

**Quarterly KRCEE-DOE Project Activity Summary Report**

**KENTUCKY RESEARCH CONSORTIUM  
FOR  
ENERGY AND ENVIRONMENT**

**January 2005 – March 2005**



**June 21, 2005**

KRCEE-DOE Earmark Quarterly Progress Report  
January 2005 – March 2005

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**KRCEE-DOE Earmark PHASE I PROJECTS  
Quarterly Activity Reports**

## 1. UK-KWRRI DOE Earmark Administration & Short-Term Project Quarterly Report

April 8, 2005

### Project Title

KRCEE Administration & Short Term Projects

### Project Goals:

- Respond with research, review, and recommendations to DOE short-term project requests
- Coordinate, supervise, and integrate KRCEE-DOE earmark project activities

### **Projected Completion Date:**

September, 2006

### **Percentage Completion to Date:**

Contractual arrangements with faculty and staff Project Teams to conduct long-term projects related to Phase I DOE earmark activities at PGDP are **95%** completed.

100% of the short-term projects requested by DOE through this quarter have been completed. Because short-term projects are not scoped in advance no percentage completion is applicable.

### Project Team/Member Roles/Tasks:

**Dr. Lindell Ormsbee**/ Director, UK-KRCEE. Direct KRCEE-DOE earmark activities.

**Steve Hampson**/Asst. Director, UK-KRCEE. Program and daily activity lead.

**Dr. John A. Volpe**/KRCEE Contractor. Provide technical, radioactive material, radiation health, and regulatory expertise for KRCEE-DOE earmark projects.

**Jim Kipp**/Associate Director, UK-KWRRI. Provide administrative and technical support for KRCEE-DOE earmark activities.

**Edwin Ebrahimi**/Financial Officer, UK-KRCEE . Provide support for KRCEE-DOE earmark financial activities.

**Anna Hoover**/ Administrative support, UK-KRCEE.

**Stephanie Jenkins/** Administrative support, UK-KRCEE.

**Project Activity Status:**

- Participated in quarterly activity meeting with DOE PPO January, 2005.
- Finalized and distributed Nickel ingots laboratory result paper January 2005.
- Redefined and distributed timelines for Holocene project in January 2005.
- Continued reference document and PGDP project document digitization & uploads to ftp site January – March 2005.
- Met with IT contractor Sam Bogales to review and develop automated PDF document indexing January 2005.
- Conducted 4th quarterly meeting with KRCEE-DOE Project Teams January 2005.
- Received MOU and site access/Readiness Review Requirements for Holocene Issues Project Team from Bechtel-Jacobs mid-February 2005.
- Conducted 2-week initial review of MOU and site access/Readiness Review Requirements with Dr. Volpe and Steve Meiners February 2005.
- Held meeting/conference call with KRCEE and contractors to discuss MOU and site access/Readiness Review Requirements late February 2005.
- Discussed MOU and site access/Readiness Review Requirements with Bechtel-Jacobs contact Dwight Lamb routinely January thru March 2005.
- Supplied UK Health and Safety with Holocene Issues Project documents and MOU and site access/Readiness Review Requirements for review February - March 2005.
- Followed up on contract requests for Holocene Issues project team participants with UK-KRCEE and UK-SPA.
- Completed draft final Holocene Project Workplan, Health & Safety Plan, and Waste Management Plans January – March 2005.
- Attended PGDP CAB meeting in March 2005. Provided CAB with presentations for Holocene Issues, SW Remedial Demonstration, Seismic Hazard Assessment, and Seismic Monitoring Projects.
- Began scoping and making prospective PI and Project team contacts for the Groundwater Activities and Ecological Activities Summary Projects. January – March 2005.
- Continued background data/information compilation and distribution to Wm. Lettis and Associates January – March 2005 .
- Recruited EPPC and EPA participation for the Surface Water “Real-time” Characterization and Remediation Demonstration Project January – February 2005.
- Completed 4th quarterly report (for October thru December, 2004) for distribution March 2005
- Conference call to discuss KRCEE/Argonne project roles and implementation of SW “Real-Time” Characterization & Remediation Project with Argonne National Laboratory and contractors January – March 2005.

- Obtained and prompted UK SPA review of Argonne standard contract for services March 2005 (SPA identified language that is not permissible in contracts with state institutions).
- Supplied Argonne with standard UK contract for review March 2005.
- Based on discussions with DOE & DOE contractor Navarro Engineering, contacted SAIC in Dublin, Ohio to obtain information about PORTS DOE facility Data Warehouse interface for PGDP data March 2005.
- Coordinated PORTS data warehouse presentation for KRCEE, DOE, DOE contractors at UK March 2005.
- Contacted DOE-PPPO regarding possibility of implementing data warehouse for PGDP March 2005.
- Coordinated BGOU SWMU 4 well log inputs for production of 3-D visualizations with UK-GLY, UK-Civil Engineering, CDM-State College Office, and CDM-Paducah January –March 2005.
- Coordinated development of well log data conversion and check program with UK-Civil Engineering and CDM-State College Office January – March 2005.
- Planned April 2005 field reconnaissance for Holocene Issues Project Team with Dr. Woolery, Wm. Lettis & Associates, DOE, SAIC, John Nelson/Illinois Geological Survey, and EPPC March 2005.
- Began development of contract scope for PGDP data warehouse project with SAIC and SAIC contract officers March 2005.
- Recruited key faculty and staff and began KRCEE review of DOE Probabilistic Modeling/Risk Assessment approach and assessment of further iterations of stochastic groundwater models March 2005.

**Task Summary:**

- Coordinate KRCEE-DOE earmark-wide Project Team meeting (4/05)
- Plan meeting with DOE to discuss project needs (4/05)
- Revise and finalize HASP, QAPP, SAP for Holocene Issues Project fieldwork based on initial project team review (4/05)
- Finalize planning and participate in Holocene Issues fieldwork reconnaissance visit to PGDP with Wm. Lettis & Assoc. et. al. (4/05)
- Finalize Holocene Issues fieldwork MOU and site access/Readiness Review Requirements with Bechtel Jacobs and DOE (4/05 -6/05)
- Finalize Holocene Issues fieldwork ITR, Project Team, and Drilling contracts (4/05 - 6/05)
- Finalize Holocene Issues fieldwork Health and Safety contracts
- Finalize PGDP Data Warehouse contracts with SAIC (4/05 – 6/05)
- Continue SW “Real-time” project planning with KRCEE, DOE, Project Team, Argonne (4/05 - 6/05)
- Meet with DOE about NDA, SWOU, BGOU, Holocene & general projects (6/05)
- Complete work on SnT Landfill historical data analysis with Civil Engineering and UL (4/05 – 7/05)

- Complete work on CTECH-EVS visualization 4-D data entry for all BGOU and SnT borings (4/05 - 7/05)

## 2. UK-Paducah Chemical Engineering Uranium Battery Project Quarterly Report

April 27, 2005

### Project Title

Development of Depleted Uranium Batteries

### Project Goals:

- Characterize uranium dioxide's electrochemical properties in various organic solvents/lithium salts commonly used in commercial battery industry. These experiments will be performed in a glove box where the moisture and oxygen concentration will be controlled. These tests will mainly consist of cyclic voltammetry and impedance spectroscopy experiments. This information will be used to construct a battery with uranium dioxide as the cathode.
- Manufacture uranium-lithium compounds to mirror the construction of manganese-lithium compounds commonly used in commercial batteries and characterize their electrochemical behavior in common organic solvent/lithium salts.
- Construct a battery consisting of lithium-uranium dioxide.

### **Projected Completion Date:**

September, 2005

### **Percentage Completion to Date:**

50%

### Project Team/Member Roles/Tasks:

**Dr. Paul Dunbar**/Asst. Professor of Chemical and Materials Engineering-UK Paducah, **PI**. Perform electrochemical testing on experimental uranium-lithium cells.

**Dr. Rhonda Lee**/Assistant Professor of Chemical and Materials Engineering-UK Paducah, **Co-PI**. Perform electrochemical testing on experimental cells and make lithiated uranium compounds.

**Dr. Stephen Lipka**/Center for Applied Energy Research-UK, materials science consultant for electrochemical cell assemblage and data interpretation.

**Walter Tracinski**/Applied Power International. Lithium battery expert who will construct prototype batteries.

**Dr. Rick Howard/Battery Materials Consultant.** Dr. Howard has guided the methods to construct  $\text{Li}_x\text{U}_y\text{O}_z$  compounds.

**Graduate Student Technician** to perform daily repetitive experiments.

**Project Activity Status:**

- The first tasks were to identify and purchase equipment capable of producing electrochemical experiments of high quality using uranium dioxide ( $\text{UO}_2$  and  $\text{U}_3\text{O}_8$ ) as cathode materials in an electrochemical cell to mirror experiments performed on manganese dioxide compounds. This involved purchasing hardware including a Vac-Atmosphere glovebox, potentiostat, frequency response analyzer, materials needed to produce the correct cathode thicknesses, state-of-the-art electrochemical cells, software to perform and analyze the data, lithium salts/solvents made by battery manufacturers, lithium metal to be used as reference and counter electrodes. These tasks have been completed.
- Build a prototype battery consisting of uranium dioxide as the cathode and lithium as the anode. This was completed last June (2004) and the battery showed a low current output (as expected), but it surprisingly showed the ability to be recharged.
- Since last fall (October 2004) we began to focus on the construction of lithiated uranium compounds. In theory these compounds show the most promise of producing a high current output as well as the ability to be recharged. Dr. Richard Howard was hired to determine the best strategy to construct these compounds. Dr. Howard recommended the purchase of a tube furnace whereby reducing conditions could be created to permit the proper chemical reaction to produce the compound  $\text{Li}_2\text{UO}_3$ . This task has just now been undertaken to due several delays in the purchasing and installation of the furnace. Experiments should be completed within four weeks and then the materials can be tested electrochemically and a prototype battery constructed in June and July by Walter Tracinski of Applied Power in Idaho. During this summer, many different forms of uranium and lithium uranium compounds will be tested for the optimal electrochemical properties suitable for commercial battery development.

**Task Summary:**

Laboratory work related to the project will continue in 2005.

### **3. Murray State University Surface Water Modeling & TMDL Quarterly Report**

April 19, 2005

#### **Project Title:**

Surface Water Characterization and TMDL Development for the Paducah Gaseous Diffusion Plant and Associated Impaired Creeks

#### **Project Goals:**

The project has two major goals as follows:

1. Hydrologic characterization of the PGDP area including a water budget analysis of the PGDP facility. Characterization will include the development and calibration of continuous simulation hydrologic models for the Bayou and Little Bayou creek watersheds using the HSPF watershed model or other appropriate tools.
2. Development of Total Maximum Daily Loads (TMDLs) for each creek. Constituents of concern for Bayou Creek are iron, lead, copper, mercury, and Tc-99. Constituents of concern for Little Bayou Creek are iron, lead, copper, and Tc-99.

#### **Project Team/ Member Roles/Tasks:**

**Mike Kemp**, Ph.D./Murray State University, Department of Industrial and Engineering Technology, Principle Investigator (PI) – Overall project administration, budget and schedule control, coordination with UK project management, primary lead on TMDL development emphasizing water quality.

**Andy Kellie**/Murray State University, Department of Industrial and Engineering Technology, Co-PI – Primary lead on hydrologic model development and calibration, secondary lead on TMDL development emphasizing water quantity.

**Jane Benson**/Murray State University, Center for Reservoir Research and Department of Geosciences – Technical support on Geographic Information System operations and hydrologic model development and calibration.

**John Hart**/Murray State University, Department of Industrial and Engineering Technology – Technical support on computer systems hardware and software, network management, and field monitoring instrumentation and equipment acquisition, installation, and operation.

**Matt Philips**/Murray State University, Environmental Engineering Technology – Student technical support on hydrologic model data entry and water quality data analyses.

**Mike Matthews**/Murray State University, Environmental Engineering Technology – Student technical support on hydrologic model data entry and water quality data analyses.

**Tammy Boyd**/Murray State University, Department of Geosciences – student technical support on hydrologic model data input.

**Project Activity Status:**

**Hydrologic Model Development and Calibration (55%) (09/05)**

1. Acquire Existing Plant Outfall and Creek Flow Data (100%)
2. Acquire Model Input Existing Data (80%) (5/05)
3. Preliminary Model Development (80%) (5/05)
4. Initial Model Calibration (25%) (6/05)
5. Install Flow Measurement Equipment If Needed (0%) (Task not needed)
6. Calibrate Model Based on Actual Measurements (15%) (6/05)

**TMDL Development (25%) (9/05)**

1. Acquire Existing Water Quality Data (100%) (6/05)
2. Identify Waste Sources (100%)
3. Input Model Mass Loadings to Model (0%) (7/05)
4. Allocate Mass Loadings (0%) (7/05)
5. Final Model Calibration and Long Term Run (0%) (8/05)

Final Report (10%) (9/05)

**Significant Findings:**

**1. General.** Work is proceeding on drafting the general content of the TMDL report. Mike Matthews participated in the discussion meeting on data base interfaces. We met with Lindell Ormsbee and Steve Hampson to discuss modeling parameters and model use. Assessment of existing flow and concentration data in association with the water budget and identification of potential site areas of emphasis with regard to a specific TMDL is complete.

## **2. Hydrologic model.**

**Hydrologic Analysis.** Work this quarter involved two phases: (a) refinement of Watershed Management Software (WMS) models of the Bayou Creek (BC) and Little Bayou Creek (LBC) watersheds and (b) initial modeling runs in Hydrologic Simulation Program FORTRAN (HSPF). Both phases center on development of an initial HSPF model based on each of the gross watersheds.

### **WMS Refinement**

The intent of this work was to delineate subwatersheds in the BC and LBC watersheds that would reflect both existing hydrography and existing gaging station locations. For the gross model, Little Bayou Creek was subdivided into two subwatersheds. One subwatershed is located south (upstream) of U.S. Geological Survey gage 03611900; the second watershed is located north (downstream) of the gage. Subwatersheds on Bayou Creek include the Forestdale Creek, Ordnance Works Creek, and Brushy Creek watersheds as well as subwatersheds defined by U.S. Geological Survey gage 036110800 and 03611850.

The WMS hydrologic models are based on the 10 m digital elevation model (DEM) of the Kentucky Office of Geographic Information (KYOGI). These have the advantage of enabling precise delineation and of watershed and subwatershed boundaries and flow paths. In addition, WMS provides the tools for editing of DEM defined flow arcs, stream cross sections, and velocity computation data. Interface between WMS and HSPF has been difficult and remains unresolved.

### **Initial HSPF Modeling**

Initial HSPF modeling has involved defining the basic parameters needed to run the model. These have included watershed and subwatershed delineation based on the BASINS DEM (30 meter resolution) and the National Hydrologic Dataset (NHD). Watershed areas have been compared against those obtained during preliminary work in August, 2004 and the WMS modeling done during the current quarter. An initial meteorological file has been prepared and used for a preliminary simulation. BASINS land use files have been integrated into the program.

At this point, the software is running and initial modeling data is realistic. However, more work is required before the model will be considered satisfactory. In particular, it is necessary to (a) substitute the 10 meter DEM for the 30 meter DEM currently used to better define subwatershed areas and flow arcs, (b) integrate an updated land use theme into HSPF to better define the infiltration and runoff components of the model, and (c) improved cross section definition for the drainages.

### **3. TMDL development**

Soil, land cover, temperature data, plus computed potential evaporation values were input to HSPF. Work is continuing on editing the file and testing model with permit compliance data. Next steps include incorporation of metals data from the outfalls.

Overall, WMS appears to provide a higher degree of hydrologic sophistication, but HSPF is needed to assess chemical mass loadings and resulting concentrations. Work is continuing on how these models might best be used.

#### **4. University of Louisville Groundwater & Burial Ground Project Report**

April, 2005

##### **Project Title**

Evaluation of technology characterization for soils, landfills and groundwater, Part 1 (concentration of S and T landfills)

##### **Project Goals:**

- Review & evaluate existing groundwater information/documents/data for the PGDP.
- Identify data gaps and provide recommendations for improvements groundwater monitoring
- Provide updated recommendations relative to applicable groundwater technologies
- Evaluate landfill/burial ground information/documents/data for the PGDP.
- Provide summary of releases, release potential
- Provide BEP/BMP monitoring & remediation recommendations for landfills and burial grounds.

##### **Project Team/Member Roles/Tasks:**

**Dr. D. J. Hagerty/CEE** Department-UL , **Co-PI** . Coordinate activities with KRCEE and project team colleagues, conduct document review, prepare comments, evaluate adequacy of characterization efforts to date.

**Dr. James C. Watters/ChE** Department-UL, **Co-PI**. Assist with the coordination of activities for the project.

**Rebecca Thompson/ChE** Department-UL, Research Assistant. Conduct document reviews, prepare comments, evaluate adequacy of characterization efforts to date, coordinate activities with KCEE colleagues

**Nick Uhl/CEE** Department-UL – Research Assistant. Conduct document review, prepare comments, evaluate adequacy of characterization efforts to date, coordinate activities with KCEE colleagues

##### **Project Tasks:**

*(percent completion) (projected completion date)*

##### **1. Landfill waste characterization and source evaluation (67%) (9/30/2005)**

- a) **Project 1A:** Characterize the wastes in the S&T landfill and in other landfills on the PGDP site.
- b) **Project 1B:** Evaluate mobility of contaminants in the S&T Landfill and in other PGDP landfills and the likelihood that contaminants from PGDP landfills have entered the groundwater flow system, or the surface water flow system.
- c) **Project 1C:** Evaluate the collected data on site conditions and groundwater flow around the PGDP landfills to assess the adequacy of that data in identifying sources of contaminants and portraying concentration zones of those contaminants.

## **2. Groundwater Management/Remediation (67%) (9/30/2005)**

- a) **Project 2A:** review and critique the process by which prior decisions were made relevant to groundwater remediation.
- b) **Project 2B:** Assess changes in technologies that were evaluated previously, and investigate new remediation technologies and/or new combinations of remediation technologies.

## **3. Surface Soils and Sediment Evaluation (10%) (9/30/2005)**

- a) **Project 3:** Perform comprehensive review of collected data, identify zones of contaminated soils and sediments that require management, and recommend appropriate management strategies.

### **Project Activity Status:**

Information obtained in the most recent exploration effort at the S and T landfills confirms previous judgments based on analysis of contaminant concentrations in groundwater around the landfills, that the landfills are not sources of TCE or Tc-99. The ongoing effort to plot all the wells, and analyze all data previously mined for chemical characteristics of groundwater has been concluded.

The assessment of remediation processes has been virtually completed, and the preparation of a report has been started. Data from several websites provided has been used to obtain additional information on newer remediation technologies.

The establishment of a procedure for selection and implementation of site assessment for appropriate bioremediation technology has been initiated. Progress will be reported at the quarterly meeting and advice on future directions will be solicited.

Review of documents describing conditions in surface sediments and around suspected sources at the Plant site has been initiated in compliance with project objectives for this group.

**Task Summary:**

1. Compile/assess new OREIS database data to obtain the most up to date monitoring information for the SnT and U Landfills (Task 1A & B)(9/30/2005).
2. Develop cross-sections depicting physical conditions underlying the SnT and U landfills reflecting the relationships of well screens to lithology, each other, and NSDD (Task 1A & B) (9/30/2005).
3. Finish Review ITRD report (Task 2A & B) (9/30/2005).
4. Continue literature review of applicable technologies (Task 2A & B)( 9/30/2005).

## **5. UK/CE Groundwater Modeling Project Quarterly Report**

April 19, 2005

### **Project Title:**

Groundwater Modeling

### **Project Goals:**

- Evaluate the adequacy of existing groundwater models at the site
- Recommend necessary improvements to the models
- Conduct Sensitivity analyses for CAB/PGDP GW modeling team Water Budget Items
- Evaluate the potential use of natural attenuation for addressing off-site dissolved phase groundwaters
- Use the models to evaluate the efficiency of proposed groundwater remediation plans

### **Projected Completion Date:**

September, 2005 for existing tasks, additional time and tasks are expected as part of Phase I activities

### **Percentage Completion to Date:**

Identified with project tasks below.

### **Project Team/Member Roles/Tasks:**

**Srinivasa Lingireddy, Ph.D./**Associate Professor of Civil Engineering-UK, PI. Coordinate the team activities, recruit and direct graduate students and post-doctoral scholars to help with the modeling efforts, prepare quarterly reports.

**Steve Hampson/**Assistant Director, UK-KRCEE – Project Manager

**Dr. Lindell Ormsbee/** Director, UK-KRCEE.. Technical Advisor

**Dr. Joe Hagerty/**Professor of Civil Engineering, UL. Provide technical consultations and expert opinion on modeling activities

**Prasad Manthena/**Graduate Student, Department of Civil Engineering, UK.

**Jim Kipp/**Associate Director, UK-KWRRI, Provide technical and administrative support

### **Project Activity Status:**

1. Finalize reviews, evaluations, and recommendations from ongoing UK groundwater modeling activities for the PGDP site. **(80%)(8/8/2005)**
2. Provide modeling assessment for a range of groundwater remedial approaches including natural attenuation, hydraulic containment, pump & treat, and source/dissolved phase removal/treatment. **(30%) (09-30-2005)**
3. Provide modeling assessment for the efficiency and expected performance of proposed groundwater remediation plans. **(30%) (9-30-2005)**
4. Provide an assessment of the adequacy of the USACOE web-based groundwater model for the PGDP. **(0%) (9-30-2005)**
  - KRCEE discussed joint project with DOE contractors Navarro, Bechtel Jacobs, and SAIC **(75%) (3/2005)**
  - Meetings with Bechtel-Jacobs/SAIC/Navarro **(3/2005)**
  - Discussed USACOE FEFLOW model with DOE contractors in joint project. Meeting **(3/2005)**
5. Provide sensitivity analyses for Water Budget items identified by PGDP CAB and PGDP GW modeling team. **(60%) (8/8/2005)**
6. Develop MS EXCEL macro for PGDP data evaluation relative to #analyses, # detects, # analyses exceeding health/regulatory/background thresholds. **(85%) (7/2005)**

### **Task Summary:**

- Complete MS EXCEL data macro that will be applied as qualitative and quantitative evaluation of data on gw, sw, soil, sediment sampling locations (4/05 – 7/05)
- Continue GW Modeling (PGDP) Team sensitivity analyses (4/05 – 8/05)
- Continue model natural attenuation simulations (4/05 – 9/05)
- Obtain and verify groundwater withdrawals from TVA & vicinity (4/05 – 7/05)
- Evaluate boundary condition effects on current vicinity & SWMU scale models (4/05 – 7/05)
- Complete simulations and documentation of groundwater conditions when plant activities cease under a number of possible remedial scenarios with consideration of parameter sensitivity analyses (9/05)

**Significant Findings:**

The KRCEE/DOE modeling project team has identified the bulleted tasks below needing sensitivity analysis. Once DOE groundwater modeling contractors have completed their review of the MODFLOW model provided to UK in CY 2000, modeling will be continued, sensitivity analyses will be finalized, and a report will be generated.

- Pumping influences/effects at TVA Shawnee Plant
- River stage changes effects on head conditions in all layers
- Recharge rates
  - Plant recharges (lagoons)
  - Rain recharges
- Leakage along the pipeline
- Plant shut down scenario
  - No outflow to Little Bayou Creek
  - Reduced outflow to Big Bayou Creek
  - Several other tasks as identified at the water budget analysis meeting

## 6. UK-Paducah Chemical Engineering Nickel Project Quarterly Report

April 29, 2005

### **Project Title:**

Purification and Recovery of Radiologically-Contaminated Metals.

### **Projected Completion Date:**

May25, 2005

### **Percentage Completion to Date:**

90%

### **Project Goals:**

- Investigate the radiological characteristics of market available Nickel
- Investigate the application of chemical vapor deposition (CVD) technology for the removal of radionuclides from radioactively-contaminated metal waste
- If CVD is a viable method of purification, design and test a laboratory-scale reactor or evaluate demonstration of industrial scale reactor
- Evaluate industrial-scale reactor for recovery of existing stockpiles of nickel waste.
- If CVD technology does not prove to be a suitable method for purification of radioactively-contaminated metal waste, explore use of electro-refining (ER) technology as a method of purification
- If ER technology proves to be a viable method of purification, design and test laboratory-scale reactor
- Evaluate industrial-scale reactor for recovery of existing stockpiles of nickel waste

### **Project Team/Member Roles/Tasks:**

**Dr. Jim Smart**/UK-Paducah Engineering, **PI**. Conduct background research, prepare experimental plan, interpret experimental results, prepare project reports, and coordinate budget.

**Dr. Fuqian Yang**/UK-College of Chemical & Materials Engineering, **Co-PI**. Consult with PI to plan/interpret experimental plan. Assist in preparation of documents.

**TBA**/ Post-Doctoral Fellow, to be hired. Retrofit existing CVD equipment. Run experiments and assist in preparation of documents.

## **Project Activity Status:**

*Activity (% completion)/(Completion Date/Projected Completion Date)*

- Attend PACROE meetings about salvage of volumetrically contaminated Ni ingots at PGDP (80%) (TBD)
- Identify Nickel refiners and suppliers (100%)(9/03 – 10/03)
- Nickel powder and barstock obtained from three different U.S. Ni suppliers (100%)(10/03)
- Participate in meetings to develop laboratory analytical methods (100%)(9/03 – 10/04)
- Obtain & review CVD technology information (100%)(9/03)
- Raw material samples distributed to UK-Chem & Materials Engineering for standard laboratory preparation (100%)(10/03 - 11/03)
- Prepared laboratory samples obtained from UK-Chem & Materials Engineering (100%)(10/03 - 11/03)
- Track sample analyses (100%)(12/03 - 9/04)
- Complete review of validated CHS-REMS radiation lab and USEC virgin nickel radioisotope analyses (100%) (9-10/04)
- Identified graduate student and external consultant to become project participants (7-9/04)(100%)
- Process flow diagram for laboratory CVD reactor system complete (100% complete)(8/04).
- Literature and patent searches regarding background of previous or existing CVD operations is complete (7/04)(100%)
- Finalize analytical plans (3/05)(100%)
- Finalize process flow diagram (3/05)(100%)
- Finalize laboratory Health and Safety plan that address Ni Carbonyl (3/05)(25%)

## **Task Summary:**

- (a) Order and setup laboratory CVD reactor system.
- (b) Operate reactor system with nickel powder and optimize operating conditions. Get comfortable using ICP analytical test method to monitor purity of nickel product.
- (c) Dose virgin nickel powder feedstock with appropriate surrogate contaminant to simulate recovery conditions
- (d) Attend CVD bench-scale demonstration in Va./W. Va. (VENDOR DECLINED TO ALLOW UK PARTICIPATION\*. KRCEE WILL NEED THE ASSISTANCE OF DOE AND PACRO IN ORDER TO OBTAIN PERMISSION FOR KRCEE OVERSIGHT PARTICIPATION IN THE CVDR PILOT TEST)
- (e) Evaluate CVD Bench Scale Results from Vendor (TBD)
- (f) Bring UK CVD reactor on-line (TBD)
- (g) Conduct Bench scale studies at UK using basic CVD technology application (6/05+)

\* KRCEE WILL NEED THE ASSISTANCE OF DOE AND PACRO IN ORDER TO OBTAIN PERMISSION FOR KRCEE OVERSIGHT PARTICIPATION IN THE CVDR PILOT TEST

**Implications/conditions that affect project:**

- Need to identify what surrogate metal is a likely non-hazardous candidate for simulated recovery testing Technetium-99 (Tc-99) is the primary radionuclide contaminate to be studied in the recovery of radiologically-contaminated metals. A non-hazardous metal will be identified and used in place of Tc-99 in initial laboratory testing
- NEED TO OBTAIN SUPPORT OF DOE AND PACRO TO PARTICIPATE IN THE OVERSIGHT OF THE PILOT CVD DEMONSTRATION BEING CONDUCTED BY THE DEPARTMENT OF THE NAVY AND THE CVDR CORPORATION
- KRCEE is concerned about the legalities relevant to development and deployment of CVD or CVD-like technology to the PGDP from the University of Kentucky and/or other entities that are not patent holders for the process

**Significant Findings:**

1. Graduate student has been conducting literature and patent searches regarding chemical vapor deposition (CVD) of nickel. Graduate student familiarizing himself with all safety precautions surrounding the CVD process and formation of nickel carbonyl. Various analytical procedures (x-ray diffraction, ICP, AA, microscopy techniques, etc.) have been evaluated for best method to analyze for low levels of contaminants in purified nickel product.
2. An external CVD expert (Richard Westfall, Galactic Mining, Inc.) has been hired to provide background and advice regarding setup of initial laboratory testing.
3. A process flow diagram for laboratory testing has been prepared. Vendors for all equipment have been identified and a price/delivery schedule has been completed.

## 7. UK Chemical Engineering Nickel Project Quarterly Report

May 25, 2005

### **Project Title:**

Background research & chemical engineering evaluation of technologies for the removal of  $^{99}\text{Tc}$  from volumetrically contaminated metals.

### **Projected Completion Date:**

June 30, 2005.

### **Percentage Completion to Date:**

100%

### **Project Goals:**

- Provide standard preparation of market available Ni for distribution to laboratories conducting analyses
- Investigate the chemical/physical characteristics  $^{99}\text{Tc}$
- Evaluate market uses of Nickel
- Identify market uses where slightly volumetrically contaminated Ni might be utilized
- Conduct a thorough research & review effort to identify documented removal methods for  $^{99}\text{Tc}$  from volumetrically contaminated material
- Provide recommendations for bench scale study to evaluate removal of  $^{99}\text{Tc}$  if processes other than commercially available CVD or electrochemical refining are promising

### **Project Team/Member Roles/Tasks:**

**Dr. Eric Grulke**/UK-Chemical & Materials Engineering, **PI**. Lead project efforts.

**Louie El Asami**/UK-Chemical & Materials Engineering, Graduate Research Assistant. Conduct daily research & investigative efforts.

**Dr. Lindell Ormsbee**/ Director, UK-KRCEE. Technical Advisor.

**Dr. John A. Volpe**/KRCEE Contractor. Provide technical and regulatory expertise for radioactive material issues.

**Steve Hampson**/KRCEE. General project support.

**Project Activity Status:**

*Activity (% completion)(Completion Date/Projected Completion Date)*

- Provide standard preparation of market available Ni for distribution to laboratories conducting analyses.(100%) (11/03)
- Meetings with project team to discuss chemistry, removal, and release issues (100%) (10/03, 11/03, 2/04, 6/04, 8/04, 9/04, 10/04)
- Conduct research into documented removal technologies (100%) (6/04)
- Identify promising technologies for removal (100%) (6/04)
- **FINAL PROJECT REPORT DISTRIBUTED JANUARY 2005.**

**Task Summary:**

- Distributed final report (1/05)

**Significant Findings:**

Chemical properties of <sup>99</sup>Tc and it's properties associated with other materials are poorly distributed and not readily available if documented.

Russian research and obscure DOE-complex research have indicated that some simple chemical-physical processes that are less complex than CVD are likely to be successful for the removal of <sup>99</sup>Tc from volumetrically contaminated metal.

Bench-scale testing to verify <sup>99</sup>Tc properties and removal from metal matrices are being developed and preliminary testing should be conducted beginning in early CY 2005.

BASED ON THE FINDINGS FROM THIS PROJECT TEAMS COMPLETION OF WORK, A RESEARCH AND DEVELOPMENT PROJECT FOR THE DEVELOPMENT OF <sup>99</sup>Tc/Ni DISTILLATION-SEPARATION PROCESS WAS INITIATED IN AUGUST 2005 AS PART OF KRCEE PHASE II ACTIVITIES.

## **8. UK – KGS & Geological Sciences Seismic Monitoring and Seismic Hazard Assessment Quarterly Report.**

April 25, 2005

### **Project Title:**

Enhancing Earthquake Monitoring and Assessing Seismic Hazard for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky\*

\*In budget information, earthquake monitoring and assessing seismic hazards are distinguished as separate projects. However, the co-PI's are the same individuals and the funding for these seismic-related projects was split between the co-PI's respective institutions - the UK-Kentucky Geological Survey and the UK-Department of Geological Sciences.

### **Projected Completion Date:**

September 2005

### **Percentage Completion to Date:**

90%

### **Project Goals:**

- To better monitor and locate earthquakes in the area
- To provide an independent and peer reviewed ground motion hazard assessment for the Paducah Gaseous Diffusion Plant (PGDP).

### **Project Team/Member Roles/Tasks:**

**Dr. Zhenming Wang**/Seismologist and Section Head/Geological Hazards, UK-Kentucky Geological Survey, **Co-PI**

**Dr. Edward W. Woolery**/Assistant Professor, UK-Department of Geological Sciences University of Kentucky, **Co-PI**.

**Dr. John Kiefer**/UK-KGS. Project Team member.

**Jim Kipp**/UK-KWRRI. Project Team member.

**Dr. Lindell Ormsbee**/Director, UK-KRCEE. Project Team member.

**Steve Hampson**/UK-KRCEE. General project management.

## **Project Activity Status:**

### **Seismic Monitoring**

Task 1. Installation of seismic stations in Jackson Purchase to enhance the existing seismic system network allows for monitoring of area micro-seismicity and the collection of seismic data directly related to and needed for ongoing and future DOE-PGDP activities. Data collected at this and other stations will provide information that will assist in the development of a database to characterize the amplification effect of near-surface soils on strong ground motion in the New Madrid Seismic Zone.

*Task(% Completion)(Completion Date/Projected Completion Date)*

- Identify new seismic station locations in the area (100%)(04/04)
- Contract driller for PGDP seismic station installation in WKWMA (100%) (3/04)
- Install WKWMA boreholes (100%) (4/04-8/04)
- Order PGDP seismic instruments (100%) (1/04)
- Completed installation seismic station at Paducah Airport (100%)(8/04)
- Completed installation seismic station in Lovelaceville (100%) (8/04)
- Implemented new Health and Safety and Notification procedures for PGDP work (1/05-3/05)
- Installed fence and electric for WKWMA seismic installation (100%)(1/05-3/05)
- Prepare seismic instruments for the station at WKWMA (100%) (1/05-3/05)
- Conducted in-situ velocity testing (100%)(3/2005)
- Began installation of seismic monitoring instruments at WKWMA (75%) (10/04-1/05)
- Complete WKWMA seismic station installation (50%)(4/05)

### **Seismic Hazard Assessment**

Task 1: Thorough literature review – There are many new developments and data in seismic hazard assessment methodology, geology, and seismology locally, regionally, and nationally. The focus will be on the new geological and geophysical investigations in the area. The literature review will ensure the use of the best data (i.e., source zonation and attenuation) and methodology for PGDP seismic related activities (90%)(9/30/05).

Task 2: Seismic source Characterization: Based on the information derived from Task 1, the seismic sources and attenuation relationship in and around PGDP will be defined (75%)(9/30/05).

Task 3: Probabilistic seismic hazard analysis (PSHA): PSHA will be performed based on the data from Task 2 (25%)(9/30/05).

Task 4: Deterministic seismic hazard analysis (DSHA): DSHA will be performed based on the data from Task 2 (25%)(9/30/05).

Task 5: Develop Preliminary report (60%)(9/30/05).

Task 6: Panel review: A 5-member review panel consisting of national and international experts will be formed to review the preliminary report (25%)(10/31/05).

## 9. UK-Geological Sciences PGDP Stratigraphic Model Project Quarterly Report

April 25, 2005

### **Project Title:**

Development of Conceptual Stratigraphic Model for the PGDP.

### **Projected Completion Date:**

September 30, 2005

### **Percentage Completion to Date:**

55%

### **Project Goals:**

- To develop a detailed, conceptual model of the stratigraphic framework at the PGDP

### **Project Team/Member Roles/Tasks:**

**Dr. Alan Fryar**/UK-Department of Geological Sciences, **PI**. Conduct background research, oversee collection of existing and field data, integrate data into compatible electronic model, prepare project reports, and coordinate budget.

**Dr. Steve Greb**/UK-Kentucky Geological Survey, **Co-PI**. Consult with PI to plan/interpret experimental plan. Assist with field work.

**Josh Sexton**/UK-Graduate Student. Perform daily tasks, organization of data, execution of field work relative to project goals.

### **Project Activity Status:**

*This project officially started July 1, 2005.*

- Participate in PGDP GW Modeling Team quarterly meeting (NA)(3/04 & 7/04)
- Identify existing information (95%)(09/05)
- Identify and recruit graduate student (100%)(4/04)
- Compile lithologic logs from site investigations in a Geographic Information System (GIS) using ArcView (55%)(9/05).
- Map exposures along Little Bayou and Bayou creeks and their tributaries (40%)(9/05).
- Correlate sedimentary facies in areal and cross-sectional views using ArcView, Surfer, and RockWorks 2002 (25%)(01/06)

## **Significant Findings:**

### **Field Mapping**

Fieldwork was conducted on March 14-16<sup>th</sup> by Josh Sexton with assistance provided by James Ward (UK). Steve Meiners (Tricord) and Steve Hampson (KRCEE) provided logistic and plant coordination assistance. During this field event, a survey was conducted to map the upper contact of the Upper Continental Deposits (HU2A) cropping out along Bayou Creek and Little Bayou Creek. Due to high water in Bayou Creek some survey locations were not accessible. Better coverage of geologic contacts was acquired along Little Bayou Creek from the plant's waterline crossing to the confluence of Bayou Creek and Little Bayou Creek. Additional activities included acquiring a PGDP plant badge and examining the surface geology of the soil borrow pits operated by the TVA Shawnee Fossil Plant.

### **Conceptual Model Development:**

Steve Hampson and Josh Sexton met several times over the quarter to discuss and incorporate additional boring logs into the digital well log database. Data input of gross lithology was aided by Prasad Manthana (UK/Civil Engineering) and an Excel macro to sort and qualify data was created by Pani Dhandayudha (UK/Civil Engineering). Over the quarter 60 additional wells were selected and entered into the database with emphasis placed on wells in Standard Municipal Waste Units (SMWU) of interest.

Comment [JLS1]: Spelling?

Steve Martin (KGS) met with Josh Sexton on April 15<sup>th</sup> to offer guidance for creating surface geologic maps and to discuss the regional geology of Western Kentucky.

Combining surveyed contact information with borehole information, surface and subsurface lithologies can now be correlated and mapped.

## 10. UK Agricultural Engineering Sediment/Contaminant Release Control Project

May 6, 2005

### **Project Title:**

Development and Design of Cost-effective, Real-Time Implementable Sediment and Contaminant Release Controls

### **Projected Completion Date:**

September 30, 2005.

### **Percentage Completion to Date:**

45%

### **Project Goals:**

- Provide soil/surface water/sediment transport model that will accurately predict soil/sediment and associated contaminant trends.
- Evaluate, design, assess and provide recommendations for surface water/sediment/contaminant control remedial options that will be cost effective and will be able to be implemented in real time.

### **Project Team/Member Roles/Tasks:**

**Dr. Richard Warner**/UK-Agricultural Engineering, Surface Mining Institute, LLC, **PI**. Lead project efforts.

**Dr. Lindell Ormsbee**/ Director, UK-KRCEE. Technical Advisor.

**Dr. John A. Volpe**/KRCEE-contractor. Provide technical and regulatory expertise for radioactive material issues.

**Dr. Mike Kemp**/Murray State University. Technical Advisor

**Steve Hampson**/UK, KRCEE. General project support.

### **Project Activity Status:**

*Activity (% Completion) (Projected Project Completion Date)*

- Obtain and review site maps for relevant environmental and engineering features (50%) (3/05)
- Obtain and review rainfall records for PDGP site and vicinity (90%) (3/05)

- Obtain and review soil, storm water, and sediment data for outfalls (30%) (3/05)
- Conduct review efforts to identify applicable readily-implementable, cost-effective storm water/sediment/contaminant control technologies (75%) (3/05)
- Prediction of hydrologic response (rainfall-runoff) for current conditions (20%) (6/05)
- Develop conceptual designs of alternative control systems (65%) (6/05)
- Provide report and design recommendations for outfalls (0%) (9/05)
- 

**Project Task Summary:**

- Identified alternative controls including weep berms, flocculation, and sand filters.
- Evaluated the potential performance of each of the above controls.
- Conducted preliminary hydrologic modeling of the 20 mm and the 2 yr 24 hr design storm.

**Significant Findings:**

- Need detailed description and dimensions of current surface water and sediment control facilities.
- The apparent lack of a digital terrain model or a contour map with 2-ft contours will require an approximate delineation of watershed and subwatershed boundaries.
- There is concern that there will not be sufficient space to locate a passive control system. Field reconnaissance is being scheduled to assess space limitations.
- Tradeoffs between surface water treatment and sub-surface water contamination are a design consideration.

**ACTIVE KRCEE-DOE Earmark PHASE II PROJECTS  
Quarterly Activity Reports**

## 11. UK Geological Sciences & KGS Field Determination of S & P Wave Velocities

May 15, 2005

### **Project Title:**

Field Determination of S & P Wave Velocities for Ground Motion Model Input at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Field Determination of S & P Wave Velocities for Ground Motion Model Input at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

### **Project Goals:**

- To obtain site-specific S- and P-wave velocity field measurements at the PGDP.
- To obtain field measurements of site specific soil damping properties at the PGDP.
- To provide measured P- and S-wave velocity models at each of the PGDP seismic monitoring sites.
- To provide accurate seismic models that reflect measured site specific S- and P-wave velocities and measured soil damping properties for the PGDP.
- Preliminary report and summary report summarizing the site specific P- and S-wave velocity models
- Preliminary report and summary report summarizing the measured damping properties of PGDP soils.
- Inclusion of site specific P- and S-wave velocity models and soil damping

### **Projected Completion Date\*:**

September 2005

\*Field activities relative to this project will be completed between January and April 2005 pending suitable weather.

### **Percentage Completion to Date:**

75%

### **Project Team/Member Roles/Tasks:**

**Dr. Zhenming Wang**/Seismologist and Section Head/Geological Hazards  
UK-Kentucky Geological Survey, **Co-PI**.

**Dr. Edward W. Woolery**/Assistant Professor, UK-Department of Geological Sciences, **Co-PI**.

**Dr. John Kiefer**/UK- KGS. Project Team member.

**Jim Kipp**/UK-KWRRI. Project Team member.

**Dr. Lindell Ormsbee**/ Director, UK-KRCEE. Project Team member.

**Steve Hampson**/UK-KRCEE. General project management.

**Project Activity Status:**

*Activity(% Completion) (Projected Project Completion Date)*

- Procure equipment (100%) (8/04)
- Conduct field measurements (50%) (04/05 – 08/05)
- Data Reduction and assessment (0%) (4/05 – 8/05)
- Preliminary report and summary report summarizing the site specific P- and S-wave velocity models (0%) (9/05)
- Preliminary report and summary report summarizing the measured damping properties of PGDP soils. (0%) (9/05)

## **12. UK-KRCEE Adaptive Sampling and Analysis Real-Time Remediation Project (“Real-Time Remediation” or “NDA” Project)**

April 15, 2005

### **Project Title:**

Field Demonstration Project for the Application of real-time survey and analytical methods (Non Destructive Analyses) for Cost Effective, Real-time Remediation of Surface Water, Sediment, and Soil at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

### **Projected Completion Date:**

October, 2005 – July, 2006.

### **Percentage Completion to Date:**

20%

### **Project Goals:**

1. To demonstrate the effectiveness of real-time survey and analytical methods to:
  - Identify sediment and soil requiring remediation in a section of Outfall 011 at the PGDP
  - Verify achievement of cleanup goals following remediation of a section of Outfall 011 at the PGDP
  - Provide WAC characterization that is both time and cost-effective relative to presently deployed methods at the PGDP
2. Provide a general cost & time comparison for the deployment of real-time survey and analytical methods and remediation completion versus historical methods previously and presently utilized for site characterization and for conducting remedial actions at the PGDP
3. Present concept and proposed plans to CAB, regulatory decision makers, and DOE/contractors
4. Present results and recommendations for future utilization of process for soil and sediment remediation at the PGDP
5. Involve the developers of EPA TRIAD and Argonne National Laboratory ASAP

### **Project Team/Member Roles/Tasks:**

**Steve Hampson**/Assistant Director, UK-KRCEE. Review of documents, methods, and contractors chosen for implementation of real-time characterization and cleanup demonstration.

**Dr. John A Volpe**/Technical Consultant, KRCEE. Conduct evaluation of methods for real-time site characterization and cleanup.

**Dr. Lindell Ormsbee**/ Director, UK-KRCEE. Technical Advisor.

**Dr. D. Joseph Hagert**/ Professor, UL- College of Engineering. Technical Advisor.

**Dr. Mike Kemp**/Professor, Murray State University. Technical Advisor

**Dr. Richard Warner**/UK-Agricultural Engineering. Technical Support.

**Mr. David Williams**/PGDP-RPM, Region IV EPA. Advisor.

**Mr. John Richards**/Region IV EPA. Mr. Richards will bring subject matter experience on related projects in Region IV and experience related to his role in the development of the multi-agency MARSSIM guidance.

**Mr. Tony Hatton**/EPPC, Assistant Director Division of Waste Management. Mr. Hatton will provide remedial and regulatory expertise as a member of the project team.

**Project Activity Status:**

1. KRCEE will develop a demonstration project utilizing real-time sampling, real-time analysis, and real-time cleanup of a section Outfall 011. A final status survey will employ statistical sampling of the remediated area to demonstrate utility of real-time methods and to confirm the attainment of cleanup goals.
2. KRCEE will develop sampling and analysis plans and quality assurance project plans to ensure the production of the quality data to support Data Quality Objectives.
3. KRCEE will utilize approaches developed by USEPA, DOE and DOE national laboratories to demonstrate the effectiveness of real-time assessment and cleanup of outfalls, ditches, and soils at the Paducah Gaseous Diffusion (PGDP).
4. The project will demonstrate utilization of appropriate radiation survey instruments, *in situ* gamma spectroscopy for radionuclides, head space measurement/in-field electron capture gas chromatography for volatile organics, and XRF technology for metals.

## **Task Summary:**

*Activity(% Completion) (Projected Project Completion Date)*

1. Internet and document search and reviews to evaluate the availability and applicability of adaptive sampling and analysis approach characterization, remediation, cleanup verification, and waste characterization methods applicable to soil and sediment remedial needs at the PGDP (100%)(01/05)
2. Internet search to find companies that have the capability to implement real-time survey mapping, and analysis procedures. A number of companies have the capability of conducting a radiation walkover survey utilizing coupled radiological survey and data positioning. Real-time methods utilized by various companies employ a GPS systems coupled to a survey meter that permits measurement, recording, and mapping of impact areas. In comparison to other technologies real-time survey and mapping technologies allow for greater areal coverage and complete site characterization versus traditional multiple phases of random location sampling and laboratory analyses.(75%)(07/05)
3. Requested a quotes from Canberra for in-situ gamma spectroscopy (50%)(07/05).
4. Review of DRAFT DOE G 441.1-XX, "CONTROL AND RELEASE OF PROPERTY WITH RESIDUAL RADIOACTIVE MATERIAL for use with DOE 5400.5, *Radiation Protection of the Public and the Environment*", April 2002 and applicable portions of MARLAP multi-agency guidance document (100%)(10/04).
5. Reviewed EPA Triad methodology and decision making documents and Argonne National Laboratory Adaptive Sampling and Analysis Program (ASAP) documents (100%)(10/04).
6. Reviewed Triad and ASAP remedial projects conducted at other sites and documented on the internet (75%)(09/04 – 07/05).
7. Contacted Argonne National Laboratories and began project discussions and contracting process (50%)(11/04 – 08/05).
8. Met with EPPC and EPA to provide information, discuss, gain acceptance and Project Team participation for concept and project (11/04 – 02/05)
9. Developed SW "Real-Time" Project Team Flowchart (100%)(02/05).
10. Presented SW "Real-Time" Project to PGDP CAB (100%)(03/05).
11. Developed templates for HASP, WP, Waste Mgmt Plan, QAPP (50%)(09/05).
12. Development of a final confirmation sampling approach utilizing Visual Sampling Program (50%)(09/05).

### 13. UK Chemical Engineering Nickel Distillation Project Quarterly Report

April 19, 2005

#### **Project Title:**

Engineering Research and Development for Cost-effective Distillation Technology to Accomplish the Separation of  $^{99}\text{Tc}/\text{Ni}$  and Decontamination of PGDP Nickel Ingots.

#### **Projected Completion Date:**

December 2005.

#### **Percentage Completion to Date:**

20%

#### **Project Goals:**

- Design and Construct Mass Spectrometer to generate physical and chemical property data for  $^{99}\text{Tc}$  and Nickel and other materials
- Investigate and document the chemical/physical characteristics of  $^{99}\text{Tc}$
- Investigate and document the chemical/physical characteristics Nickel
- Apply research findings to develop bench-scale distillation unit for the separation of  $^{99}\text{Tc}$  from nickel ingots
- Conduct bench scale experiments
- Apply research and bench scale experiment findings to the design of full-scale process

#### **Project Team/Member Roles/Tasks:**

**Dr. Eric Grulke**/UK-Chemical & Materials Engineering, **PI**. Lead project efforts.

**Louie El Asami**/UK-Chemical & Materials Engineering, Graduate Research Assistant. Conduct daily research & investigative efforts.

**Dr. Tony Zhai**/UK-Chemical & Materials Engineering, Metallurgy Technical Advisor

**Dr. Lindell Ormsbee**/ Director, UK-KRCEE. Technical Advisor.

**Mr. Bert Lynn**/UK-Chemical & Materials Engineering, Mass Spectrometer Expert. Will advise project team on MS design, procurement of materials, and will construct the specialized MS equipment.

**Dr. John A. Volpe**/KRCEE-contractor. Provide technical and regulatory expertise for radioactive material issues.

**Steve Hampson/UK-KRCEE.** General project support.

**Project Activity Status:**

(% Completion) (Projected Project Completion Date)

- Conduct research to construct specialized mass spectrometer.(100%) (11/03)
- Meetings with MS specialist to identify design parameters and suppliers (100%)(7/04 – 12/04)
- Submit equipment cost estimates (100%) (8/04)
- Begin procurement from suppliers (90%) (9/04 – 4/05)
- Visited NASA research facility in Ohio to observe Knudsen cell mass spectrometer installation (100%)(12/04)

**Task Summary:**

(% Completion) (Projected Project Completion Date)

- Construct MS/Knudsen Cell (50%)(4/05 – 7/05)
- Begin analytical tests (0%)(7/05 - 12/05)

**Significant Findings:**

TBD

#### **14. UK–KRCEE, UK Geological Sciences & KGS Holocene Issues Project Team**

May 4, 2005

##### **Project Title:**

Field Study and Peer Review for Determination of Holocene Displacement at the C-746-U Landfill at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

##### **Projected Completion Date:**

May - September, 2005

##### **Percentage Completion to Date:**

25%

##### **Project Goals:**

- To determine whether Holocene displacement has occurred along target zones associated with faults identified at the C-746-U landfill
- To provide an independent and peer reviewed report summarizing the results of the field investigation

##### **Project Team/Member Roles/Tasks:**

**Dr. Zhenming Wang**/ Seismologist and Section Head/Geological Hazards, UK-Kentucky Geological Survey, **Co-PI**

**Dr. Edward W. Woolery**,/Assistant Professor, UK-Department of Geological Sciences, **Co-PI**.

**Dr. Martitia Tuttle**/Tuttle and Associates. (formerly Univ. of Maryland). Project Team member-Independent Technical Review.

**Dr. Roy Van Arsdale**/University of Memphis. Project Team Member-Independent Technical Review.

**Mr. John Nelson**/ Illinois Geological Survey. Project Team.

**Mr. John Nelson**/ Illinois Geological Survey. Project Team.

**Dr. Bill Lettis, Dr. John Baldwin, Dr. Keith Kelsen** Lettis & Assoc. / Walnut Grove, Ca Project Team Members, Field Oversight Contractors

**Dr. Dave Amick** /SAIC-Augusta. Project Team.

**Mr. Marshall Davenport**/Jacobs Engineering, Oak Ridge. Project Team

**Steve Hampson**/UK, KRCEE. General project management.

**Project Activity Status:**

*Activity(% Completion) (Projected Project Completion Date)*

Task 1. Recruit project and Independent Technical Review (ITR) teams comprised of experienced national and international experts (100%)(03/05)

Complete Project Team/ITR Contracts (85%) (3/05 – 7/05)

Task 2. Hire experienced and qualified contractor to obtain DPT cores

Complete Project Team Contracts (25%) (3/05)

Task 3. Hire experienced field management team to oversee all aspects of fieldwork

Completed William Lettis and Associates contract for workplan development, background research, and field oversight (100%) (November 2005)

WLA Project Team background research conducted during November-March 2005 (50%) (3/05)

Began contracting process with SAIC-Paducah to provide field oversight manager to coordinate activities on-site (50%)(04/05 - 06/05)

Task 4. Complete review and submission of Readiness Review items

Readiness Review Requirements information package for UK-KRCEE was substantially completed by Bechtel Jacobs during the quarter (100%)(2/05)

KRCEE/UK review (50%)(2/05 – 6/05)

Pre-Submittal Meeting with Bechtel Jacobs (0%)(7/05)

Submit Readiness Review as complete package (80%)(3/05 – 07/05))

Task 5. Complete project scoping.

Discussions are ongoing with campus Project Team members and with WLA

Write workplan, Health and Safety plan and submittals (90%)( 3/2005 – 06/05)

Compile and distribute background information to technical contractors (50%)(01/05  
– 07/05)  
Plan and conduct field recon (50%)(04/05)

Task 6. Conduct field activities (Expected 4/05 – 9/05)

Task 7. Convene project team to write preliminary project report (Expected 04/05 - 09/05)

Task 8. Submit and revise project report based on ITR review (Expected 04/05 - 09/05)

Task 9. Final report for distribution and journal publication (Expected 04/05 - 09/05)

**Significant Findings:**

TBD