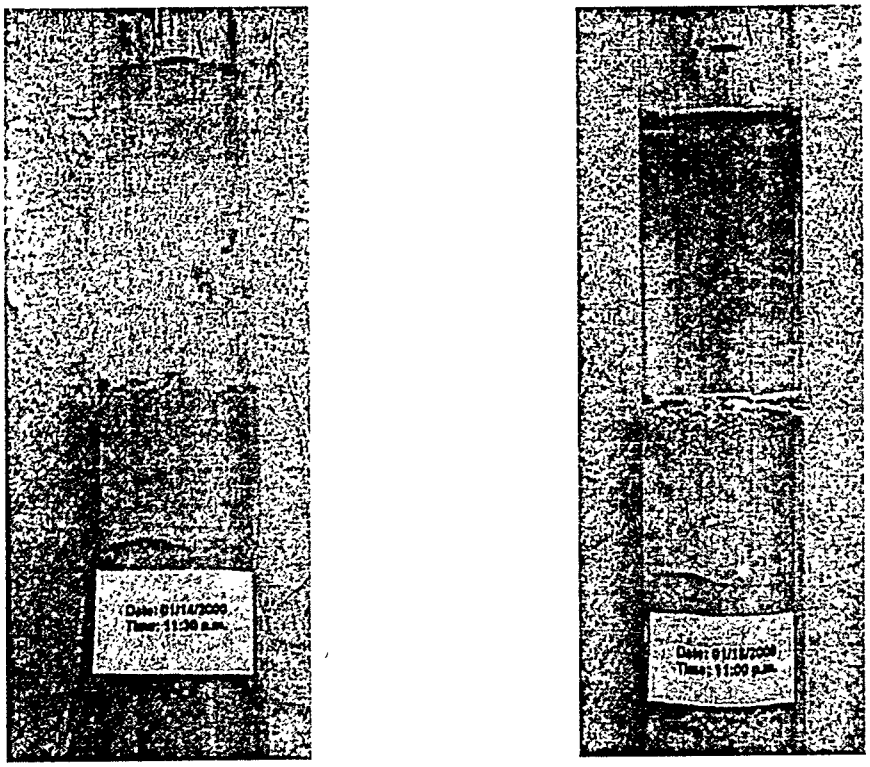

Figure 5. Kaolin Clay and plaster of Paris mixture on 01-14-00 (left) and on 01-18-00 (right).

From the results of the blockage testing, it was found that the Bentonite mixture in a flooded pipe stayed together. Therefore, it is suitable for snake and high water pressure unplugging technologies. However, Clay mixture can be easily washed or pushed away with water. Considering the roughness of the pipeline, further testing is necessary to see how the Clay mixture behaves in carbon steel pipe and also in a pipe with inner surface coating to grab the blockage.

Assessment of current status and issues

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

Plans for the next two months

Activities for the next two months include the following:

- Slurry transport experiments in the dip will be continued. Slurry transport velocities will be 1.5, 2.0, and 2.5 m/s, and SRS slurry simulant concentrations will be 20, 30, and 50 wt%.
- Blockage testing will be continued to find blockages that simulate actual blockages best.
- Companies will be selected for validation equipment tests on large-scale test beds.

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Investigation of Waste Glass Pouring Behavior 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 Defense Waste Processing Facility (DWPF) uses the vitrification technology to treat and immobilize radioactive waste. A DWPF melter heats a mixture of glass frit and high-level waste to a temperature that is high enough to convert the feed into a stable glass waste form. The vitreous product is then poured into stainless-steel canisters that are sent for storage. However, the pouring process experiences flow fluctuations and an unusual flow phenomena termed "wicking," where the pour spout, canister, and hardware get coated with glass and often become plugged.

FIU-HCET will expand parametric investigations of the glass pouring process in FY00. The overall objective of this project is a continuation of one established in FY98 and includes the following:

- Manufacture of a new pour spout and 2 knife edges completely simulating the DWPF melter pour spout.
- Experimental runs of steady and transient glass pouring with altered (more viscous) glass chemistry
- Testing for the effect of inserts currently being used at DWPF and newly designed inserts. The investigation will focus on the effect of the temperature profile of the melter/pour spout combination (new and eroded knife edges) on the molten glass pouring.
- Numerical modeling to simulate the temperature gradients in the FIU-HCET and DWPF pour spouts.

Major milestones

Changes were made in milestones to account for work not accomplished last year. These changes were concurred by the customer.

Milestone No.	Milestone Description	Completion Criteria	Status
T003-M1	Glass flow experiments using old pour spout with inserts; alternate glass chemistry, and spout wear	Report detailing raw experimental data, video images, and correlations	Due Date 2/28/00
T003-M2	Melter modification and installation of new furnace and pour spout, 2 knife edges, and 2-3 heat zones	Validation of spout temperature and position	Due Date: 3/29/00
T003-M3	Completion of alternate glass chemistry experiments	Comparison of pouring behaviors	Due Date: 4/30/00
T003-M4	Completion of study of advanced inserts	Comparison of pouring behaviors	Due Date: 8/31/00
T003-M5	Modeling and simulation of temperature gradients	Results of model prediction	Due Date: 9/30/00

Significant events for this reporting period

No significant events to report.

Accomplishments and technical progress to date

- Shortly after beginning a test run on the glass melter, it was discovered that zone II on the glass melting furnace was not operating. An electrical problem with the furnace was also discovered. The electrical problem involved an exposed wire that was becoming grounded because it was touching the metal conduit. This electrical short melted a wire and blew a fuse. A broken fuse, electrical conduit, and the wire for zone II were replaced in order to prevent the grounding. A broken heating element coil was also discovered in zone II (Fig. 1). The melter will be dismantled to repair the broken element.

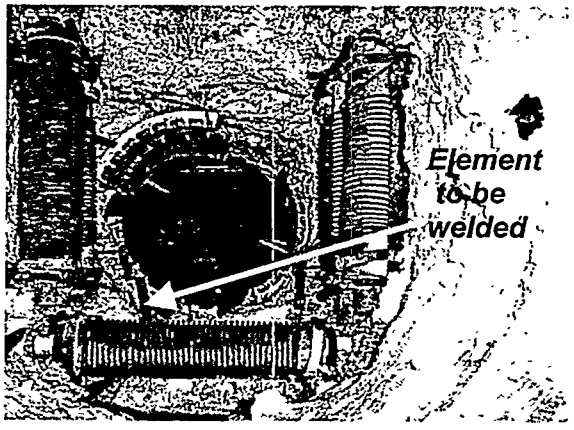

Figure 1. Picture showing the element that needs repair.

- The plans for the new downspout (Fig. 2), which will have 2 knife-edges and will be used for the second phase of the experiment, were revised after SRTC reviewed the draft of the initial new downspout design. The major discussion topic was where to place the windows to view the behavior of the molten glass stream. The placement of the viewing windows is important because during the pouring process, glass must not come out of the window. It is also important to have a good view of the glass stream after it disengages the knife edges.
- The procurement of a new furnace from ThermCraft was initialized. The new furnace will greatly reduce time spent on repairs, which will help in achieving milestones. The new furnace was initially scheduled for delivery to FIU-HCET in the new high bay on March 29, 2000; however, that date will probably be delayed by three weeks due to a lag in the purchasing process.

Assessment of current status and issues

- A potential three-week schedule impact to milestone T003-M2 may be realized, following technical recommendations for the specific furnace unit, resulting in additional sole source procurement justification, in lieu of a competitive procurement.
- The test plan for the project has been revised substantially to include enhanced experimentation. These are reflected in the major milestones section of the report. When the furnace is repaired, the tests involving the zero degree cutback angle, a temperature of 1050°C, and a flowrate ranging from 50-250 lbs/hr will begin.
- In order to fix the broken heating element in zone II, the machinist will weld the two pieces of coil together using a union made of Inconel. New heating element coils have been ordered from Pyrotech to have as spares.
- An ethernet line is being laid across to the high bay where the melter sits. Once online, SRTC personnel will be able to view the experiments in realtime and advise on any changes during the run.

Plans for the next two months

Activities for the next two months include the following:

- Complete the repairs on the existing melter.
- Finalize the design of the new furnace.
- Carry out the experiments and draft the report (T003-M1).
- Install the new furnace and move the old furnace to the NW section of the high bay.
- Fabricate the new pour spout.

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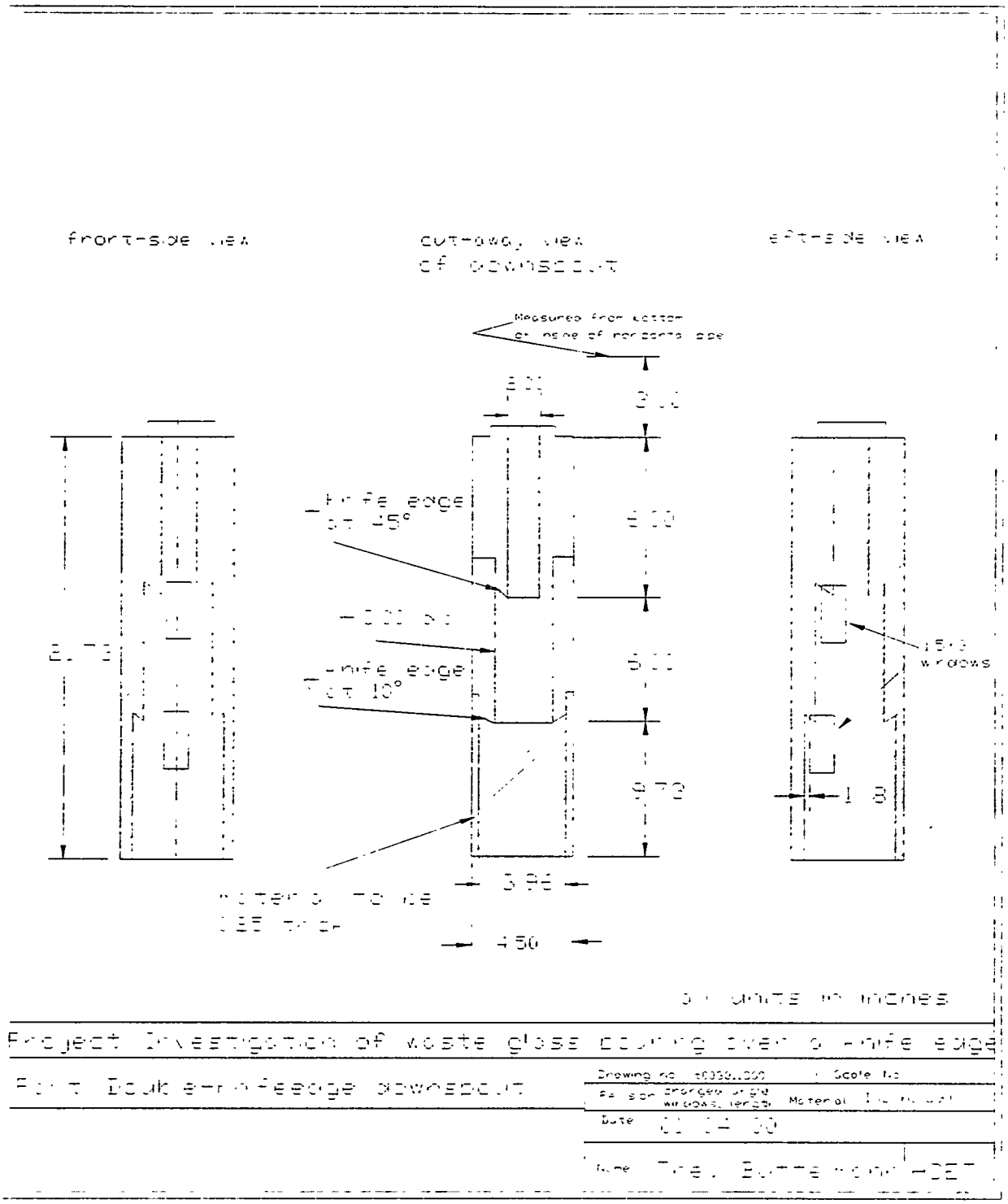

Fig 2. Draft of the new pour spout showing the 2 knife-edges.

Solids Formation and Feed Stability During Waste Slurry Transfer

Project Number: HCET-2000-T006

Project objectives

Some of the Department of Energy's (DOE) sites have experienced plugged pipelines during waste slurry transfer. The pipelines become plugged when solids form during certain operating conditions. FIU-HCET will conduct bench-scale and engineering-scale tests to measure the actual conditions that cause the blockages. This project will address the key technical issues of the effects of temperature reduction, flow regime, slurry composition, and chemical and physical processes on slurry transfer behavior. The objectives for the project will be

- identifying the operating parameters and feed conditions that cause solids formation and pipeline plugging
- obtaining correlation of the observed data that will enable the prediction of slurry transport characteristics
- providing engineering data and technical recommendations to support the Hanford Tank Waste Remediation System (TWRS) operation.

Major milestones

Substantial changes were made to the PTP to reflect issues addressed by the customer. These changes are included in the major milestones section.

Milestone No.	Milestone Description	Completion Criteria	Status
T006-M1	Finalize the project test plan.	Submission of the test plan to the client.	Due Date: December 1999 Completed on 12/21/99
T006-M2	Design, procurement, and assembly of bench-scale loop.	Validation of the bench-scale loop.	Due Date: 01/17/00 One week behind.
T006-M3	Scoping tests using the bench-scale setup.	Report with raw data, experimental results, and data correlation.	Due Date: 04/03/00
T006-M4	Design, procurement, and assembly of the pilot-scale loop.	Validation of the pilot-scale loop.	Due Date: 04/04/00
T006-M5	Experiments using the pilot-scale setup.	Report with raw data, experimental results, and data correlation.	Due Date: 09/30/00

Significant events for this reporting period

No significant events this reporting period.

Accomplishments and technical progress to date

- Assembly of the bench-scale setup has started. The existing loop is being modified to comply with the test requirements. An existing stainless steel slurry tank will be used. Two immersion heaters were attached to the tank to heat the simulants (50°C) prior to transfer.

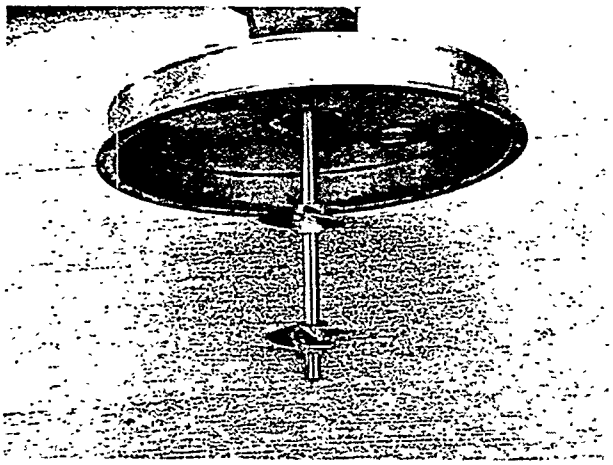

Figure 1. Tank lid and impeller.

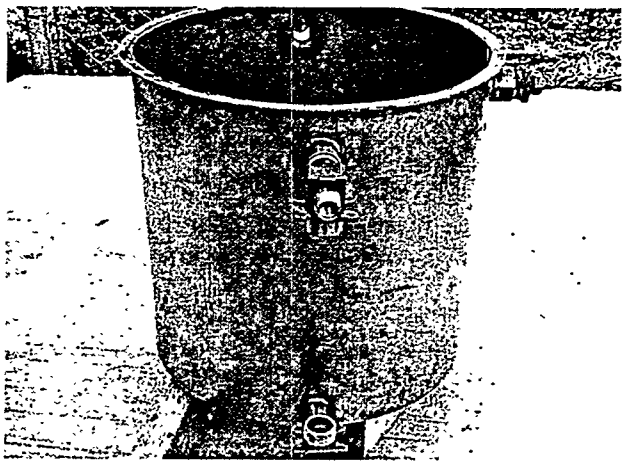

Figure 2. Simulant tank.

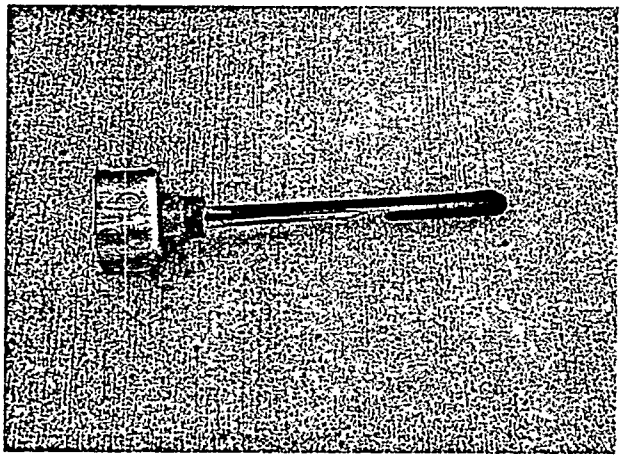

Figure 3. Immersion heater.

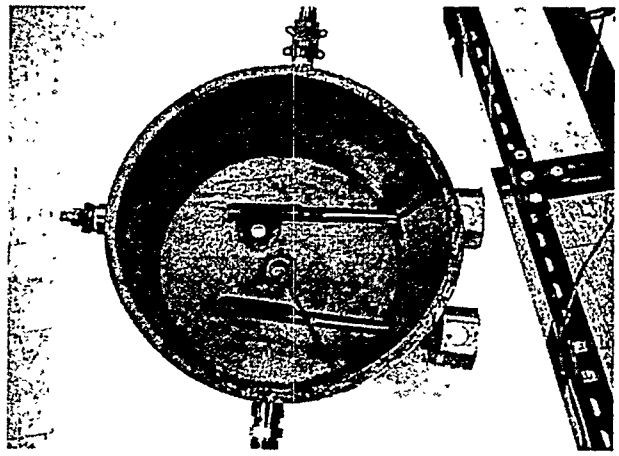

Figure 4. Simulant tank with immersion heaters attached.

- Minor modifications were made to the conceptual design of the bench-scale setup. These changes include the following:
  - Use of ½-inch tubing instead of ¼-inch. This decision was made based on the high-pressure head expected when using ¼-inch diameter. The pumping system (Fig. 5) available at the present time can handle the pressure drop gradient corresponding to ½-inch diameter.

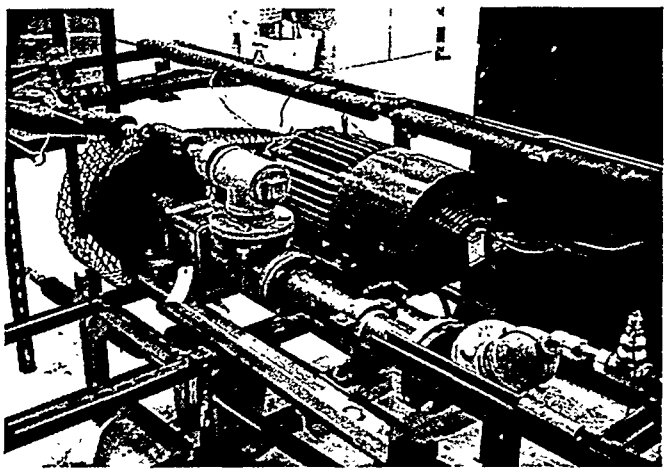

Figure 5. Moyno pump for simulant transfer.

- The design of the cooling system was also modified. Instead of cooling the pipe before the test section, the test section itself will be cooled as shown in Fig. 6. This change is based on the fact that if the pipeline were cooled, solids formation would occur there and not in the test section, as desired. Table 1 shows the revised test matrix for scoping tests. It includes a laminar flow rate.

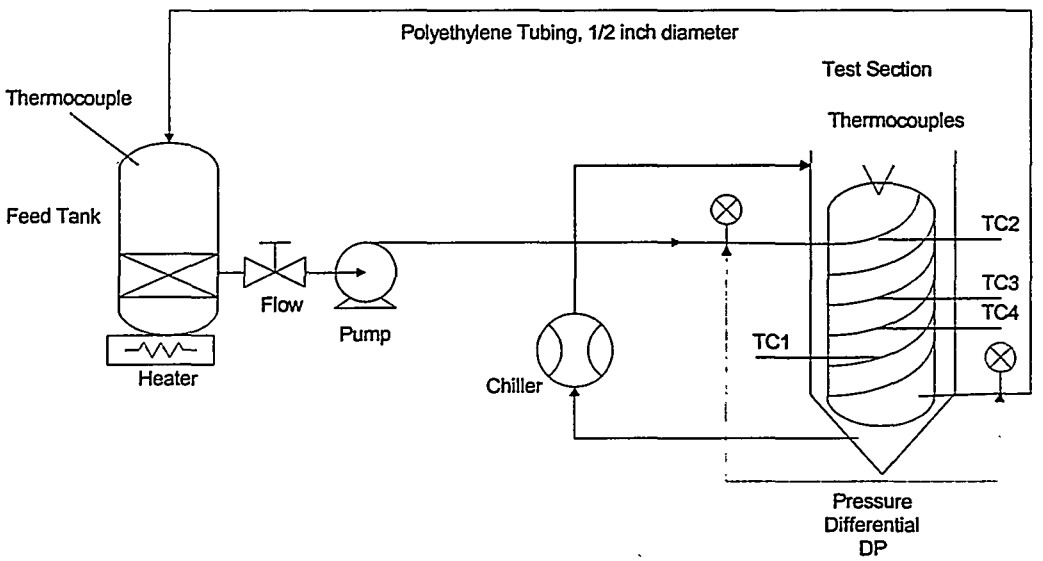

Figure 6. Conceptual design for experimental scoping tests.

Table 1.
Test matrix for scoping tests

Simulant	Feed Tank Temperature, °C	Tubing Temperature, °C			Flow rate, ft/sec (Re)	
X1 (hydroxide-phosphate-fluoride system)	50	15 If solution plugs rapidly at 15, use 40			3.45 (1000)	
X1 (hydroxide-phosphate-fluoride system)	50	15	25	40	17.25 (5000)	69 (20000)
X2 (X1 + nitrate)	50	15	25	40	17.25 (5000)	69 (20000)
Hanford 1 (AZ101)	50	15	25	40	17.25 (5000)	69 (20000)
Hanford 2 (AN103)	50	15	25	40	17.25 (5000)	69 (20000)

Note 1: The following assumptions were made to calculate the Reynolds numbers.
Pipe diameter = 3/8" I.D., Viscosity = 10 cP, and Density = 1g/cm^3
Note 2: Completing the matrix for all conditions may not be required. Decision will be made as results and significant effects are obtained.

- Some changes were also made to the experimental matrix for pilot-scale tests. Table 2 shows the revised matrix. Room temperature (25oC) testing for simulants X1 and X2 were deleted. Simulant X1 (hydroxide-phosphate-fluoride) was prepared in the lab. The system was dissolved at 70oC and then cooled at 10o intervals. Solids precipitation was observed at 30oC and below (Fig. 7).

Table 2.
Test matrix for pilot-scale tests

Simulant	Feed Tank Temperature, °C	Tubing Temperature, °C			Flow rate, ft/sec (Re)	
X1(hydroxide-phosphate-fluoride system)	50	15		40	3.25 (5000)	13 (20000)
X2 (X1 + nitrate)	50	15		40	3.25 (5000)	13 (20000)
Hanford 1(AZ101)	50	15	25	40	3.25 (5000)	13 (20000)
Hanford 2 (AN103)	50	15	25	40	3.25 (5000)	13 (20000)

Note: The following assumptions were made to calculate the Reynolds numbers.
Pipe diameter = 2", Viscosity = 10 cP, and Density = 1g/cm^3

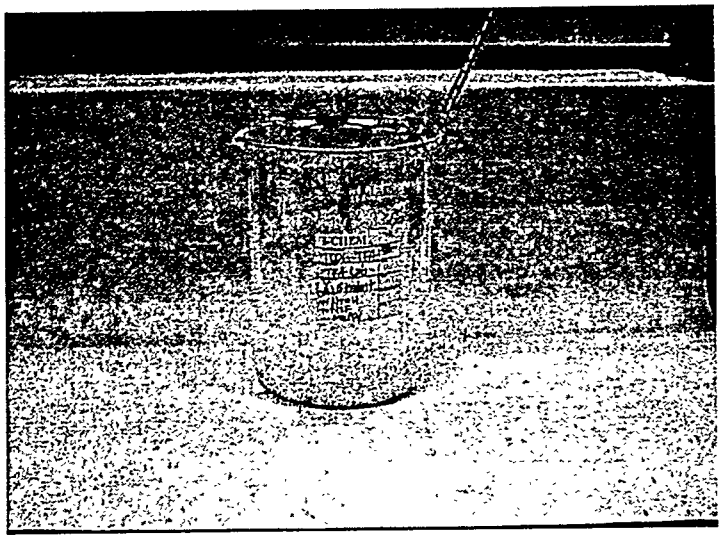

Figure 7. Hydroxide-phospate-fluoride system (X1 simulant).

Assessment of current status and issues

- Some date changes were made in the major milestone section. Dates in the December report did not reflect the correct milestone due dates as described in the project test plan.
- A detailed milestone chart is shown in the Appendix. Based on this table, the project is one week behind on the setup of the bench-scale apparatus. However, the setup is 90% complete, and the project will be back on schedule when the testing begins (T006-M3).

Plans for the next two months

Activities for the next two months include the following:

- Conduct scoping tests in bench-scale setup (T006-M3).
- Preliminary design, procurement, and assembly of the pilot-scale experimental setup (T006-M4).

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Appendix

FY 2000 milestone chart for Solids Formation and Feed Stability during Waste Slurry Transfer

	Task Description	Start Date	End Date
1	Test plan*	Mon 11/01/99	Mon 12/13/99
	Test plan draft**	Mon 11/01/99	Thu 12/09/99
	*Test plan final****	*Mon 12/13/99*	Mon 12/21/99
2	Bench-scale setup	Tue 12/14/99	Mon 01/17/00
	Design	Tue 12/14/99	Tue 12/21/99
	Procurement	Mon 12/20/99	Mon 01/03/00
	Assembly	Tue 12/14/99	Mon 01/17/00
3	Bench-scale study	Tue 01/18/00	Mon 04/03/00
	13 scoping experiments (hydroxide, fluoride, phosphate)	Tue 01/18/00	Mon 02/28/00
	Data analysis	Fri 01/21/00	Mon 03/06/00
	Report drafting	Mon 03/06/00	Mon 03/13/00
	Scoping report 1	*Mon 03/13/00*	*Mon 03/13/00*
	12 scoping experiments (Hanford 1 & Hanford 2)	Mon 03/13/00	Fri 03/24/00
	Data analysis	Wed 03/15/00	Fri 03/31/00
	Report drafting	Fri 03/31/00	Mon 04/03/00
	Scoping report 2	*Mon 04/03/00*	*Mon 04/03/00*
4	Pilot-scale setup	Mon 01/17/00	Mon 10/02/00
	Conceptual design	Tue 01/18/00	Mon 02/28/00
	Procurement & Assembly	Tue 02/29/00	Tue 04/04/00
5	Pilot-scale study	Mon 04/17/00	Mon 10/02/00
	10 experiments (hydroxide, fluoride, phosphate)	Mon 04/17/00	Fri 04/28/00
	Data analysis	Mon 04/18/00	Tue 4/28/00
	Report drafting	Mon 04/18/00	Tue 4/28/00
	Pilot scale report 1	*Mon 5/01/00*	*Mon 5/01/00*
	12 experiments (Hanford 1 & Hanford 2)	Mon 05/01/00	Mon 07/31/00
	Data analysis	Mon 05/01/00	Tue 08/08/00
	Report drafting	Mon 07/17/00	Fri 09/01/00
	Pilot scale report 2	*Mon 09/15/00*	*Mon 09/15/00*
6	*Final Report*	*Mon 09/30/00*	*Mon 09/30/00*

*Major tasks

**Subtasks

***Deliverables

Evaluation and Demonstration of Alternative HLW Canister Decontamination Techniques

Project Number: HCET-2000-T007

Project objectives

The previous Savannah River Site (SRS) and West Valley evaluations of canister decontamination technology will be accessed for applicability and performance. Candidate processes will be identified and evaluated for compatibility with the existing process and equipment constraints. Enhancements to the existing decontamination process and the integration with the current defense waste processing facility (DWPF) process technology baseline will be identified. CO_2 blasting and laser ablation have recently been evaluated at West Valley and may have application to this need for both sites. An evaluation of this past work and other potential systems, such as the West Valley nitric acid-based decontamination process, will be performed (the nitric-ceric acid process may be compatible with Savannah River).

A process-down selection will be performed to optimally match technology to the process and facility constraints. The integration with the individual site flowsheets is essential to process selection and in particular to disposal and processing of secondary wastes. The existing equipment configuration and process constraints will be defined and used to provide a basis for this task. Of importance will be ensuring process flexibility for any secondary waste streams to avoid the bottlenecks similar to the current frit-processing tie to the Slurry Mix Evaporator in DWPF. For West Valley, continuing operations will be very limited by the time the canisters are being decontaminated for shipment, and secondary waste stream disposition will be critical.

Applicable enhancements or alternative decontamination techniques will be demonstrated on a nonradioactive pilot. If an alternative is to be implemented, qualification testing to meet waste acceptance product specifications will be conducted. Specifications for the full-scale system will be prepared; equipment will be procured, tested, and installed; and the alternative canister decontamination system will be deployed. Both sites have canisters available that were filled during cold runs. These will be used to verify effectiveness of any candidate decontamination system.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
T007-M1	Document process constraint and interface requirements for WV and SRS	Completion of review and summary of site user requirements on the technology	Due Date: 1/31/00 Completed: 1/31/00
T007-M2	Document process recommendations for WV and SRS	Evaluation and recommendations to site users	Due Date: 4/30/00
T007-M3	Document results of the developmental and/or confirmatory testing of the short-listed decontamination technique requested by TFA	Selection of technologies and identification of their performances	Due Date: 7/31/00

Milestone No.	Milestone Description	Completion Criteria	Status
T007-M4	Document canister decontamination system specifications that satisfy SRS and WV needs	Specifications of canister decontamination requirements and comparison to the selected technology performance	Due Date: 9/30/00

Significant events for this reporting period

- A Commerce Business Daily (CBD) ad was placed after being reviewed by West Valley and Savannah River personnel. This ad will identify potential companies with technologies that can address the decontamination of High Level Waste canisters.
- A detailed search for potential technologies applicable to canister decontamination has been performed, and a list of 20 technologies has already been compiled. Additional technologies will be added from responses to the CBD ad.

Accomplishments and technical progress to date

- Based on information gathered from SRS and WV, an integrated facility constraints and specification requirements document is being finalized and should be delivered to SRS and WV on time (M1).
- SRS and West Valley developed a draft of the list of constraints and requirements for the design specifications of the DWPF canister decontamination.

Assessment of current status and issues

Progress is on schedule; no issues to report.

Plans for the next two months

- Collect and evaluate responses to CBD announcement.
- FIU-HCET will continue preparing a technology recommendation document to provide to each of the integrated canister decontamination team members to allow short listing a few specific technologies for further demonstration and potential development.
- A team teleconference has been scheduled for February 15, 2000, to review the findings of the technology screening process and the integrated facility constraints and specification requirements.

FIU-HCET collaborators

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Rajiv Srivastava, (305) 348-6621

Center of Expertise for Tank Slurry Monitoring

Project Number: HCET-2000-C014

Project objectives

This project will be a multi-year, collaborative effort with ongoing tasks at FIU-HCET, Oak Ridge National Laboratory (ORNL), and Savannah River Site (SRS). This effort will meet the needs of SRS, ORNL, and possibly Hanford to develop effective slurry monitors for retrieval of high-level radioactive tank waste. This project will support finding or developing tank waste slurry monitoring technologies that can be deployed in the near future. Initial scope for this project will focus on development of an in-tank dual Coriolis slurry monitoring system to meet critical SRS needs for deployment in FY01. Collaboration with Hanford contractors and the Office of River Protection will continue to identify opportunities for deployment of a dual Coriolis system at Hanford and for other slurry monitors needed. Specific tasks to be completed in FY00 and FY01 include

- A loop segment design with a partial liquid phase extractor will be prepared by FIU-HCET and tested along with two commercial Coriolis mass flow monitors to measure weight percent solids.
- A full-scale slurry monitoring system will be developed in collaboration with SRS to deploy in a HLW tank at SRS in FY01. The system will be able to measure weight percent solids of slurry in the tank at various depths to ascertain acceptable conditions for retrieval.
- One of the existing FIU-HCET slurry test loops with 1-inch diameter pipelines will be used to develop an in-tank, dual Coriolis slurry sensor for weight percent solids measurement. The same loop will be available for development and testing of any additional slurry monitors needed by DOE sites over the years.
- A continuing workshop environment will be provided for site users at the working level, DOE field decision makers, and select experts in the field to evaluate problems and contribute solutions relating to monitoring slurry and slurry transport properties.
- Additional needs and development opportunities for slurry monitors for HLW will be documented for DOE sites as part of this project.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C014-M1	Submit an experimental test and evaluation plan. Plan will summarize the equipment design and all experimental work intended to provide evaluation of the dual Coriolis system for weight percent solids measurement. The test plan will be developed in collaboration with ORNL and submitted to Tank Focus Area (TFA), CMST-CP, and ORNL for review and concurrence prior to initiation of testing.	Submitted to TFA, CMST-CP, and ORNL for review and concurrence.	Due Date: 1/30/00

Milestone No.	Milestone Description	Completion Criteria	Status
C014-M2	Complete slurry monitor tests to verify applicability for site field-testing. Results of this testing will determine what monitors will be deployed in FY01. Document test results for analysis and development of a test report.	Complete tests and document.	Due Date: 6/30/00
C014-M3	Issue report on evaluation of dual Coriolis monitor performance. Report will document all experimental evaluations of the dual Coriolis monitor and will provide an analysis of its capabilities to meet site user needs. Report will be submitted to TFA, CMST-CP, and ORNL for peer review prior to issuance.	Issue report previously submitted to TFA, CMST-CP, and ORNL for peer review.	Due Date: 9/15/00

Significant events for this reporting period

Based upon the functional requirements from SRS for a slurry monitor in a high-level waste tank, FIU-HCET developed and delivered a draft slurry monitor design and draft test plan.

Accomplishments and technical progress to date

- Slurry Monitoring Workshop was held December 14-15, 1999, in Atlanta, Georgia. TFA Technology Integration Manager for Characterization, Tom Thomas; CMST-CP Liaison to TFA, Glenn Bastiaans; Savannah River key tank slurry process engineer, Gary Johnson; ORNL lead slurry monitor Principal Investigator, Tom Hylton; Syracuse University professor, Larry Tavlarides; process transfer equipment experts from industry, Jack Bachner (Moyno, Inc.) and Roy Leffew (Carl Eric Johnson, Inc.); process control instrumentation expert from industry, James Walker (Endress+Hauser, Inc.); and FIU-HCET participants Elaine Elder, Rajiv Srivastava, Richard Musgrove, and David Roelant met to evaluate problems and contribute solutions relating to slurry transport integrity particularly related to SRS needs and plans for slurry monitoring instrumentation.
- FIU-HCET's conceptual design for an in-tank slurry system for monitoring physical properties, including weight percent solids and functional yield stress, has been refined based upon input of workshop attendees.
- A revision of this project occurred at the Slurry Monitoring Workshop, which included more work, a more aggressive schedule, and a path for moving from conceptual design, through testing, to deployment in a real HLW tank at SRS in less than two years
- The initial phase of assessing the current and projected future needs; previous lessons learned; and present applications is complete.
- The workshop in December 1999 was convened to complete the collective analysis of these same items.
- Meeting with TFA and SRS officials at SRS set groundwork for identifying SRS needs for an in-tank slurry monitoring system.

- The essence of the Function Design and Requirements (FD & R) has been assembled, jointly by SRS and FIU-HCET. The formal document to be presented to FIU-HCET by SRS in January 2000.
- The conceptual design of the in-tank is complete and ready for preliminary design in preparation for key component procurement.
- A detailed Gantt chart was developed at the workshop for moving from conceptual design, through testing, to deployment of a slurry monitoring system in a real HLW tank at SRS in less than two years.Assessment of current status and issues

Assessment of current status and issues

- Project is on schedule with no foreseen delays.
- Workshop has provided the basis for preparation of a test and evaluation plan for this project and confirmed details critical to system design.

Plans for the next two months

Activities for the next two months include the following:

- Draft test plan and the draft design for the slurry monitor was delivered to SRS; modifications by SRS and by FIU-HCET are expected in the upcoming months.
- Create a list of vendors and pricing for slurry monitor components and initiate procurement.
- Deployment of a dual Coriolis slurry monitor on high-level radioactive waste began in December 1999 at ORNL. FIU-HCET will continue to analyze data from this much larger system deployed in a loop outside the tank for incorporation of changes into our much smaller and challenging dual Coriolis slurry monitoring system.
- A revised TTP and PTP will be developed and submitted to DOE for approval.

FIU-HCET collaborator

Richard Musgrove (305) 348-6622

III. SUBSURFACE CONTAMINATION PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET Program Manager	**David Roelant**
DOE Technical Lead	**Scott McMullin**
DOE Focus Area Lead	**Jim Wright**
DOE HQ Program Manager	**G. Chamberlain**
Program Officers	**John Wengle**
	Karl-Heinz Frohne

http://www.hcet.fiu.edu

Long-Term Monitoring and Technical Assistance

Project Number: HCET-2000-C012

Project objectives

Long-term monitoring for up to 30 years is required for closed, contaminated Department of Energy (DOE) sites that include landfills and other waste repositories. The required monitoring encompasses leachate, groundwater, surface water, and cover condition. There is currently no technology that can accomplish this type of monitoring without significant cost, maintenance, and human intervention.

Ideally, a long-term monitoring system for these facilities would function for long periods with minimal maintenance and cost. It would be a remote, in-situ surveillance system with a data collection and transmission system. Different sensors to monitor soil or groundwater are also desirable. The system would have a power supply for data collection, storage, transmission and receiving units. In conjunction with DOE, FIU-HCET will identify the exact requirements for the ideal system, search available technologies, integrate systems, and test systems to determine which ones satisfy requirements.

Another associated site need is for technical assistance regarding environmental remediation, monitoring, and characterization. FIU-HCET will assist DOE managers by providing assistance and advice in choosing the most effective and/or least expensive options to resolve specific challenges.

The principal objectives of this project are to

- Develop a remote long-term environmental monitoring system.
- Provide or arrange technical assistance to sites regarding environmental remediation issues.

In support of the main objectives, the following are FY00 activities:

- Compile the requirements that a data acquisition and transmission system needs to fulfill environmental monitoring at DOE sites.
- Find the available technologies and determine their applicability to the DOE sites, their performance, and cost.
- Design a prototype system that integrates available off-the-shelf technology.
- Initiate building and testing of the prototype system.
- Gather requests for technical assistance from site users and perform one.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C012-M1	Identification of low-cost, low-maintenance long-term monitoring technologies	Develop a comprehensive literature survey of DOE monitoring needs, current baseline technologies, and alternative technologies.	Completed on 1/18/00 before due date: 1/31/00
C012-M2	Full-scale testing of the prototype data system	Conduct full-scale testing that provides continuous data collection and transmission for any sensor array.	Due Date: 8/30/00
C012-M3	Full-scale testing of the long-term monitoring system	Conduct full-scale testing of the monitors and the integrated monitoring system.	Due Date: 6/30/01
C012-M4	Deployment of long-term monitoring system at DOE site	Deploy system at DOE site	Due Date: 8/30/01

Significant events for this reporting period

Draft report has been completed concerning DOE monitoring needs, current baseline technologies, and alternative technologies. This draft report completes milestone 1.

Accomplishments and technical progress to date

- Conceptual design of a long-term monitor was presented to SCFA. Meetings were held at SRS with DOE-SR, SCFA, and Environmental Restoration regarding FIU-HCET's tasks on this project and involvement with various SCFA activities. As a result, SCFA designated that FIU-HCET would join their Caps and Covers Group. Potential deployment of an FIU-HCET Long-Term Monitoring system in FY01 was discussed. As requested by the SCFA, FIU-HCET presented its R&D capabilities related to SCFA.
- Supported DOE-Ohio on review of characterization plans at its sites. Specific recommendations include cost analyses of innovative characterization technology.
- Attended DOE's Eleventh Technology Information Exchange (TIE) Workshop in Las Vegas, NV, and discussed with key technical experts and DOE site program managers ideas for design and deployment of a long-term monitoring system.
- While at the TIE Workshop, FIU-HCET's Dr. David Roelant chaired two sessions on characterization and monitoring. Additionally, FIU-HCET personnel met with several principal investigators working on long-term monitoring efforts for long-term capping and for monitored natural attenuation. Three projects were presented with a potential impact to this project: U.S. Nuclear Regulatory Commission has results of monitoring 12 years of performance of engineered covers at a humid site in Maryland; Sandia National Laboratory is testing a fiber optic moisture-monitoring system from England that may give soil moisture levels throughout a cover at multiple depths; and finally the measurement of ratios of common elements in groundwater can show leachate leaking from waste sites even though no contamination escapes.

- Upon request from DOE, FIU-HCET initiated design of a simple soil analyzer for the Fernald highest priority need, a rapid method for detection and measurement of Technetium in soils.

Assessment of current status and issues

- Project is on schedule with no foreseen delays.
- Continue to work with EPA and Sandia National Laboratory on capping and long-term monitoring needs.

Plans for the next two months

Activities for the next two months include the following:

- FIU-HCET will begin participating in biweekly conference calls of the Caps and Covers Group, which involves DOE, EPA, and commercial companies.
- Begin contacting key characterization points of contact in the caps and covers group to work out a strategy for the design of a long-term monitor.

FIU-HCET collaborators

Hans Weger (305) 348-6620

David Roelant (305) 348-6625

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

MONTHLY PROGRESS REPORT

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

http://www.hcet.fiu.edu

Review of Current Practice in Characterization and Monitoring

Project Number: HCET-1999-C009

Project objectives

The characterization of waste and contaminated sites and facilities throughout the U.S. DOE complex is the first step in cleanup. DOE's Characterization, Monitoring, and Sensor Technology Crosscutting Program (CMST-CP) task is to deliver appropriate technology to its sites providing solutions to the Office of Waste Management, the Office of Environmental Restoration, and the Office of Facility Transition and Management. Yet, current baseline characterization and monitoring technology is inadequate or expensive for many of the needs identified at the DOE sites. Innovative and advanced technology and methodology are needed. A database of current practices of characterization and monitoring at DOE sites that FIU-HCET is preparing will contain detailed cost and performance data for each baseline technology. This database will allow CMST-CP to compare new technologies to baseline technologies.

The principal objective of this project is to research and describe the technologies that are being used or are planned for use by DOE site environmental programs at the Savannah River Site (SRS) and the Idaho National Engineering and Environmental Laboratory (INEEL).

The detailed objectives are as follow:

- Evaluate current DOE environmental characterization and monitoring needs as documented in CMST-CP literature and in the Site Technology Coordinating Groups (STCGs) Technology Need Statements for SRS and INEEL.
- Update the DOE environmental characterization and monitoring needs for Oak Ridge sites and Hanford site.
- Identify baseline characterization and monitoring technologies that are used and planned for use at identified DOE environmental sites and gather their performance specifications.
- Develop baseline cost estimates for use of these technologies.
- Develop information needed for comparison of these baseline technologies with new innovative technologies.
- Update the existing CMST-CP baseline technology database, web functionality, and documentation.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C009-M1	SRS and INEEL Characterization and Monitoring Requirements Identification	Understanding of the characterization and monitoring needs and goals at SRS and INEEL	Completed on 11/24/99, before the due date of 2/8/00
C009-M2	Current Practice in characterization and monitoring at SRS and INEEL	Outline the baseline characterization and monitoring methods and tools at the two DOE environmental cleanup sites.	Due Date: 4/14/00
C009-M3	Description of Baseline Technologies and Applicability to needs at SRS and INEEL	Compare technical specifications of the baseline technologies with needs at the two sites.	Due Date: 6/9/00
C009-M4	Baseline Technology Costs	Assess life-cycle costs of baseline characterization and monitoring technologies slated for use at two sites.	Due Date: 8/25/00
C009-M5	Maintain CMST-CP Current Practice Database	Provide maintenance and development services through FY00	Due Date: 10/31/00

Significant events for this reporting period

No significant events this reporting period.

Accomplishments and technical progress to date

- Initiated discussion with CMST-CP personnel concerning linking the database to the CMST-CP webpage.
- Initiated identifying and describing the baseline characterization and monitoring methods and tools at Savannah River Site and at INEEL that are currently used or planned to be used to meet the STCG characterization and monitoring needs.
- Transferred the project and project data from DOE Special Technologies Laboratory and Krell Institute to FIU-HCET during early FY99 upon recommendation by DOE.
- Reviewed and tabulated the baseline technologies currently used or planned to be used to meet the STCG characterization and monitoring needs for the Oak Ridge and Hanford sites.
- Obtained and compiled descriptions, performance data, and cost data concerning 39 baseline technologies and current practices identified in the STCG needs for Oak Ridge sites and Hanford site. Information was obtained from documents, vendors, and contacts from these sites and from FIU-HCET personnel.
- Continued discussions concerning project and database with CMST-CP personnel. The database was presented at the 1999 CMST-CP Mid-Year Review at Gaithersburg, Maryland, for comments and suggestions

- Designed and developed a database that includes information on the STCG needs and the baseline technologies. The database can be accessed via the Internet at website <http://131.94.165.121/www/index.htm>.
- Reviewed and tabulated the STCG characterization and monitoring needs for INEEL, the Savannah River, the Oak Ridge, and the Hanford sites.

Assessment of current status and issues

This project is proceeding, and no scheduling deadlines have been missed. Milestone 1 for FY00 has been completed ahead of schedule. Currently, no impediments are known that could delay the scheduled completion of the remaining milestones for FY00.

Plans for the next two months

Activities for the next two months include the following:

- Continue identifying the baseline technologies used at INEEL and SRS.
- Continue programming activities to improve and upgrade the database.

FIU-HCET collaborator

Hans Weger, (305) 348-6620

Technical and Programmatic Support to CMST-CP

Project Number: HCET-2000-C015

Project objectives

This project provides program support and expert technical assistance in technical integration and field coordination for the Characterization, Monitoring, and Sensor Technology Crosscutting Program (CMST-CP). The activities involve and contribute to identification and assessment of CMST capabilities, limitations, needs, and technology performance requirements; promotion of technology integration, implementation, and commercialization; assessment of technology development opportunities; and program planning and execution. Some specific activities include collecting and inputting data on CMST-CP projects into Technology Management System (TMS) database and the CMST-CP database, regular updating of technology deployment information, and technical and programmatic support to CMST-CP management. Additionally, FIU-HCET will support CMST-CP liaisons with analysis of STCG needs to help identify performance requirements, whether technology exists for the needs, to capture real technology gaps, and document in a Gap Analysis Report.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
C015-M1	Submit Needs Analysis Reports	Support CMST-CP liaisons with analysis of STCG needs helping identify performance requirements and whether technology exists for the needs. Work with liaisons to capture real technology gaps and document in a Gap Analysis Report.	Due Date: 3/31/00
C015-M2*	Submit draft Technology Gap Analysis Report	Work with CMST-CP liaisons to pull together a CMS Technology Gap Analysis and submit to CMST-CP.	Due Date: 4/30/00
C015-M3*	Submit draft ITSR	Submit draft Innovative Technology Summary Report to CMST-CP	Due Date: 5/31/00

*** Milestones 2 and 3 are dependent upon receiving final funding during FY00.**

Significant events for this reporting period

Per request of DOE-Ohio, FIU-HCET participated in a week-long value engineering study for the characterization, decontamination, and dismantlement of their critical path facility.

Accomplishments and technical progress to date

- Met with the principal investigators for the CMST-CP cone penetrometer testing project and the Dense Non-Aqueous Phase Liquids (DNAPL) characterization project to discuss the project status and deployment issues.
- Reviewed CMST-CP annual performance plan.
- Collected all (several hundred) Site Technology Coordination Group (STCG) Need Statements from all DOE sites and began analysis of needs in coordination with the CMST-CP Focus Area Liaisons who are responsible for technical responses to the DOE sites. The accumulated responses related to characterization and monitoring will be collected into a single Technology Gap Analysis Report and distributed across DOE.
- Attended CMST-CP FY00 kickoff meeting.
- Attended and chaired two characterization and monitoring sessions at DOE's Eleventh Technical Information Exchange Workshop in Las Vegas, NV.
- Began collecting performance data for two characterization technologies in preparation for development of an Innovative Technology Summary Report for one of the technologies.
- Met with the three DOE-NV Program Managers for CMST-CP to discuss issues related to program and project execution.
- Revised Technical Task Plans for CMST-CP projects at FIU-HCET at the request of Focus Areas and CMST-CP.
- Reviewed CMST-CP Annual Performance Plan.
- Completed third revision to work scope for DNAPL detection using Electrical Impedance Tomography on CMST-CP project. Coordinated with LLNL, EPA, and DOE-NV to scope project containing only carryover funds.
- Responded to several requests for information from CMST-CP.
- Provided monthly input on CMST-CP monthly Business Review presentation to DOE HQ upper management.
- Identified technology deployments for CMST-CP to forward to DOE HQ.

Assessment of current status and issues

Project is on schedule. Two of three milestones are contingent upon full funding. Working with DOE-NV on identifying when the funds will be moved.

Plans for the next two months

Activities for the next two months include the following:

- Complete analysis of all STCG needs.

- Continue to participate in biweekly conference calls and continue to communicate with all CMST-CP team members regularly.

FIU-HCET collaborators

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V. INTERNATIONAL TECHNOLOGY INTEGRATION (ITI) PROGRAM

MONTHLY PROGRESS REPORT

FIU-HCET Principal Investigator	**M.A. Ebadian**
FIU-HCET International Coordinator	**Ana Ferreira**
Focus Area Technical Lead	**Elizabeth O'Malley**
Program Officers	**John Wengle**
	Karl-Heinz Frohne

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 assist government leaders of the Americas in the promotion of the use of efficient and non-polluting technologies.

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

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

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

The FY00 objectives for this project are to

- Bring together the resources of FIU, U.S. industry, the United States Department of Energy (DOE), and other government entities in order to facilitate the demonstration and transfer of U.S. environmental technologies in LACNs.
- Fulfill FIU-HCET's mission of establishing itself as the private organization with contacts to LACNs by becoming a repository of information on environmental needs, policies, and funding priorities.

- Establish an international environmental clearinghouse to provide technologies, assistance, and training to the LACNs and U.S. industry.

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
I001-M1	Support DOE-HQ-IPO	Coordinate DOE-CNEA activities, prepare meeting records, track status of action items, and perform other requested activities.	Due Date: Ongoing
I001-M2	Establishment of Interactive Communication Website	Provide updated energy-related information and development on the Summit energy initiatives.	Due Date: Ongoing
I001-M3	Identify environmental/technology organizations to incorporate in the database	Identify U.S. environmental technology organizations to assist in recognizing the latest innovative technologies on the market.	Due Date: Ongoing
I001-M4	Large-scale Technology Demonstration Project	Coordinate efforts with DOE in identifying potential implementation of a LSTDP focusing on environmental and/or energy problems in Mexico.	Due Date: 7/25/00
I001-M5	Host an international conference/symposium	Organize a conference focusing on Latin America and its environment.	Due Date 8/14/00

Significant events for this reporting period

No significant events applicable to this reporting period.

Accomplishments and technical progress to date

- FIU-HCET representative met with representatives from CAMACOL, the Latin Chamber of Commerce, to discuss FIU-HCET's participation in the next Hemispheric Congress. The Hemispheric Congress of Latin Chambers of Commerce and Industry is an international business forum encompassing the national chambers of commerce and business organizations throughout the region. FIU-HCET has been invited to provide a speaker in one of the panels. FIU-HCET will showcase a booth at the exhibit.
- FIU-HCET representative will be meeting with officials from the U.S. Department of Commerce to discuss promoting U.S. industry in Latin America and the Caribbean.
- FIU-HCET completed a U.S. DOE proposal to expand the Clean Cities Program to the Western Hemisphere.
- FIU-HCET forwarded information on FIU-HCET's ISO 14000 capabilities to Juan Carlos Aguilar, Chief Planning Officer, for CUAO (Corporación Universitaria Autonoma de Occidente) in Cali, Colombia. The CUAO is interested in establishing an environmental center on campus and is seeking introductory courses on the environmental management system.

- FIU-HCET representative held a telephone conference with representatives from the Environmental Quality Center (EQC) in Chihuahua, Mexico. The discussions focused on possible collaboration between the two organizations for a water project.
- FIU-HCET representative has been asked by John Hindman, E2S Team (Energy and Environment Solution), to draft a paper on the international activities being pursued by the Center, focusing on climate change, the Hemispheric Energy Initiative, and environmental studies. The paper will be used to help identify international collaborative projects between the two organizations.
- FIU-HCET continues to work on establishing a contract vehicle with the Office of International Affairs at the USDOE.

Plans for the next two months

Activities for the next two months include the following:

- FIU-HCET personnel will continue to assist the DOE-EM international program manager in activities with the CNEA of Argentina.
- FIU-HCET personnel will continue to identify international opportunities for U.S. environmental technologies.

FIU-HCET collaborator

Ana M. Ferreira, (305) 348-1818

International Deactivation and Decommissioning Symposium

Project Number: HCET-1999-I002

Project objectives

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

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

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

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

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

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

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

Major milestones

Milestone No.	Milestone Description	Completion Criteria	Status
I002-M1	Acceptance notification for papers	Letters of acceptance mailed to all selected authors.	01/21/00. Completed.
I002-M2	Final Agenda	Acceptance of Final Agenda by DOE.	03/01/00
I002-M3	Registration/Program Brochure	Registration/Program Brochure mailings complete.	03/20/00
I002-M4	Technology Demonstrations Selected	Acceptance Letters mailed to approved Technology Demonstrators.	04/03/00
I002-M5	Final approval papers due	Receipt of all final submittals.	04/07/00
I002-M6	Proceedings	Development of CD and Paper Proceedings.	07/14/00

Significant events for this reporting period

Milestone I002-M1 has been completed. FIU-HCET sent letters to approved abstract authors and provided further instructions for paper submittal.

Accomplishments and technical progress to date

- The Marketing Committee has held two meetings and has discussed marketing strategy. Individuals from other Oak Ridge area industrial/environmental organizations will be invited to attend the next meeting
- The Executive Committee was finalized
- The Technical Committee identified and is contacting session chairs. Abstracts have been divided into session tracks.
- Seventy-eight abstracts have been received from 23 countries.

Assessment of current status and issues

Several letters have been written by DOE and FIU for distribution to target audiences: DOE employees, the general D&D community, the IDS Executive Committee, and academia. The distribution of the letters will significantly increase the amount of interest in the conference.

Plans for the next two months

Activities for the next two months include the following:

- All tracks and sessions will be finalized.
- Track and session chairs and co-chairs, as well as presenters will be finalized.
- Executive Committee implementation/ and associated marketing efforts will take place.

- Letters to keynote speakers will be distributed.
- The preliminary program brochure will be developed.
- The Technical Program Committee will review full drafts of the papers and comments will be provided to the authors.
- Technical Demonstration marketing and sales activities will be performed.
- Tour options will be determined.
- Exhibit sales and marketing activities will be performed.
- Subcontractor management activities (hotels, convention center and exhibit contractor) will be continued.
- International Marketing activities will be continued.

FIU-HCET collaborators

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