

SUBSURFACE CONTAMINANTS

PLUMES

EXPEDITED SITE CHARACTERIZATION

TTP #: *SRI-6-C2-21*

SITE CHARACTERIZATION AND ANALYSIS PENETROMETER SYSTEM LOGISTICS

Principal Investigator: Carol Eddy-Dilek, Westinghouse River Company, 513-529-3218

Project Objectives:

The work to be completed under this task consists of separate tasks all involving evaluation and/or deployment of the Cone Penetrometer Test (CPT) toolbox approach for Dense Non-Aqueous Phase Liquids (DNAPL) characterization.

- Task A: Site Characterization of the Interagency DNAPL Consortium (IDC) Site - The IDC is a joint Environmental Protection Agency (EPA), U.S. Department of Defense (DoD), U.S. Department of Energy (DOE), and National Aeronautics and Space Administration (NASA) program that is focused on evaluation of innovative technologies for DNAPL remediation. The IDC will complete and evaluation of three DNAPL remediation technologies (Six Phase Heating, Steam Stripping, and Chemical Oxidation) in shallow permeable sediments at the Cape Canaveral Air Station in Fiscal Year (FY) 2000. Activities in FY 2001 will focus on identification and characterization of a new evaluation site in a more complex geohydrologic setting such as fractured rock. Funding from this task will be used to do preliminary characterization of the selected site. This activity will be coordinated with Skip Chamberlain and Tom Early of the Subsurface Contaminants Focus Area. This task will support initial site characterization activities using the DNAPL Characterization Toolbox. The purpose of this work will be to delineate the nature and extent of DNAPL at the selected site in order to confirm the site is sufficient for the technology demonstration and to collect data to support development of the call for proposals for the individual technologies.
- Task B: Characterization to Support Density Balanced Mobilization Remediation Evaluation at Dover - Currently two approaches, Partitioning Interwell Tracer Tests (PITT) and discrete soil measurements, have been proposed and applied at various sites. Each approach has limitations and strengths. It is critical to do side-by-side testing of the methods to objectively determine the appropriate applications for these techniques. We have been invited by Ron Falta of Clemson University to deploy the DNAPL Characterization Toolbox in conjunction with an EPA-sponsored density balanced mobilization test at the Dover test site.
- Task C: Development and Deployment of the CPT Toolbox - The Membrane Interface Probe (MIP) is a probe that was developed by a commercial vendor (GeoProbe) for use with smaller diameter GeoProbe rods. The sensor uses a diffusion membrane and is the only

currently available tool for in-situ measurement of high concentration dissolved phase contamination and DNAPL. It is especially useful for site screening purposed to locate unidentified DNAPL source areas. The MIP was first demonstrated at the Savannah River Site (SRS) in FY 1999 in the AM area where the sensor performed well. The field testing of the MIP at several sites including SRS shows that the response of the MIP is dependent on the properties of the subsurface probe zone as well as the amount of target contaminant in that zone. Work in FY 2001 on this task will focus on developing laboratory and field experiments to better understand the dynamic operation of the MIP. We hope to understand the performance of the MIP in different applications so that it can be used to provide a semi-quantitative vertical profile of Volatile Organic Compounds (VOCs) and DNAPL in the subsurface. This technology is currently manufactured and sold by a commercial vendor in a smaller diameter rod. The testing and evaluation will be done in conjunction with Georgia Tech and the Army Corps of Engineer Site Characterization and Analysis Penetrometer System Logistics (SCAPS) program. The probe will be evaluated in the AM area at SRS (PBS 1701). The work scope should facilitate widespread use of the technology by commercial CPT vendors and the SCAPS program. Environmental safety and health concerns and regulatory issues will be minimal and will be addressed by current regulations and practices for use of CPT sensors.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Perform field work at Dover Air Force Base	06/30/01	

Accomplishments and Technical Progress:

- Task A - In late November and early December 2000, Principal Investigator (PI) participated in a multi-agency team that was tasked with drafting a strategy document for the future activities of the IDC including selection and site characterization strategies for the next IDC site, as well as, recommendations for evaluation of innovative technologies. It is anticipated that site selection will be completed by February 2001, and the DNAPL Characterization Toolbox will be used to delineate the nature and extent of DNAPL at the selected site. Potential sites for the IDC demonstration site include Loring and Edwards Air Force Bases.
- Task B - This activity was originally scheduled for the second quarter of FY 2001, but has been postponed due to difficulties that the primary investigators are having obtaining required permits for the test. Joe Rossabi has been coordinating with Ron Falta to reschedule this activity for third quarter of FY 2001.
- Task C - A final work scope has been approved for researchers at Georgia Tech to conduct the required laboratory experiments to support development of a conceptual model. Work on the contract will be initiated in February 2001. Once the relevant laboratory experiments have been completed, we will initiate testing of the MIP in the field.
- A Close-out Plan is being developed to close out this task in the next FY. One of the activities proposed as part of the close out, is to develop a compendium of CPT methods for environmental site characterization that includes a history of the SCAPS program and documents the significant accomplishments. The success of this group was cited in the National Academy of Sciences evaluation of the Office of Environmental Management/DOE

program. The compendium would be an interagency effort with involvement from DoD (Navy, Army Corps of Engineers, Air Force) and EPA and will be issued either as a book or a special issue of a technical journal. Initial planning for the close-out documentation will be done at the SCAPS Users Meeting hosted by Georgia Tech in February 2001.

Plans for the Next Quarter:

- Continue with drafting strategy document for future IDC activities.
- Follow up on rescheduling of deployment of DNAPL Characterization Toolbox at Dover Air Force Base.
- Initiate testing of the MIP in the field.
- Continue to work on Close-out Plan for this task.

TTP #: FT0-8-C2-62

SITE CHARACTERIZATION TECHNOLOGY INTEGRATION AND SUPPORT

Principal Investigator: Paul Wang, Concurrent Technologies Corporation, 412-577-2648
 Point-of-Contact: Ron Staubly, National Energy Technology Laboratory, 304-285-4991

Project Objectives:

This project is to provide a center of expertise in alternative characterization and monitoring solutions to help reduce cost and schedule of groundwater and soil cleanup at U.S. Department of Energy (DOE) sites. The project scope involves providing technical and technology integration support to the Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP) as well as providing technical assistance to DOE sites. Task activities will be guided by the Site Technology Coordinating Group (STCG) needs documentation and site "Accelerating Cleanup: Paths to Closure" Plans, specifically in reference to site project baseline summary activities and critical closure paths/events. Specific activities will include: 1) serving as the CMST-CP technical point of contact (liaison) to the Subsurface Contaminants Focus Area (SCFA), and other programs listed above, and providing these programs with expert review of proposals and projects; 2) assessing development status of technologies from all these programs; 3) linking the Principal Investigators (PIs) with site users and vice versa; and 4) keeping the CMST-CP program and its customers informed about the availability, applicability, strengths, and limitations of technology development efforts.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Assist in Technology Gap Analysis and documentation of response to STCG needs	04/30/01	
2	Prepare Draft Innovative Technology Summary Report (ITSR) on topic to be determined	07/15/01	

Accomplishments and Technical Progress:

- Meeting /Workshop/Teleconference Participation:
 - SCFA Needs Workshop, October 18-20, 2000, at the DOE Nevada Operations Office (NV).
 - Workshop on Environmental Monitoring in the DOE Complex on October 25-27, 2000, at Lawrence Livermore National Laboratory (LLNL).
 - SCFA strategic planning meeting in November 2000.
 - CMST-CP Road Map and Strategic Planning Meeting in November in Las Vegas, Nevada.
 - 12th National Technology Information (TIE) Workshop held November 14-16, 2000, in Augusta, Georgia. Additionally, participated in two side meetings, one on the Environmental Management Science Program (EMSP) Science Initiative and the other on integration of long-term monitoring development with the EMSP Program and the Fernald Post-Closure Stewardship Technology Project (PCSTP).
 - PCSTP Integrated Steward Technology Team Meeting held November 30, 2000, at Fernald, Ohio.
 - SCFA site needs visit to Oak Ridge and provided responses to several site needs related to characterization and monitoring technologies.
 - Telecon on the SCFA Fiscal Year (FY) 2003 Congressional Review Budget (CRB) package preparation.
- Documents/Reports:
 - Concept paper titled "Support to DOE/NV on Applications of Micro-to-Nano Scale Science, Engineering, and Technology." DOE/NV plans to brief the Office of Science in November 2000 about its joint initiative with Sandia National Laboratory (SNL) on nanotechnology.
 - Preparation assistance on response to a U.S. General Accounting Office review of the status of monitoring technologies for measuring emissions from stationary air sources and point and non-point water sources.
- Requests for Information, Conference/Workshop Support, and Website Development:
 - Work scope for the project titled "Evaluation of Long-Term Monitoring Technologies."
 - Availability of in-field or in-situ systems to detect metals.
 - In-situ detection and quantification of organic and rad contaminants in soil using push probe technology.
 - Two needs, NV23-0101-12 and NV01-0101-01S.
 - Began planning workshop on long-term monitoring technologies in May 2001. Finalized the scope, location, and dates for the workshop
 - CMST-CP website redevelopment project: Preparation of the template for the project information pages, design the structure for other areas of the website, and review of comments and suggestions that were submitted on the user-friendliness draft redesigned CMST-CP website.

Plans for the Next Quarter:

- Activities in support of the SCFA will be coordinated and level-of-support work requested by the CMST-CP management team will be provided.

FIELD ANALYSIS

TTP #: SR1-7-C2-21

DEVELOPMENT AND DEPLOYMENT OF INNOVATIVE DENSE NON-AQUEOUS PHASE LIQUIDS CHARACTERIZATION METHODS

Principal Investigator: Joe Rossabi, Savannah River Technology Center, 803-725-5220

Project Objectives:

This project has sought to develop and field test innovative technologies for subsurface Dense Non-Aqueous Phase Liquids (DNAPL) characterization. Currently, we are focusing on the development and enhancement of one of the most successful characterization technologies to date, the Ribbon Non-Aqueous Phase Liquids (NAPL) Sampler (RNS). The RNS was developed in a collaboration between Savannah River Technology Center (SRTC) and FLUTE Ltd. The RNS uses a hydrophobic sorbent membrane with an impregnated dye that is deployed using everting flexible liner technology. The dye's color is expressed when NAPL contacts the membrane in the subsurface. When the membrane is brought to the surface, the depth and location of the NAPL is determined. The first objective for this fiscal year is to select, lab test, and deploy a replacement DNAPL dye for Sudan IV which has been recently identified as a suspected mutagen. The other main objective is to deploy the RNS at suspected DNAPL site in fractured rock geology.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Identify partner to develop new dyes	11/30/00	11/30/00
<i>Updates:</i> Dr. R. C. Aspland from Clemson University Textile Sciences Department will partner.			
2	Deploy RNS at fractured rock site	08/31/01	
<i>Updates:</i> Deployment will be at Smithville, Ontario, site.			

Accomplishments and Technical Progress:

- Dr. R. C. Aspland of the School of Textiles, Fibers, and Polymer Science at Clemson University has agreed to help select a suitable non-toxic dye to replace Sudan IV and to develop methods for applying and fixing the dye to our current substrate.

Plans for Next Quarter:

- Formally subcontract Dr. Aspland for work on the project.
- Contact Ted O'Neil to fix plans for deploying RNS at Smithville, Ontario, site.

CONTAMINANT DETERMINATION and MIGRATION

TTP #: RL3-5-C2-23

JOINT COORDINATING COMMITTEE FOR ENVIRONMENTAL RESTORATION AND MANAGEMENT CONTAMINANT TRANSPORT STUDIES

Principal Investigators: Signe K. Wurstner, Pacific Northwest National Laboratory,
509-372-6115
Michael G. Foley, Pacific Northwest National Laboratory, 509-372-4671

Project Objectives:

Perform detailed geochemical and contaminant-transport analyses of the historic ground-water plumes from Lake Karachay at the Mayak Site and an injection plume at the Tomsk Site in the West Siberian Basin using all available information sources, including direct interactions with Russian scientists and visits to the sites, to benefit the U.S. Department of Energy/Environmental Management (DOE/EM) efforts in the United States (U.S.) by providing unique assessments of scale effects in contaminant migration available from no other source.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Complete Fiscal Year (FY) 2000 Project Report	09/30/01	

Accomplishments and Technical Progress:

- The principal effort in October was devoted to continuation of the development of the recharge model for the Mayak three-dimensional transient groundwater model.
- The principal effort in November was devoted to continuation of the development of the recharge model and participation in a Joint Coordinating Committee for Environmental Restoration and Management Contaminant Transport Studies (JCCEM) workshop in North Carolina, and to meet with the Russian delegation and discuss scope of work and contract agreement for FY 2001 work at Tomsk and Mayak.
- The principal effort in December was devoted to continuation of the development of the recharge model for the Mayak three-dimensional transient groundwater model.

Plans for Next Quarter:

- Conduct joint U.S.-Russian modeling workshop at Pacific Northwest National Laboratory (PNNL) February 26 - March 9, 2001.
- Provide Russian delegation with data CD.

LANDFILLS

POST-CLOSURE MONITORING

TTP #: *AL2-8-C2-21*

ALTERNATIVE LANDFILL COVER DEMONSTRATION

Principal Investigator: Stephen Dwyer, Sandia National Laboratories-Albuquerque,
505-844-0595

Project Objectives:

The Alternative Landfill Cover Demonstration (ALCD) is a large-scale field test at Sandia National Laboratories (SNL), located on Kirtland Air Force Base in Albuquerque, New Mexico. Construction and instrumentation is complete and the ALCD is now in the performance-monitoring phase.

The stated objectives of the ALCD are to:

- Demonstrate the construction and cost of cover design alternatives.
- Measure the performance of the design alternatives for a minimum five-year post-construction period using water balance and ancillary data as the primary evaluation method.
- Validate predictive models for evaluating long-term performance of the cover designs.
- Document the results through presentations, reports, and peer-reviewed publications.

The test covers are constructed side-by-side for comparison based on their performance, cost, and ease of construction. The focus of this project is to provide the necessary tools (i.e., cost, construction and performance data) to the public and regulatory agencies so that design engineers will have better regulatory acceptable alternatives to the conventional cover designs.

Continuous water balance and meteorological data is currently being obtained. It will be actively collected for a minimum five-year, post-construction period. In addition, periodic measurements of vegetation cover, biomass, leaf area index, and species composition are being taken.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Water Balance Data Report	08/30/01	

Updates: Data is being collected.

Accomplishments and Technical Progress:

- Completed all milestones for Fiscal Year (FY) 2000.
- Data is still being collected to be included in FY 2001 Milestone Report.
- Just completed vegetation data field work and lab work. Currently performing statistical analysis of vegetation data.

Plans for the Next Quarter:

- Continue to collect water balance data at the ALCD site.
- Start statistical analysis of vegetation data collected.

HIGH LEVEL WASTE TANKS

SAFE STORAGE

TTP #: *CHI-0-C2-11*

CENTER FOR NONDESTRUCTIVE EVALUATION SAFETY

Principal Investigator: Brian Larson, Center for Nondestructive Evaluation/Ames Laboratory,
515-294-8158

Project Objectives:

Hanford, Idaho National Engineering and Environmental Laboratory (INEEL), Savannah River Site (SRS), West Valley (WV), and Oak Ridge (OR) share a common need to assess and confirm the integrity of their aging High-Level Waste (HLW) storage tanks. Nondestructive Evaluation (NDE) methods are commonly used to collect data on the conditions of materials and structures. The sites will benefit from an activity that promotes collaboration and information sharing relative to NDE issues. The Center for NDE (CNDE) has an extensive history in working with industry on collaborative projects that solve difficult problems. CNDE will initiate a collaborative activity that involves the five main HLW storage facilities. CNDE will assist the sites in solving NDE related technical issues by: 1) coordinating both inter- and intra-site information and technology exchange and 2) providing NDE related technical support and review.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Issue a Summary Report on the Site Assessment of NDE for Tank Integrity Inspection	01/31/01	
<i>Updates:</i> In progress - This milestone is on schedule.			
2	Issue a Year-End Report of Activities	09/30/01	
3	Conduct Multi-Site Tank Integrity Inspection Workshop and Technology Exchange	12/30/00	11/01/00
<i>Updates:</i> Complete			
4	Issue a Report on the Results of the NDE Workshop and Technology Exchange	03/01/01	
<i>Updates:</i> In progress - This milestone is on schedule.			
5	Issue a Final Report on HLW Tank Inspection and Repair Technologies	09/30/01	

Accomplishments and Technical Progress:

- During the month of October, efforts were focused on reviewing information that was collected during visits to five of the U.S. Department of Energy (DOE) sites that took place in September, and preparing for a tank integrity workshop that occurred on October 31 and November 1, 2000. The sites visited were SRS, OR, WV, Idaho, and Hanford. The purpose of the visits was to gather information about each site's tank integrity program, and to discuss opportunities for collaboration that would lead to improvements in the tank integrity programs across the DOE complex. This information was used in the planning and execution of the workshop.
- On October 31 and November 1, 2000, the First Annual Tank Integrity Workshop was held in Atlanta, Georgia. Representatives from the Hanford, Idaho, SRS, OR, and WV sites were joined by participants from Ames Laboratory, Los Alamos National Laboratory, private sector firms, and the Defense Nuclear Facilities Safety Board to discuss tank integrity issues and challenges faced by the DOE complex. Twenty-six individuals participated in this first of its kind workshop. Participant feedback on the workshop was extremely positive.
- The remainder of the quarter focused on preparing a report that will serve as the proceeding of this workshop and also to summarize information collected from the five site visits that took place in September. The first draft of the report is complete and sections have been distributed for comment. Effort has also gone into conducting a literature search for articles written about tank inspection and repair. Once the pertinent articles have been collected and reviewed, a summary report will be distributed to contacts at the sites. Contributions were also made to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code meetings that were held during the week of December 10, 2000.

Plans for the Next Quarter:

- The effort for the next quarter will focus on finalizing the report summarizing the tank integrity issues identified during the site visits and during the workshop.
- Work will also focus on working with the sites to identify their most pressing NDE related needs and to begin to develop plans to address these needs.

WASTE RETRIEVAL

TTP #: FT0-0-C2-11

CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY-CROSSCUTTING PROGRAM UNIVERSITY PROGRAMS (FLORIDA INTERNATIONAL UNIVERSITY) [CENTER OF EXPERTISE FOR TANK SLURRY MONITORING]

Principal Investigator: Anindra Mazumdar, Florida International University, 305-348-2348
Point-of-Contact: Ron Staubly, National Energy Technology Laboratory, 304-285-4991

Project Objectives:

This project will be a multi-year, collaborative effort with ongoing tasks at Hemispheric Center for Environmental Technology/Florida International University (HCET/FIU), Oak Ridge National Laboratory (ORNL), and Savannah River Site (SRS). This effort will meet the needs of SRS, ORNL, and 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. Fiscal Year (FY) 2001 scope for this project includes finalizing the design of the prototype, fabricating the monitor and cold test stand, and cold testing the in-tank dual Coriolis Slurry Monitoring System to meet critical SRS needs for deployment in FY 2002. 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.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Complete changes to detailed design	12/29/00	
<i>Updates:</i> Iterations are still on-going with SRS personnel. Design will be finalized over the next month or two.			
2	Issue Cold Test Plan for Prototype Dual Coriolis Wt% Solids Monitor	04/30/01	
3	Fabricate the Prototype Dual Coriolis System Assembly and Test Stand	06/29/01	
4	Complete Cold Tests on Prototype and Issue Report	09/27/01	

Accomplishments and Technical Progress:

- Bench Scale
During previous experimental runs, a temperature difference was observed between the slurry and the filtrate. This was attributed to the low filtrate flow rate, which resulted in the

cooling of the filtrate. A redesigned Mott Filter was installed, and the problems associated with the temperature drop across the previous filter were overcome. The system is also being tested for fluids with pH comparable to the actual field conditions as discussed with the client.

All the bench-scale experiments have been completed, and the results have been submitted to ORNL for statistical analysis. Preliminary analysis performed by HCET/FIU demonstrates a high degree of correlation between the measured and reference experiment values. The results provide a high degree of confidence to proceed with the prototype development and large-scale deployment.

- **Large Scale**

The large-scale probe will need to be compact for easy introduction and positioning in the tank. Hence, the dimensions of the parts are critical. The dimensions and details of major parts have been finalized. Detailed drawings and specifications for major equipment and control philosophy have been finalized.

Shielding calculations have been completed. These results would be used to determine the effective shielding required for the probe.

The final drawings are nearing completion and will be submitted by the due date at the end of this month.

Plans for the Next Quarter:

- Detailed design by HCET/FIU and review by SRS are continuing. Contributions toward creation of a prototype design report will include selection of components by specification and vendor, schematics, operational flowcharts, revised mechanical layout, and assembly drawings. Equipment with extended delivery requirements will be ordered in the next two months for maintaining the schedule.

WASTE SAMPLING/ANALYSIS

TTP #: NV0-8-C2-31

INTEGRATED RAMAN pOH SENSOR FOR IN-TANK MONITORING

Principal Investigator: Job Bello, EIC Laboratories, Inc., 781-769-9450

Project Objectives:

The objectives of this project are to design, assemble, and demonstrate an *in-situ* monitor for corrosive species in U.S. Department of Energy's (DOE) large-scale waste tanks. The goal is

to develop a combined chemistry and corrosion probe consisting of a fiber-optic Raman Probe for sensing nitrate, nitrite, and hydroxide concentration and an Electrochemical Noise (EN) Sensor for monitoring in-tank corrosion. In Fiscal Year (FY) 2001, EIC Laboratories, Inc. will work with Savannah River Site (SRS) to finalize the design of the deployment platform for the combined Raman/EN Sensor that meets SRS specifications. Based on approved platform design by SRS, EIC Laboratories, Inc. will then fabricate and deliver the deployment platform along with the probe and associated instrumentation. EIC Laboratories, Inc. will also provide technical assistance to SRS in the cold acceptance testing of the corrosion probe.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Deliver Raman System and Deployment Platform to SRS	09/15/01	

Accomplishments and Technical Progress:

- A new, lower-cost subcontractor for the deployment platform fabrication has been identified. The subcontract by EIC Laboratories, Inc. to HiLine has been authorized by DOE/NV. HiLine has started fabrication. As-built drawings are being developed. Expected completion is late February 2001.
- Pre-cold test procedures have been drafted. Pre-cold test experiments are being completed. The Cold Test is scheduled for April 2001 in Richland, Washington.
- The new conduit was received from the vendor. This conduit has a larger internal diameter (ID), is completely sealed, and can withstand higher pressure than the previous conduit. The larger ID will permit use of a larger size vacuum/pressure tubing with the probe, which is needed to meet SRS vacuum and pressure requirements for sampling and cleaning the sampling chamber.
- New filters were ordered for the corrosion probe sampling compartment. The sintered metal filter clogged up with sludge, diminishing its performance. The new filter is a surface type media, where debris is collected on the outer surface of the filter media and is easily back washed.

Plans for the Next Quarter:

- Complete fabrication of deployment platform
- Test new filters
- Assemble Raman probe

MIXED WASTE

OFFGAS & EFFLUENT MONITORING

TTP #: CHI-7-C2-33

DEVELOPMENT OF A MULTI-ELEMENT METAL CONTINUOUS EMISSIONS MONITOR FOR COMPLIANCE MONITORING

Principal Investigator: David Baldwin, Ames Laboratory, 515-294-2069

Project Objectives:

The goal of this project is to provide a system capable of monitoring elemental emissions from waste treatment facilities. The purpose of this monitoring system is to provide documentation of regulatory compliance with regard to toxic metal or radioactive emissions. In order to achieve this goal, we have developed a Compact, High-Resolution Spectrometer (CHRS) based on Acousto-Optic Tunable Filter (AOTF) and high-resolution echelle grating technologies. The CHRS is combined with an air-plasma Inductively Coupled Plasma-Atomic Emission Spectrometry (ICPAES) system developed by collaborators at Mississippi State University (MSU). The combined system is capable of compliance monitoring of heavy metal (e.g., Resource Conservation and Recovery Act [RCRA] metals) and actinide (e.g., alpha emitters) contaminants in stack emissions. In Fiscal Year (FY) 2000, innovations include 1) adaptation of the echelle spectrometer system for use as a Hg vapor monitor with simultaneous background and interference monitoring, and 2) application of the existing AOTF-echelle spectrometer system to other emission-based Continuous Emission Monitoring (CEM) techniques. These innovations will improve the speed and reliability for compliance with Environmental Protection Agency (EPA) maximum achievable control technology CEM regulations at thermal waste treatment facilities. During FY 2001, we will demonstrate these capabilities at user sites and in collaboration with other CEM developers to establish the ability of this technology to aid in the application of CEMs to emissions monitoring. The spectrometer has an advanced user interface capable of easy adaptation to atomic or molecular emission spectrometric applications such as hot cell and nuclear fuel analysis and processing, field analyses in complex matrices, or passive remote sensing. Additional applications are being sought.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Complete Test Plan for Validation Test	05/31/01	
2	Demonstrate Hg CEM	09/30/01	

Accomplishments and Technical Progress:

- Arrangements have been made to travel to Sandia National Laboratories-Livermore (SNLL) in February to perform experiments using the CHRS as a high resolution spectrometer with the Laser-Induced Breakdown Spectroscopy (LIBS) monitoring system developed there.
- The data from the September field tests of the multi-metal and mercury monitoring systems have been examined and compared to validation data acquired using EPA Reference Method 29. A draft report has been prepared and is being reviewed internally.
- The mercury monitoring system was reassembled in the laboratory and additional experiments have begun to examine potential interferents in addition to HCl and SO₂. The FY 2000 test at Diagnostic Instrumentation and Analysis Laboratory (DIAL) indicated that the system works well for converting mercuric chloride to atomic mercury (eliminating that interference) and adequately corrects for background due to SO₂ interferences. These tests indicated good performance in these areas using the same concentrations planned for the tests of commercial Hg monitors planned for January 2001 at EPA-Research Triangle Park (RTP). There were other unidentified spectral interferents in the gas stream at the DIAL test stand. In order to adequately correct for all interferences, it will be necessary to determine other likely interferents and include in our system means for correcting those interferences. One likely candidate interferent is high water vapor concentrations.
- The polarizers in the multi-metals CEM CHRS spectrometer have been replaced. Last FY, we upgraded from MgF₂-Rochon to BBO-Glan-Taylor polarizers and improved the rejection ratio for the CHRS to out-of-band noise. We have now replaced the Glan-Taylor polarizers with BBO-Rochon polarizers (a newly available commercial product). These new optics are better than both previous sets of polarizers. The BBO-Rochon has a larger extinction ratio than the MgF₂ optics, with a larger separation of the undesired beam in a much shorter length optic. The BBO-Rochon is an improvement over the BBO-Glan-Taylor because it is much better at rejecting light over a wider wavelength range. The Glan-Taylor optic worked well only in the UV near the emission lines of interest. It would have been a problem for LIBS since the laser spark generates bright near-infrared emission that was passed by the polarizers. The BBO-Rochon polarizers solve this problem.
- The multi-metals CEM CHRS has been redesigned to incorporate parabolic reflectors in the optical design. These optics proved to provide slightly better resolution than the original spherical optics. This may be important in some applications, but not all. For instance, the improvement is insignificant for the mercury monitoring application. It will be most important for measuring low concentrations in high background matrices.

Plans for the Next Quarter:

- Complete and release the report of the September tests.
- Perform LIBS experiments at SNLL.
- Discuss arrangements for a field test of the Hg monitoring system with focus area staff and managers of potential demonstration sites.

TTP #: NV0-1-MW-31

CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY-CROSSCUTTING PROGRAM TECHNICAL EXECUTION - DIAGNOSTIC INSTRUMENTATION AND ANALYSIS LABORATORY AND ALTERNATIVE OXIDATION TECHNOLOGY

Principal Investigator: Stephan Weeks, Bechtel Nevada/Special Technologies Laboratory,
805-681-2262

Project Objectives:

This task provides analytical measurement technical expertise for the execution of Transuranic (TRU) and Mixed Waste Focus Area (TMFA) research products being developed at the Diagnostic Instrumentation and Analysis Laboratory (DIAL) at Mississippi State University (MSU); and to be used for monitoring effluents of Alternative Oxidation Technologies (AOT) being developed for processing Mixed TRU (MTRU) and Mixed Low Level (MLL) wastes.

- Subtask 1: The Principal Investigator (PI) will coordinate activities and communications to enhance measurement technology development and expedite regulatory permitting of TMFA treatment processes for projects being executed at DIAL that support TMFA priorities.
- Subtask 2: A critical review of technologies applicable to monitoring effluents from mixed waste treatment processes that may provide alternatives to incineration will be performed. The PI will work closely with the management and support staff of the TMFA and the Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP) to select and use appropriate monitors in order to obtain data that will 1) enhance the development of the Alternative Waste Treatment Technologies (AWTT), and 2) enable regulatory permitting. The emphasis will be defining data required by effluent monitoring technologies to support successful Fiscal Year (FY) 2002 demonstrations of selected AWTT.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Letter Report to TMFA: Alternative Oxidation Technologies (AOT) Effluent Monitoring	09/18/01	
2	Letter Report to TMFA: DIAL	09/30/01	

Accomplishments and Technical Progress:

- National Technical Workgroup (NTW) for the Environmental Protection Agency (EPA) US Department of Energy (DOE) Memorandum of Understanding (MOU) on mixed waste treatment includes a project on High Efficiency Particulate Air (HEPA) Filter Performance and Monitoring DIAL has a lead role. A draft position paper has been completed. The issues identified to increase confidence in HEPA filter performance and to provide a basis for regulatory actions (e.g., permit conditions) were identified as relating HEPA filter performance to risk, calibrating Particulate Matter (PM) monitoring instruments, determining impacts of

failure modes, and determining performance of alternatives to HEPA filters. Path forward for each issue was developed and a work plan is being developed.

- Seminars presented under the auspices of the EPA/DOE MOU for Dioxin/Furan (D/F) Formation and Prevention Studies (TTP HQ00C231) took place November 7, 2000, at DIAL/MSU and December 6-7, 2000, at the EPA's Research Triangle Park (RTP) Environmental Research Center. TMFA and CMST-CP jointly coordinate these leveraged activities with the National Energy Technologies Laboratory (NETL). Brian Gullet, EPA principal scientist, presented a seminar at DIAL and a talk with lab tour at the RTP Environmental Research Center. The tour, part of the 25th Annual EPA - Air and Waste Management Association Information Exchange, included a demonstration of a state-of-the-art Jet Resonance Enhanced Multiphoton Ionization Time-of-Flight Mass Spectrometer. This instrument was procured recently to provide real-time D/F measurements for the studies, which are aimed at providing improved process control methods and/or simpler environmental surrogates for D/F measurements. The EPA effort is coordinated with work performed at SRI International through NETL, MSE Technology Applications, Inc., and DIAL through a Cooperative Agreement (CA).
- TMFA, CMST-CP, and DIAL personnel met at MSU on November 7, 2000. The purpose of the meeting was to discuss scope of work and technical tasks to be included in the FY 2001-2002 DOE/DIAL CA. Principal activities were identified to support the TMFA under the CA. The activities include assessing AOTs, effluent monitoring technology development and field testing, and support of DOE/EPA MOU in the areas of HEPA filter performance and D/F formation and control studies. A tour of DIAL's Combustion Test Stand Facility and Research and Development labs occurred. DIAL provides a Combustion Test Stand and other facilities for the testing and development of PM, mercury, multi-metal, and D/F Continuous Emissions Monitoring (CEM). DIAL conducts research in areas such as the detection of chlorinated aromatics by cavity ringdown spectroscopy.
- PI initiated a literature search on effluent monitoring technologies applicable to alternative to incineration technologies. PI reviewed Blue Ribbon Panel Report of the Secretary of Energy Advisory Board's Panel on the Emerging Technological Alternatives to Incineration. National Technical Workgroup (NTW) for the EPA/DOE MOU on mixed waste treatment includes a project on AOT Evaluation.

Plans for the Next Quarter:

- Review FY 2001-2002 DOE/DIAL CA.
- Participate in NTW HEPA Filter Performance and Monitoring conference calls and activities (e.g., Data Quality Objective [DQO] document subgroup).
- Participate in NTW AOT Evaluation conference calls and activities.
- Preparations to co-chair session and present a status report on monitoring technologies in a Special Workshop on Alternatives to Incineration April 26, 2001, held in conjunction with *A National Forum & Technology Exhibit, Developing Strategies to Accelerate Federal Agency Environmental Cleanup ...* with special sessions on Waste Treatment Alternatives to Incineration in Salt Lake City, Utah, April 23-26, 2001.
- Preparations for NTW meetings to be held in conjunction with 2001 IT3 Conference: Twentieth Annual International Conference on Incineration and Thermal Treatment Technologies, May 14-18, 2001, in Philadelphia, Pennsylvania.

DISPOSITION OF FACILITIES (D&D)

FACILITY CHARACTERIZATION

TTP #: FT0-0-C2-51

SCREENING TO BELOW REGULATORY LIMITS

Principal Investigator: Hans Weger, Florida International University, 305-348-6620
Point-of-Contact: Ron Staubly, National Energy Technology Laboratory, 304-285-4991

Project Objectives:

The purpose of this Characterization, Monitoring and Sensor Technology-Crosscutting Program (CMST-CP) task is to provide minimal investment in engineering development and/or system integration of existing commercially-available technologies such that these technologies will have a broader application range and be more rapidly deployed across the U.S. Department of Energy (DOE) sites.

A key objective of this CMST-CP activity is to identify technologies successfully demonstrated by the Deactivation and Decommissioning Focus Area (DDFA) and/or currently used by DOE sites for characterization and monitoring that, if enhanced, could provide better pre- and post-decontamination surveying. Enhancement includes the identification of a greater number of radionuclide or hazardous species and/or detecting to lower (e.g., release) levels.

Available technologies identified by DDFA and CMST-CP include, but are not limited to:

- Pb Analyzers including those for Pb Paint
- Alloy Analyzers
- PCB Analyzers
- Integrated systems for Rad/Hazardous constituents
- Low-energy gamma radionuclides (e.g., Th, Pu)

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	To be determined		

Accomplishments and Technical Progress:

- Due to scheduled November 2000 award of new grant agreement with Florida International University (FIU), the Office of Management and Budget (OMB) hold on Environmental Management funding, and the delay in receipt of funds for FIU in the FINPLAN, this work has not yet officially commenced at FIU.

Plans for the Next Quarter:

- National Energy Technology Laboratory (NETL) to award CMST-CP tasks to FIU grant.

TTP #: FT0-0-C2-52

REAL-TIME BERYLLIUM MONITOR FOR SURFACE AND AIR SAMPLES

Point-of-Contact: Ron Staubly, National Energy Technology Laboratory, 304-285-4991

Project Objectives:

This project, with the investigator to be selected under a Request for Proposals (RFP) to be issued by the National Energy Technology Laboratory (NETL), aims to develop, certify, and demonstrate a prototype airborne and surface contamination real-time (or near real-time) Beryllium Monitor. Upon delivery and implementation of an instrumentation system, the Industrial Hygiene program at Rocky Flats (RF) would be able to provide the Deactivation and Decommissioning (D&D) program accurate, real-time measurements of the airborne beryllium concentrations for both area monitors and personnel monitoring, as well as beryllium contamination assessments of a wide variety of surfaces. The real-time results in these critical monitoring functions will result in reduced risk of exposure for the work force, and increased productivity for those D&D activities involving areas potentially contaminated with beryllium.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Final Conceptual Design Report	02/10/01	
2	Prototype fabrication complete	07/15/01	

Accomplishments and Technical Progress:

- Fabrication of a Laser-Induced Breakdown Spectroscopy (LIBS) hardware set to conduct analysis of Be loaded filter media was completed in December. Integration of the Chromsoft software, that operates the spectrometer and Charge Coupled Device (CCD) detector with software to control the X-Y position stage was attempted. Upon detailed examination of the Chromsoft software, it was determined that the function to allow an external triggering of the CCD exposure was in fact not implemented in the software. To overcome this limitation, a custom software program was developed that communicates directly with the CCD detector and provides the necessary triggering and read-out of the CCD. This program will be integrated with the program used to control the X-Y stage, allowing an automated process for LIBS analysis of a filter media test sample using a large number of spark positions.
- The hardware set was used, in a manually operated mode, to conduct the first series of measurements detailed in the Method Development Test Plan. This series of measurements is designed to develop an understanding of the spectral landscape around the principal candidate beryllium emission lines. Because the hardware set was needed for continued

software development activities, it remained at Science and Engineering Associates, Inc. (SEA). The initial measurements of a pure beryllium metal source were conducted in sealed glass vials, to obviate the need for the strict contamination controls that will be implemented at the Lovelace facility, once LIBS measurements are made on beryllium loaded filters.

- The Draft Design Report was internally reviewed, and formally submitted to U.S. Department of Energy (DOE) NETL. This document, as described previously, details the design approach developed for the Real-Time Beryllium Monitor. The report is organized into five major topical areas:
 - The **Introduction** defines the scope and content of the report, defines the objectives of the design process, and provides an overview of LIBS.
 - The **System Requirements** section gives a brief description of the system requirements document (included as Appendix A) for the prototype design.
 - The **System Hardware Design** provides an overview of the modes of operation, the design approach to each of the three major instrumentation modules that comprise the prototype, and an indication of how the prototype instrument is expected to operate in each of its three operational modes.
 - The **System Control Software** section gives a detailed description of the software that will be used to control the instrument in each of its operational modes.
 - The **Calibration and Data Reduction** section provides a general discussion of the data analysis techniques that will be used to reduce the raw spectral data from individual laser induced sparks to a quantitative measurement of beryllium abundance for the various modes of operation.

Plans for the Next Quarter:

- Begin fabrication of selected components, initiate integration of available components, continue software development.

FIELD PROGRAM ACTIVITIES

TTP #: CHI-0-C2-31

TECHNICAL INTEGRATION FOR CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY-CROSSCUTTING PROGRAM

Principal Investigator: Williams Haas, Ames Laboratory, 515-294-4986

Project Objectives:

This project provides technical integration for the Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP) activities with the Transuranic (TRU) Mixed Waste Focus Area (TMFA). The Principal Investigator (PI) serves as CMST-CP project facilitator and undertakes other CMST-CP technology integration and technical support tasks as assigned. The PI also reviews proposals, test plans, progress reports, and other documents as assigned, and provides observations and conclusions to CMST-CP management as requested.

The principal areas of emphasis are the TMFA, technical support to Industry and University Programs efforts in support of the CMST-CP related needs of the TMFA, TMFA support provided by the Diagnostic Instrumentation and Analysis Laboratory (DIAL) at Mississippi State University (MSU), and the monitoring and control of emissions from mixed waste thermal treatment processes and other treatment processes that may be acceptable alternatives to incineration.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Date Due</i>	<i>Completion Date</i>
1	N/A		

Accomplishments and Technical Progress:

- *Advanced Tensiometer (AT)* Innovative Technology Summary Report (ITSR) - Sought, received and incorporated comments on the draft *AT* ITSR from Joel Hubbell and Buck Sisson, co-inventors of the *AT*, and from Heather Holmes-Burns, who deployed the *AT* as part of the Vadose Zone Monitoring System Accelerated Site Technology Development (ASTD) project at the Savannah River Site (SRS). Informed John Jones, CMST-CP Lead, that there is a perceived problem with the cost analysis section and asked him to resolve that with his counterpart in the Subsurface Contamination Focus Area (SCFA). The anticipated outcome is that CMST-CP and SCFA management will agree to produce two ITSRS, one on the *AT* (credit to CMST-CP and SCFA) and one on the Vadose Zone Monitoring System (in which the *AT* and other technologies were deployed) (credit to SCFA). The Advanced Tensiometer (Office of Science and Technology (Office of Science & Technology [OST] TechID #2122) was developed under Technical Task Plan (TTP) #ID7-5-C2-21, Integrated Geophysical and Hydrological Characterization of Transport in Fractured Media. October-December 2000.

- “Implementing Mercury Continuous Emissions Monitors (CEMs) on Hazardous Waste Incinerators” - A paper, "Implementing Mercury CEMs on Hazardous Waste Incinerators," by Dr. Nina Bergan French, Dr. Steve Priebe, and Dr. William Haas was published in the October 20 issue of *Pollution Engineering* (Vol. 32, pp. 38-41). It can also be seen at *Pollution Engineering* (www.pollutionengineering.com/archives/2000/pol1001.00/pol1000F1.htm). Preparation of the paper was jointly sponsored by the CMST-CP and the TMFA.
- Support to the TMFA - Continued frequent communication with Steve Priebe, TMFA Product Line Manager, and Stephan Weeks, CMST-CP Liaison to the TMFA. Topics addressed included the following:
 - The U.S. Army Environmental Center description of the Vanguard Research Inc. industrial-scale Plasma Energy Pyrolysis System (PEPS) for destruction of hazardous wastes.
 - The planned November 2000 shutdown of the Waste Experimental Reduction Facility, a mixed waste incinerator at the Idaho National Engineering and Environmental Laboratory (INEEL). INEEL plans to aggressively pursue alternative methods to incineration. A blue ribbon panel has been studying technological alternatives to incineration and was to send recommendations to U.S. Department of Energy (DOE) by December 15, 2000.
 - Weeks and Priebe visit to DIAL on November 7, 2000, (cavity ring down spectrometry; High Efficiency Particulate Air [HEPA] filter; and particulate matter monitoring studies, polychlorinated dibenzodioxins/furans).
 - Weeks and Priebe participation in the November 30-December 1, 2000, meeting of the Non-Destructive Assay (NDA) Interface Working Group (IWG) in Salt Lake City, Utah. The main topics addressed included a) the Waste Isolation Pilot Plant (WIPP) Central Characterization Facility (CCF) plans, strategies, and issues; b) the CCF concept, its proposed role, implementation and integration into the overall characterization process; and c) the capability of current NDA techniques for characterization of large volume containers.
 - Weeks and Priebe visit to Environmental Protection Agency (EPA) Research Triangle Park (RTP) to participate in the December 5-6, 2000, EPA/A&WMA (Air and Waste Management Association) Information Exchange Meeting and the December 7, 2000, meeting of the American Society of Mechanical Engineers (ASME) Research Committee on Industrial and Municipal Waste.
 - Planned observation of the EPA ETV verification testing of mercury CEMs at the EPA RTP rotary kiln incinerator simulator facility in January 2001.
 - Planned participation in the TMFA End-User Review Meeting and the NDA IWG Meeting in Salt Lake City, Utah, in February 2001.
- CMST-CP Road Map - Provided written input, suggestions, and review comments on several occasions to John Jones, CMST- CP Lead, and Charles Davis, CMST-CP Field Coordinator, for a draft CMST-CP Road Map. October–December 2000. Also participated, with other CMST-CP team members in the CMST-CP Road Mapping and Strategic Planning Meeting at the Nevada Operations Office November 2-3, 2000.
- CMST-CP Conference Calls - Participated in CMST-CP team conference calls. Topics addressed included CMST-CP Road Mapping and strategic planning, CMST-CP requirements of the Long-Term Stewardship program, ITSR preparation, Highlight reporting, and reports from staff. October 18 and November 30, 2000.

- HEPA Filter Performance - Reviewed a draft position paper, "HEPA Filter Performance," prepared by the DIAL for the DOE/EPA HEPA Filter Performance and Monitoring Technical Work Group (TWG). In the paper, the TWG identified key unresolved issues related to HEPA filter performance and described the steps it intends to take to resolve them. Participated in the TWG conference call for discussion of the draft position paper and proposed next steps. Other conference call participants included Randy Seeker, GE Energy & Environmental Research Corp.; John Plodinec, DIAL; David Eaton and Steve Priebe, BWXT; C. C. Lee, EPA. Conveyed a summary of the discussion to Stephan Weeks. December 6, 2000.
- Draft input for DOE Environmental Management (EM) response to U.S. General Accounting Office (GAO) Audit of the Status of Emissions Monitoring Technologies - Distributed background information to other members of the CMST-CP team and prepared the first draft of proposed DOE/EM input for a GAO audit concerning the status of technologies for monitoring emissions from stationary air sources and point and non-point water sources. Worked with Steve Priebe, John Jones, Charles Davis, Stephan Weeks, and Paul Wang to produce final draft input and deliver the same to Beth Moore, Headquarter (HQ) Point-of-Contact (POC) for the CMST-CP. Moore had been tasked to prepare proposed DOE/EM input for review and approval by Gerald Boyd. December 12-13, 2000.

Plans for the Next Quarter:

- Complete work on the AT ITSR.
- Continue to contribute to the preparation of the CMST-CP Road Map.
- Observe the EPA ETV verification testing of mercury CEMs at the EPA RTP Rotary Kiln Incinerator Simulator Facility on January 25-26, 2000. Assist in the selection of mercury CEMs for extended duration verification testing/demonstration at the Toxic Substance Control Act (TSCA) Incinerator.
- Participate in the TMFA End-User Review Meeting and the NDA IWG meeting in Salt Lake City, Utah, February 6-8, 2001.

TTP #: *CHI-9-C2-11*

TECHNICAL SUPPORT AND PROGRAM LIAISON TO TANKS FOCUS AREA

Principal Investigator: Glenn Bastiaans, Ames Laboratory, 515-294-3298

Project Objectives:

This task provides technical support and assistance in field coordination and program support for the Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP). It involves and contributes to identification of technology needs; assessment of technology requirements, capabilities, and limitations; promotion of technology integration; assessment of technology development opportunities; and program planning and implementation. Glenn Bastiaans works as a member of the combined U.S. Department of Energy (DOE) Headquarters (HQ) and Field CMST-CP management and implementation team, providing technical and other support, as directed, to the CMST-CP HQ Program Manager and the CMST-CP Field Manager. A primary duty is to provide liaison to the Tanks Focus Area (TFA) for all collaborative technology development and technical oversight activities.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Prepare Draft Strategic Plan	10/30/00	10/27/00
2	Prepare Final Strategic Plan	03/31/01	
<i>Updates:</i> Revised draft submitted for TFA comment on 11/22/00.			
3	Identify CMST-CP related development and performance requirements	04/30/01	
<i>Updates:</i> Site needs have been classified and technical response preparation has started.			
4	Complete product delivery expectations	05/30/01	
5	Prepare Draft Program Execution Guidance (PEG)	06/30/01	

Accomplishments and Technical Progress:

- Technical Support to CMST-CP & TFA–Slurry Monitors - A technical project review of the Hemispheric Center for Environmental Technologies/Florida International University (HCET/FIU) slurry monitor project was held on October 24, 2000, in collaboration with TFA personnel. On October 26, 2000, a follow-up meeting was held with Savannah River Site (SRS) personnel to plan design review and deployment preparation activities. A letter report on the project review with specific action recommendations was issued to TFA and CMST-CP field leads. Monthly conference calls were held with HCET, SRS, Oak Ridge National Laboratory (ORNL), and TFA personnel to monitor technical progress.
- Technical Support to CMST-CP & TFA–Raman Corrosion Probe - A subcontract for the fabrication of the mechanism to deploy the Raman/Electrochemical Noise (EN) Probe in Tank 43 at SRS has been approved and issued to HiLine Engineering. Fabrication is expected to be complete in February 2001. Additional funding of \$30K has been allocated to support engineering design changes. Conference calls to facilitate progress in the deployment of the Raman probe were held on a biweekly basis.
- Technical Support to CMST & TFA–Nondestructive Evaluation (NDE) for Tank Safety - On October 31 - November 1, 2000, CMST-CP and TFA collaborated to hold a workshop on tank integrity assessment. Contractor representatives from the five DOE sites that have large underground waste storage tanks attended along with representatives from CMST-CP, TFA, DOE, and one attendee from the Defense Nuclear Facilities Safety Board (DNFSB). The workshop was organized by the Center for Nondestructive Evaluation (CNDE) at Ames Laboratory/Iowa State University. The purposes of the workshop were to allow different DOE site contractors to discuss how tank integrity assessment efforts can be done to comply with DOE Order 435.1, to discuss common and different tank assessment needs, and to establish communication and cooperative efforts between DOE site contractors and with the CNDE. After informative discussions, the workshop proceeded to treat issues of concerns to the DOE contractors.

- Technical Support to CMST-CP & TFA–West Valley Tank Characterization - PEG development was completed for the final task of the West Valley project to inventory residual tank waste. A recommendation was made for an outside contractor to perform modeling studies to predict characterization accuracy. A conference call was held with all project participants to kick off the effort.
- Technical Support to CMST-CP & TFA-Liaison - On November 7-9, 2000, Bastiaans represented CMST-CP at the TFA technical team kick-off meeting for Fiscal Year (FY) 2001. Plans were discussed and reviewed for all the technical support activities planned for the remainder of FY 2001. In addition, Bastiaans was one of four members of the CMST-CP team who attended the Technical Information Exchange (TIE) Workshop November 14-16, 2000. Of special interest at the workshop, were discussions of HQ and Field planning for Long-Term Stewardship. CMST-CP representatives also attended a discussion on the formation of a DOE Sensor Working Group.
- CMST-CP Program Support - Bastiaans participated in the CMST-CP conference calls held this quarter and attended a meeting at DOE/Nevada (DOE/NV) November 2-3, 2000, to advance preparation of a Road Map for long-term planning purposes. Written material for the CMST-CP Road Map was revised, extended, and submitted to DOE/NV. Program highlights, activity summaries, and comments on the revised CMST-CP website were submitted to the CMST-CP field office. Bastiaans also participated in several TFA management conference calls to represent John Jones for CMST-CP.

Plans for the Next Quarter:

- Biweekly conference calls will be held to facilitate deployment of the Raman Tank Corrosion Probe at SRS. Periodic conference calls will be held among representatives from TFA, FIU, ORNL, and SRS to facilitate slurry monitor development work.
- Technical responses will be prepared in response to site needs requiring development of characterization, monitoring, and sensor technology as requested by TFA and CMST-CP.
- Bastiaans will participate in the TFA Mid-year Meeting activities in March 2001.
- Bastiaans will continue to supply CMST-CP management with updated project status, milestone, and spending information for the monthly business review, weekly program highlights, and other programmatic information.
- Bastiaans will continue to assist in the preparation of the CMST-CP Road Map.
- Bastiaans will revise and enhance the first draft of an Innovative Technology Summary Report (ITSR) on the *Raman Corrosion Probe*.
- Bastiaans will start preparation of product and delivery expectations for CMST-CP/TFA projects.
- Work on the Raman Probe ITSR will be continued.

TTP #: CH2-7-C2-61

CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY PROGRAM TECHNICAL SUPPORT

Principal Investigator: Bruce Friedrich, University of Iowa, 319-626-7947

Project Objectives:

Provide technical support and assistance in field coordination for the Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP). Serve as project facilitator for CMST-CP projects assigned by the CMST-CP Field Program Manager. Monitor the technical progress and schedule status, perform an annual on-site review of technical progress, and transmit review reports to the Principal Investigator (PI) and CMST-CP Field Program Manager. Write Innovative Technology Summary Reports (ITSR) for projects assigned by the Field Program Manager.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Prepare draft ITSR on topic to be determined	07/15/01	

Accomplishments and Technical Progress:

- Completed ITSR entitled *Real-Time Monitor for Transuranics in Glass* (Technology Management System [TMS] #2004). This ITSR has been published.
- Participated in CMST-CP planning meeting.
- Contributed materials for the CMST-CP Road Map.

Plans for the Next Quarter:

- Participate in project reviews and document preparation.

TTP #: FT0-0-C2-61

TECHNICAL AND PROGRAMMATIC SUPPORT TO THE CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY-CROSSCUTTING PROGRAM

Principal Investigator: David Roelant, Florida International University, 305-348-6625

Point-of-Contact: Ron Staubly, National Energy Technology Laboratory, 304-285-4991

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-CP 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 the 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, Hemispheric Center for Environmental Technologies/Florida International University (HCET/FIU) will support CMST-CP liaisons with analysis of Site Technology Coordination Group (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:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Collect data, write, and submit Draft Innovative Technology Summary Report on an Office of Science and Technology (OST) technology	08/01/01	

Accomplishments and Technical Progress:

- Due to scheduled November 2000 award of new grant agreement with FIU, the Office of Management and Budget (OMB) hold on Environmental Management (EM) funding, and the delay in receipt of funds for FIU in the FINPLAN, this work has not yet officially commenced at FIU. Certain tasks are being covered as necessary, such as the biweekly CMST-CP conference calls, drafting of various white papers and reports, etc.

Plans for the Next Quarter:

- National Energy Technology Laboratory (NETL) to award CMST-CP tasks to FIU grant. FIU to begin efforts on production of deliverables and milestones.

TTP #: NV0-6-C2-61

TECHNICAL INTEGRATION AND CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY-CROSSCUTTING PROGRAM LIAISON FOR TRU/MIXED WASTE FOCUS AREA

Principal Investigator: Stephan Weeks, Special Technologies Laboratory, 805-681-2262

Project Objectives:

This project will provide technical integration for Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP) projects associated with the Transuranic (TRU) Mixed Waste Focus Area (TMFA). The Principal Investigator (PI) will provide technical expertise, leadership, and assessments to facilitate various projects under CMST-CP; respond to TMFA and CMST-CP information requests; conduct technical studies; assist in reports, cost savings, and other designated TMFA and CMST-CP activities, as directed; develop and administer the public and team CMST-CP world wide web (WWW) sites; and champion technologies where applicable. Activities include support the identification of technology needs; assessment of

technology requirements, capabilities, and limitations; prioritization of technology development activities according to the impact of cost savings for U.S. Department of Energy (DOE) sites; issuance of solicitations that seek solutions in the identified high-priority technology deficiency areas; technical monitoring of the progress of projects; program planning and implementation; and promotion of technology deployments to meet DOE site cleanup objectives. Major task activities also include helping to coordinate the CMST-CP input to the TMFA Review meeting.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Letter Report to TMFA	06/30/01	
2	Prepare Draft Innovative Technology Summary Report (ITSR)	07/15/01	

Accomplishments and Technical Progress:

- CMST-CP Technical and Programmatic Support - Technical liaison support to TMFA Effluent Monitoring and Waste Characterization.
- Participated in:
 - Surface Acoustic Wave Mercury Vapor Sensor Review Meeting, October 19, 2000.
 - Beryllium Monitor Project Kick-off Meeting, October 20, 2000.
 - Diagnostic Instrumentation and Analysis Laboratory (DIAL) projects coordination meeting for TMFA at Mississippi State University with Steve Priebe (TMFA Effluent Monitoring Product Line Manager), November 7, 2000.
 - Nondestructive Assay (NDA) Interface Working Group meeting, Salt lake City, Utah, November 30, 2000: concerned Waste Isolation Pilot Plant (WIPP) Central Characterization Facility (CCF) plans, strategies and issues; technical presentations concern the CCF concept, its proposed role, implementation and integration into the overall characterization process; also addressed the capability of current NDA techniques with respect to the characterization of large volume containers and associated issues.
 - TMFA Integrated Planning, Accountability, and Budgeting System (IPABS) milestones review and re-submission of CMST-related long-form Technical Task Plans (TTPs).
 - CMST-CP Road Map & Strategic Planning Meeting, Las Vegas, Nevada, November 2-3, 2000, discussions plus TMFA liaison and public web site presentations
 - Environmental Protection Agency (EPA)/Air & Waste Management Association (AWMA) Information Exchange, December 5-6, 2000, and American Society of Mechanical Engineers (ASME) Research Committee meeting on December 7, 2000. Held discussions with Brian Gullett on EPA/DOE Memorandum of Understanding (MOU) "Dioxin/Furan Formation and Prevention Studies" (HQ00C231) and Jeff Ryan on EPA ETV Mercury Continuous Emission Monitor (CEM) Phase I test plan.
 - Completed reviews on papers concerning development and implementation of Polychlorinated Biphenyls (PCBs) methods, development and evaluation of a Volatile Organic Compound (VOC) CEM, and perspective on hazardous waste treatment emissions, as requested by the TMFA Effluent Monitoring Product Line Manager, October 5, 2000.

- Contributed to draft DOE Environmental Management (EM) response to U.S. General Accounting Office (GAO) audit on the status of emissions monitoring technologies, December 13, 2000.
- Facilitated Projects:
 - Integrated Raman/Electronic Noise Probes for in-tank Corrosion Monitoring (Technology Management System [TMS] TechID #2015) - The Cold Acceptance Test is scheduled for April 2001. Subcontractor, HiLine Engineering, is expected to complete fabrication of the deployment device in February.
 - Development of a Multi-element Metal CEM for Compliance Monitoring - Acousto-Optic Tunable Filter (AOTF)/Echelle Compact High-Resolution Spectrometer (TMS TechID #1564). The multi-metal and mercury CEM field test reports has been drafted. Improvements in the Hg CEM are being made based on results from the field test.
 - Compare Mercury CEMS (OR09MW31) - Scheduled project kickoff meeting for January 25, 2001, during the EPA ETV Phase I demonstration at EPA Research Triangle Park (RTP) Pilot-Scale Incinerator. This task follows completion of a Particulate Matter (PM) CEMs evaluation at the Oak Ridge Toxic Substance Control Act (TSCA) Incinerator.
 - Dioxin/Furan Formation and Prevention Studies (HQ00C231) - PI, Brian Gullet, presented talks at DIAL (November 7, 2000) and at the EPA/AWMA Information Exchange (December 6, 2000). This task is also coordinated with SRI "Development of CEM for Dioxin" National Energy Technology Laboratory (NETL) contract DE-AC26-98FT-40370.
 - Technical Execution - DIAL and Alternative Oxidation Technologies (AOT) (NV01MW31) - Discussions on progress and cooperative agreement were held at DIAL November 7, 2000. PI participated in the conference calls for National Technical Workgroup on High Efficiency Particulate Air (HEPA) Filter Performance and Monitoring, in which DIAL has a lead role. Also, initiated literature search on effluent monitoring technologies applicable to alternative to incineration technologies.
- CMST-CP Internet Pages:
 - Presentation of the new CMST-CP Field Office web site goals and format at the CMST-CP Strategic Planning Meeting, November 1, 2000; received review comments.

Plans for the Next Quarter:

- Kick-off Meeting for TTP OR09MW31 Compare Mercury CEMS, January 25, 2001.
- Discuss CEMS with EPA technical leads at RTP, January 24-26, 2001.
- TMFA End-User Review Meeting, February 6-8, 2001.
- Complete draft of new CMST-CP Field Office public web site for review.
- Attend Waste Management 2001 and assist at CMST-CP booth; February 25 - March 1, 2001.
- Complete draft ITSR.

TTP #: NV0-9-C2-41

TECHNICAL AND PROGRAM SUPPORT FOR NUCLEAR MATERIALS FOCUS AREA

Principal Investigator: Paul Hurley, Special Technologies Laboratory, 805-681-2472

Project Objectives:

This task provides technical and program support for future Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP) related projects in the Nuclear Materials Focus Area (NMFA). The principal role for this task is to serve as the liaison from CMST-CP to NMFA and provide technical and program support to the NMFA and CMST-CP field and Headquarters (HQ) program managers. Other tasks for this project include facilitation for several other CMST-CP related projects.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	NMFA Technology Assessment Report	09/30/01	

Accomplishments and Technical Progress:

- Attended the NMFA Needs Workshop at Pacific Northwest National Laboratory (PNNL) in October.
- Attended the NMFA Needs Workshop at Savannah River Site (SRS) in October/November.
- Attended the NMFA Multi-Year Program Plan Meeting in November.
- Met with Stan Wolf, NMFA Program Manager, in Washington, DC, in November.
- Visited the Plutonium Finishing Plant at Hanford in December.
- Participated in NMFA weekly conference calls.
- Acted as facilitator for four CMST-CP projects.

Plans for the Next Quarter:

- Attend NMFA Needs Technical Response Meeting at Sandia National Laboratory (SNL) in January.
- Attend NMFA Mid-Year Review in Tucson, Arizona, in March.
- Visit Principal Investigators (PIs) to facilitate their CMST-CP projects in March.

TTP #: NV0-9-C2-61

CHARACTERIZATION, MONITORING, AND SENSOR TECHNOLOGY-CROSSCUTTING PROGRAM TECHNICAL & PROGRAM SUPPORT FIELD COORDINATION

Principal Investigator: Charles B. Davis, Professional Analysis Inc./Bechtel Nevada,
702-295-0541

Project Objectives:

The primary objective of this project is to provide overall coordination of the Characterization, Monitoring, and Sensor Technology-Crosscutting Program (CMST-CP). As part of this coordination, responses to requests from Headquarters (HQ) for information, plans, tables, and other documents will be drafted using information obtained from the CMST-CP Team. Management and planning documents will be created as appropriate to assure good program management and document program performance.

Major Milestones:

<i>No.</i>	<i>Milestone Title</i>	<i>Due Date</i>	<i>Completion Date</i>
1	Deliver CMST-CP Annual Performance Plan (APP)	12/31/00	Cancelled
<i>Updates:</i> This milestone has been cancelled. It was based on the 07/14/00 draft Office of Science and Technology (OST) Management Plan.			
2	Prepare CMST-CP Technology Summary - Fiscal Year (FY) 2001	08/31/01	
3	Prepare Draft Innovative Technology Summary Report (ITSR)	07/15/01	

Accomplishments and Technical Progress:

- Reviewed, edited, and/or submitted to HQ for publication ITSRS: *Real-Time Monitor for Transuranics in Glass* (TechID #2004) and *Adaptive Sampling and Analysis Programs (ASAPs)* (TechID #2946); prepared monthly CMST-CP ITSR Status Reports.
- Provided ongoing maintenance of information on CMST-CP technologies in the Technology Management System (TMS) database.
- Developed and refined image library on CMST-CP technologies for use by CMST-CP personnel and others.
- Completed first draft of ITSR *Induced Fluorescence Sensors for Direct Push Systems* (TechID #2237); communicated this to Principal Investigators (PIs) for their comment and input.
- Prepared materials for FY 2000 Fourth Quarterly Business Review in support of Focus Areas (FA) and Technical Program Officer (TPO).
- Provided assistance to FA with regard to Technical Task Plan (TTP) preparation for FA/CMST-CP technical tasks.
- Participated in meetings of the TMS Users Group, renamed to Environmental Management (EM) Science & Technology Information Working Group (EMS&TIWG). Led efforts of

the Technology Application Team (TATeam) toward the OST Information Systems Functional Requirements document. Lead discussion of this effort at the EMS&TIWG meeting during the Technical Information Exchange (TIE) Workshop November 16, 2000.

Prepared first draft of TATeam contribution to that document.

- Organized and coordinated CMST-CP Road Map and Strategic Planning Meeting November 2-3, 2000.
- Prepared and distributed two drafts of CMST-CP Science and Technology Development Road Map for OST; responded to comments from the CMST-CP team.
- Participated in Diagnostic Instrumentation and Analysis Laboratory (DIAL)/High Efficiency Particulate Air (HEPA) technical working group conference calls.
- Provided management support to U.S. Department of Energy/Nevada (DOE/NV) personnel regarding budget, management, planning, and quarterly business reporting matters.
- Provided inputs to a summary of CMST-CP activities for Mark Gilbertson, EM-52, and a report on OST activities aimed at regulatory compliance for Jef Walker, EM-54.
- Coordinated CMST-CP input to OST response to U.S. General Accounting Office (GAO) call for information on innovative emissions monitoring technologies in response to Congressional inquiry.
- Participated on OST HQ Exhibit Design group and Communications Working Group.
- Provided input to HQ concerning FY 2000 technology deployments recorded in the Integrated Planning, Accountability & Budgeting System (IPABS) database, specifically with regard to CMST-CP and related technologies misidentified by site personnel as non-OST technologies.

Plans for the Next Quarter:

- Continue to provide program coordination with regard to budget, management, planning, and business reporting matters.
- Continue lead role in CMST-CP Road Mapping activities; prepare revised draft CMST-CP Science and Technology Development Road Map for OST.
- Continue editing, reviewing, and submitting ITSRs to HQ and preparing monthly CMST-CP ITSR Status Reports.
- Review, edit, and/or submit several CMST-CP ITSRs to HQ for publication.
- Complete ITSR: *Induced Fluorescence Sensors for Direct Push Systems* (TechID #2237).
- Distribute *Characterization, Monitoring, and Sensor Technology Crosscutting Program Technology Summary: Fiscal Year 2000*.
- Update CMST-CP Exhibit; take exhibit to Waste Management 2001 in Tucson, Arizona, February 25 - March 1, 2001.
- Participate in Waste Management 2001 and side meetings, particularly FA/TPO coordination meeting.
- Prepare review of OST progress in CMST-CP Science and Technology development as requested by the Deputy Assistant Secretary.
- Assist in refining FY 2000 deployment records.
- Continue leadership of TATeam of the EMS&TIWG; prepare revised drafts of the Functional Requirements document; provide reviews and coordination as needed.
- Participate on OST HQ Exhibit Design group and Communications Working Group.