

KRCEE First Quarter DOE Report

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

April 23, 2004

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 grant project activities

Project Team/Member Roles/Tasks

Dr. Lindell Ormsbee/Acting Director KRCEE-UK. Direct KRCEE-DOE grant activities.

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

Dr. John A. Volpe/KRCEE Contractor. Provide technical and regulatory expertise for KRCEE-DOE grant projects.

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

Edwin Ebrahimi/KRCEE Financial Officer - UK . Provide support for KRCEE-DOE grant financial activities.

Anna Hoover/KRCEE-UK. Administrative support.

Project Status

Projected Completion Date: September, 2006

Percentage Completion to Date: Contractual arrangements with faculty and staff Project Teams that will conduct long-term projects related to DOE activities at PGDP are **80%** completed.

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

Project Activity Status Summary

- Completed initial discussions with DOE for scope of work.
- Identified initial tasks for grant contracts with faculty and staff.
- Identified, recruited and developed scopes of work and initial timelines for nine faculty unit contracts at UK, Murray State, and University of Louisville.
- Implemented contracts for faculty units.
- Completed initial document and data distribution for contract tasks.
- Identified initial timelines for contract tasks.
- Completed administrative background research and review of PGDP RFP.
- Completed administrative background research and review of ACO's & LOI.
- Completed administrative & technical background research and review for ACL's.
- Completed administrative & technical background research and review for TI waivers.
- Completed administrative background research and review for national and international material release criteria.
- Coordinated preparation and distribution of market available Nickel samples to USEC and CHS/REMS labs.
- Obtained and implemented use of VSP statistical sampling and analysis program November-December 2003
- Provided radioanalytical technical support for laboratory activities related to analysis of market-available Nickel at USEC and CHS/REMS labs.
- Provided technical support for the development of market-available Nickel SAP.
- Completed independent QC for CHS/REMS Nickel analytical data.
- Provide technical support for KPDES 001 toxicity issues to Ky. and USEC.
- Coordinated GW Project Team technical meeting February 2004.
- Coordination of KRCEE-DOE grant-wide Project Team meeting March 2004
- Coordinated site tour for SW/TMDL Project Team March 2004
- Began electronic distribution of documents starting January 2004
- Began implementation of ftp site for document and information distribution February 2004.
- Provided Seismic/C-746-U issues summary to DOE & regulators February 2004
- Provided SnT Landfill recommendation to DOE February 2004.
- Reviewed and provided comments for DOE RBES March 2004.
- Began implementation of sediment controls project team March 2004.

Project Path Forward

TASK (completion date)

- KRCEE-DOE grant-wide Project Team meeting (4/04)
- Meeting with DOE to discuss project needs (4/04)
- Obtain revised DOE timelines for projects (5/04)
- Obtain access permission to interface with contractors & site personnel (4/04)
- Sediment controls project team contract implementation (5/04)
- Identify Holocene issues project team (5/04)
- Finalize Holocene issues project team (6/04)
- Provide review comments for C-746-U landfill field investigation (5/04)
- Finalize QC activity for USEC market-available Nickel analyses (6/04)

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

April 23, 2004

Project Title

Development of Depleted Uranium Batteries

Project Goals

- Construct a battery with uranium dioxide as the cathode following characterization of uranium dioxide's electrochemical properties in various organic solvents/lithium salts commonly used in commercial battery industry.
- 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.

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.

Graduate Student Technician to perform daily repetitive experiments.

Project Status

Projected Completion Date: September, 2005

Percentage Completion to Date: 10%

Project Activity Status Summary

- Background research is completed.
- Uranium dioxide experimental design in progress
- Equipment and supplies have been ordered including: 1) Solartron 1250 FRA electrochemical cell; 2), lithium solvents/salts; 3) Z-plot electrochemical impedance spectroscopy software; and 4) lithium

Project Path Forward

Laboratory work related to the project will begin in June 2004

Significant Findings to Date

None until laboratory activities begin.

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

April 23, 2004

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/Department of Industrial and Engineering Technology-Murray State University, PI. Project administration, budget and schedule control, coordination with UK-KRCEE project management, primary lead on TMDL development.

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

Dr. Lindell Ormsbee/UK-KRCEE & College of Engineering. Technical advisor.

Jane Benson/Center for Reservoir Research and Department of Geosciences-Murray State University. Technical support on geographic information system operations and hydrologic model development and calibration.

John Hart /Department of Industrial and Engineering Technology-Murray State University. Technical support on computer systems

hardware/software, network management, and field monitoring instrumentation and equipment acquisition, installation, and operation.

Matt Phillips/Environmental Engineering Technology-Murray State University. Student technical support on hydrologic model data entry and water quality data analyses.

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

Tammy Boyd/Department of Geosciences-Murray State University. Student technical support on hydrologic model data input.

Project Status

Projected Completion Date: September 2005 (A final report for each project task).

Percentage Completion to Date: Projects and significant project tasks are identified below along with the percentage completion and the projected completion date as follows:

Project/Task (% Completion) (Projected Date of Completion)

1. Hydrologic Model Development and Calibration (1%) (10/04)

- Acquire Existing Plant Outfall and Creek Flow Data (5%) (6/04)
- Acquire Model Input Existing Data (5%) (6/04)
- Preliminary Model Development (0%) (7/04)
- Initial Model Calibration (0%) (8/04)
- Install Flow Measurement Equipment If Needed (0%) (9/04)
- Calibrate Model Based on Actual Measurements (0%) (11/04)

2. TMDL Development (0%) (7/05)

- Acquire Existing Water Quality Data (5%) (8/04 for bulk of data)
- Identify Waste Sources (1%) (8/04)
- Input Model Mass Loadings to Model (0%) (2/05)
- Allocate Mass Loadings (0%) (4/05)

- Final Model Calibration and Long Term Run (0%) (7/05)

Project Activity Status Summary

- Murray State University subcontract finalized March, 2004.
- Computer software and hardware identified and procurement process initiated.
- Identified and acquired available existing data for plant and watersheds.
- Identified procedures and protocols for TMDL development.
- Participated in meetings with UK and DOW personnel to discuss hydrologic model use and data input requirements, the level of detail needed for the specific TMDLs
- Access to OREIS database secured through DOW
- Site tour conducted to PGDP and watersheds
- Obtained access to RHTAB-USGS streamflow gauging station data for Big and Little Bayou Creeks

Project Path Forward

- DOW will be providing additional water quality data.
- Meeting with DOW personnel to obtain outfall discharge information
- Complete acquisition of plant outfall and streamflow data
- Initiate flow model development

Significant findings to date

During a site tour that involved inspection of the plant outfalls and the creeks, three active USGS gauging stations (upstream and downstream of most of the facility on Bayou Creek and downstream on Little Bayou Creek) were identified. These stations will be of benefit when calibrating the hydrologic model.

Furthermore, flow measuring devices were observed at each outfall. If existing flow data are available or if new data can be obtained, preparation of the plant water budget will be simplified.

4. University of Louisville Groundwater & Burial Ground Project Report

April 16, 2004

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.

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

Project Status

Percentage Completion to Date: Projects and significant project tasks are identified below along with the percentage completion and the projected completion date as follows.

Project Tasks (% Completion)(Projected Project Completion Date)

1. Landfill waste characterization and source evaluation (25%) (9/30/2004)

- Project 1A: Characterize the wastes in the S&T landfill and in other landfills on the PGDP site.
- 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.
- 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 (10%) (12/31/2004)

- Project 2A: review and critique the process by which prior decisions were made relevant to groundwater remediation.
- 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 (0%) (9/30/2005)

- 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 Summary (Date of Activity)

- Meeting w/KRCEE-UK to discuss contract tasks (11/03)
- Received initial groundwater and burial ground project documents and data (1/04)
- Completed review of SnT RI Scoping Package (2/04)
- Completed review of SnT Landfill Site Investigation Workplan (2/04)
- Completed review of 1999 TCE/99Tc Contamination in the RGA (2/04)
- Participated in GW Project Team technical meeting (2/04)
- Completed review of the GW Conceptual Model Document (3/04)
- Completed review of 2001 TCE/99Tc Contamination in the RGA (3/04)
- Completed review of C-746 SnT Landfills Baseline Sampling Events 1 & 2 for the New Monitoring Well Network (3/04)

Project Path Forward (Date of Activity)

- Investigate well control to E of SnT to assess RGA flow thru area or radially from area (4/04 - 5/04).
- Obtain clarification on basis for plume maps in RGA contamination mapping documents and in individual project documents (4/04 - 6/04).
- Obtain and begin review of additional groundwater data/interpretation documentation including Ph I and II investigations, GW Ph III/IV Investigations, GW FS, DOE & Fryar LBC-GW studies, NE/NW Plume Investigations (6/04 - 9/04).
- Obtain all boring logs for SnT (6/04)
- Produce lithofacies cross sections or fence diagrams showing relationships of wells in nests and relationship of wells to stratigraphy/hydrostratigraphy in order to provide information relative to lateral UCRS flow at the SnT complex. (6/04 - 7/04).
- Produce isoconcentration cross-sections by sampling date to show relationships of contamination to monitoring location, stratigraphic/hydrostratigraphic and disposal cell features (7/04 - 8/04).
- Obtain clarification on monitoring well surface/casing/well screen datum (6/04).
- Obtain clarification on landfill cell construction details and waste streams (6/04).
- Begin assembly of data for chemical & hydro-geochemical evaluation of disposal cells (6/04 - 9/04).

Significant findings to date

- Monitoring well datum is different for several new monitoring wells from one SnT baseline sampling event to another and needs clarification for evaluation of water levels and flow potential.
- Datum basis for maps depicting contaminant plumes needs to be clearly identified for all mapping published across documents.
- SnT investigation soil samples should be obtained from target intervals beneath the landfill for evaluation of target chemicals/rad.
- SnT investigation soil samples should be discrete and not composite as described in the SAP.
- Future investigations conducted to determine breach, leach and transport (BLT) from the landfill should utilize borings through the landfill or angular borings to UCRS locations under the landfill in order to confirm or deny BLT and in order to characterize existing UCRS water quality beneath the landfill.
- Pump tests utilizing SnT wells would provide valuable data of RGA in vicinity of the SnT.

- Based on statements regarding the chronological disposal of waste in various SnT landfill cells and on the nature of the disposed waste the source for 99 Tc at the SnT is most likely not the SnT landfill cells.
- Based on RGA contaminant mapping documents and the data available for the SnT landfills, the C-616 lagoons and NSDD are more likely sources of mapped RGA groundwater contamination at the SnT than the landfill cells.
- Additional monitoring wells are needed in UCRS and RGA N of the C-616 Lagoons to verify inferred interpretations of the NWP contaminant distributions in the area and relative to SnT.
- Historical 99 Tc, TCE, and Cr SnT data shows much higher levels and extremely higher frequencies of detection in the RGA than the UCRS. IF UCRS flow at this site is downward, THEN THE DATA INDICATES THAT SOURCES ARE EXTERNAL TO THE SnT CELLS.

5. UK/CE Groundwater Modeling Project Quarterly Report

April 16, 2004

Project Title

Groundwater Modeling

Identification of Project Goals

- Evaluate the adequacy of existing groundwater models at the site.
- Recommend necessary improvements to the models.
- Evaluate the potential use of natural attenuation for addressing off-site dissolved phase groundwater contaminants.
- Use the models to evaluate the efficiency of proposed groundwater remediation plans.

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/KRCEE - Project Manager

Dr. Lindell Ormsbee/UK-KRCEE & College of Engineering. Technical Advisor

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

Jagadeesh Anmala - Visiting Faculty, University of Kentucky, Provide Technical and Modeling Support

Jim Kipp - Director/KWRRRI, Provide technical and administrative support

Project Status

Projected Completion Date: September, 2005

Percentage Completion to Date: Approximately 17.5%

Project Activity Status Summary

Activity(% Completion)(Projected Project Completion Date)

- Finalize reviews, evaluations, and recommendations from ongoing UK groundwater modeling activities for the PGDP site. (30%)(07-31-2004)
- Compile prior work (9/03-2/04)
- Meeting with GW project team to discuss modeling & identify concerns (2/04)
- Review PGDP modeling reports & projects with modeling component (2/04-3/04)
- Compile brief history of PGDP modeling efforts (2/04)
- Begin compilation of baseline modeling effort report (9/03-3/04)
- Provide modeling assessment for a range of groundwater remedial approaches including natural attenuation, hydraulic containment, pump & treat, and source/dissolved phase removal/treatment. (20%) (06-30-2005)
- Begin runs for hypothetical Pump & Treat options for TCE (9/03-3/04)
- Assess P&T scenarios effects on contaminant distribution over time (1/04-3/04)
- Provide modeling assessment for the efficiency and expected performance of proposed groundwater remediation plans. (20%) (12-31-2004)
- Preliminary simulations of barrier wall installation(s) (1/04-3/04)
- Provide an assessment of the adequacy of the USACOE web-based groundwater model for the PGDP. (0%) (06-30-2005)

Project Path Forward

Activity (Date)

- Complete write up of UK baseline modeling efforts (4/04-7/04)
- Meet with GW and GW Modeling Project Teams to discuss historic doc review (5/03)
- Begin compilation of natural attenuation simulations (6/04)
- Obtain and verify groundwater withdrawals from TVA & vicinity (6/04)
- Evaluate boundary condition effects on current vicinity & SWMU scale models (7/04)
- Begin simulations and documentation of groundwater conditions when plant activities cease under a number of possible remedial scenarios (7/04)

Significant Findings

The effects of boundary conditions on the results of modeling runs conducted to assess various remedial options for the Uranium Burial Ground are in question and will be further evaluated through modeling simulations.

A modeling study pertaining to pump and treat approach for removal of TCE was undertaken. Based on the preliminary findings it might be concluded that a pump and treat approach can reduce the TCE levels significantly over a 40-50 year period in the off-site portions of the NW & NE plumes. However, preliminary simulations indicate that an extensive pump and treat capacity is required to effectively mitigate the off-site portions of the plumes. Further investigations utilizing a final UK validated groundwater model with appropriate boundary conditions are necessary to corroborate the results from this preliminary study.

6. UK-Paducah Chemical Engineering Nickel Project Quarterly Report

April 9, 2004

Project Title

Purification and Recovery of Radiologically-Contaminated Metals.

Projected Completion Date

October, 2004

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 an 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

Project Task (% Completion) (Projected Project Completion Date)

- Attend PACROE meetings about salvage of volumetrically contaminated Ni ingots at PGDP (80%) (8/03-3/04)
- 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 (80%)(9/03)
- Review ER pilot demonstration data (100%)(9/03)
- Samples prepared and distributed to laboratories (100%)(10/03 - 11/03)
- Participated in meetings at UK CVD lab (100%)(12/03)
- Track sample analysis (100%)(12/03 - 3/04)

Project Path Forward

- Complete independent QC of laboratory analytical data (6/04)
- Compile & Evaluate Data & Write report (6/04 - 7/04)
- Prepare Laboratory Data Summary report (7/04)
- Attend CVD bench-scale demonstration in W. Va. (6/04)
- Evaluate CVD Bench Scale Results (8/04)

Significant Findings:

MCL's or release criteria have not been developed for release of nickel or other volumetrically contaminated metals. Therefore, participating laboratories analyzed the market available Ni samples so that isotopic activities below background levels could be detected.

Internal duplicates and spike were performed at a rate of one per ten samples.

Because of current government and DOE release policies, any technology potentially applicable for the removal of radioactive material from volumetrically contaminated stock must be judged upon its ability to remove radionuclides to activities at or below background levels and/or activities below laboratory detection limits.

7. UK Chemical Engineering Nickel Project Quarterly Report

April 23, 2004

Project Title

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

Projected Completion Date:

June 30, 2004

Percentage Completion to Date: 50%

Project Goals

- Provide standard preparation of market available Ni for distribution to laboratories conducting analyses.
- Investigate the chemical characteristics ^{99}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}Tc from volumetrically contaminated material.
- Provide recommendations for bench scale study to evaluate removal of ^{99}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/UK-KRCEE & College of Engineering. 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

Project Task (% Completion) (Projected Project 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 (% NA) (10/03, 11/03, 2/04)
- Conduct research into documented removal technologies (60%) (6/04)
- Identify promising technologies for removal (60%) (6/04)

Project Path Forward

Activity (completion date)

- Complete all tasks above (6/04)
- Provide summary report for market use and removal technologies (6/04)
- Provide recommendation for bench scale technology evaluation (6/04)

Significant Findings

Chemical properties of ^{99}Tc and its 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 ^{99}Tc from volumetrically contaminated metal.

Bench-scale testing to verify ^{99}Tc properties and removal from metal matrices are being developed and preliminary testing should be conducted by 9/04.

8. UK - KGS & Geological Sciences Seismic Monitoring and Seismic Hazard Assessment Quarterly Report.

April 23, 2004

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

October, 2005

Percentage Completion to Date: 25%

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)

Kentucky Geological Survey, University of Kentucky, Co-PI

Dr. Edward W. Woolery, Assistant Professor, 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/UK-KRCEE & UK College of Engineering . Project Team member.

Steve Hampson, UK/KRCEE. General project management.

Project Activity Status

Project Task (% Completion) (Projected Project Completion Date)

Installation of seismic stations in Jackson Purchase to enhance the existing seismic system network allow for monitoring of area micro-seismicity and the collection of seismic data directly related to and needed for ongoing and future DOE-PGDP activities.

- Contract driller for PGDP seismic station installation in WKWMA (100%) (3/04)
- Install WKWMA boreholes (0%) (4/04-5/04)
- Order PGDP seismic instruments (100%) (1/04)
- Paducah seismic station installation
- Identify new seismic station locations in the area.

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 and methodology for PGDP seismic related activities.

- Seismic source Characterization: Based on the information derived from Task 1 and 2, the seismic sources in and around PGDP and their characteristics will be defined.
- Probabilistic seismic hazard analysis (PSHA): PSHA will be performed based on the seismic source data from Task 3.
- Deterministic seismic hazard analysis (DSHA): DSHA will be performed based on the seismic source data from Task 3.
- Develop Preliminary report.
- Panel review. A 5-member review panel consisting of national and international experts will be formed to review the preliminary report.

Project Path Forward

Activity (completion date)

- Complete all tasks above (6/04)
- Provide summary report for market use and removal technologies (6/04)
- Provide recommendation for bench scale technology evaluation (6/04)

Significant Findings

Chemical properties of ^{99}Tc and its 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, less complex than CVD, are likely to be successful for the removal of ^{99}Tc from volumetrically contaminated metal.

Bench-scale testing to verify ^{99}Tc properties and removal from metal matrices are being developed and preliminary testing should be conducted by 9/04.