

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: Preliminary Investigation of Beneficial Uses of Kingston Ash Material

Activation Amount: \$12,000.00

Agency: Tennessee Department of Transportation

Personnel:

PI - L. K. Crouch, Civil and Environmental Engineering

Senior Personnel - Daniel Badoe, Civil and Environmental Engineering

Senior Personnel - Lenly Weathers, Civil and Environmental Engineering

Support Personnel - Anthony Greenway, Energy Center

Support Personnel - Jeffrey Holmes, Civil and Environmental Engineering

Abstract:

The recent spill of impounded ash materials near Kingston, Tennessee, was certainly unexpected and unfortunate. Although this is not a clear moral imperative to render emergency assistance like a flood, fire, or other life threatening situation, it does appear that an agency of the "volunteer" state would choose to render assistance if possible. The spill provides an opportunity to test our commitment to sustainability while helping others in our state. Tennessee Department of Transportation (TDOT) is the largest user of most construction materials in Tennessee; and if truly committed to sustainable construction practices, should investigate possible beneficial uses of this material prior to consideration of more typical and less "green" disposal methods. However, we cannot allow environmental concerns and the desire to render assistance to compromise material performance-safety of the motoring public is a TDOT primary goal. Further, the magnitude of this spill requires that multiple beneficial uses be investigated since it is unlikely that any one application will require sufficient volume. The research team proposes four possible beneficial use possibilities: 1) supplementary cementing material/aggregate replacement for flowable fill; 2) supplementary cementing material for concrete; 3) subgrade and aggregate base course stabilization admixture; and 4) embankment material.

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From: 1/1/10 to 1/31/10

Project Title: Optimum Air Content Range (Plastic and Hardened) for TDOT Class D PCC

Activation Amount: \$12,000.00

Agency: Tennessee Department of Transportation

Personnel:

Co-PI - Benjamin Mohr, Civil and Environmental Engineering

PI - L. K. Crouch, Civil and Environmental Engineering

Senior Personnel - Daniel Badoe, Civil and Environmental Engineering

Senior Personnel - Jane Liu, Civil and Environmental Engineering

Support Personnel - Anthony Greenway, Energy Center

Support Personnel - Jeffrey Holmes, Civil and Environmental Engineering

Abstract:

Some federal sources have suggested that a higher air content than currently specified in TDOT bridge deck concrete would improve the durability of bridge decks. However, some Tennessee concrete producers have expressed concern about the effects of the higher air content on obtaining the specified compressive strength of 4000-psi at 28 days. Further, it has been suggested that the measured plastic and hardened air contents may differ significantly. A study is needed to determine the possible advantages and disadvantages of various air contents in TDOT bridge deck concrete as well as the agreement between plastic and hardened air content determinations. The study needs to be conducted using typical Tennessee materials and a typical TDOT bridge deck mixture design over a wide range of air contents to be relevant. The primary benefit to TDOT is increased service life and improved performance of bridge decks. The increased service life and improved performance decrease maintenance and replacement costs. Further, longer service life and improved performance reduce maintenance incursions into traffic thus reducing congestion and delays. Finally, and perhaps the most importantly, improved performance (less reinforcement corrosion) increases the safety of traveling public. Second, less frequent maintenance and replacement of bridge decks lowers TDOT carbon footprint by using less Portland cement. Third, a less evident benefit is team building and increased cooperation. By investigating federal and industry points of view, TDOT is increasing team building and fostering a beneficial cooperative working atmosphere.

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From: 1/1/10 to 1/31/10

Project Title: Ivanhoe Fellowship-Siddique Akbor

Activation Amount: \$5,000.00

Agency: The Ivanhoe Foundation

Personnel:

PI - Faisal Hossain, Civil and Environmental Engineering

Abstract:

The purpose of this project is to understand how the proposed space mission called Surface Water and Ocean Topography (SWOT) that is due for launch in 2016 can be beneficial for water management in Bangladesh. SWOT is a proposed mission that aims to provide information on river flow for major rivers of the world every 3-10 days. Knowledge of global discharge is poor today. In particular, for Bangladesh, such knowledge stands to improve the flood forecasting lead time (which is three days) to seven days if SWOT can provide upstream river flow information on Ganges and Brahmaputra river from the Indian and Nepal regions. Although the concept is exciting and there is tremendous potential, SWOT needs rigorous assessment for the case of Bangladesh. In this regard, this project will use a hydraulic model called HEC-RAS to simulate water levels from a hydrologic model that simulates flow. Consequently, these water levels will be used in a program with Ohio State University called "virtual SWOT" to understand how accurate SWOT will be for measurement of river flow for Bangladesh.

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From: 1/1/10 to 1/31/10

Project Title: Benthic Macroinvertebrate Assessment Associated with Brook Trout Restoration of Lynn Camp Prong, GSM

Activation Amount: \$24,075.00

Agency: Great Smokey Mountains National Park

Personnel:

PI - Bradford Cook, Biology

Abstract:

The objective of this work is to collect aquatic macroinvertebrate samples from a statistically valid number of sites to characterize the community prior to treatment with antimycin in 2008. Samples are to be collected quarterly. Tasks associated with this project include: 1) measure physical macro-habitat features of each site-these measurements will delineate pool, riffle, glide, cascade and run habitat; measurements of width and depth will be taken for each unit; 2) substrate composition will be determined; 3) benthic macroinvertebrate communities will be sampled quarterly and identified to the lowest taxonomic level possible-if necessary, taxa that cannot be identified to the appropriate taxonomic level will be sent to an expert for that taxonomic group identification; and 4) each sample will be sorted and sub-sampled to approximately 200 organisms. Tennessee Department of Environment and Conservation protocols for sampling benthic macroinvertebrates and appropriate quantitative techniques (i.e., modified Hester Dendy samplers and drift nets) will be used to sample and assess the benthic macroinvertebrate community at each site. Sample analyses will include the Tennessee Department of Environment and Conservation protocols for analyses of benthic macroinvertebrates and compared to metrics from reference streams.

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: ITQ - Supporting the New High School Geometry Standards: Focus on Processes and Technology

Activation Amount: \$74,703.00

Agency: Tennessee Higher Education Commission

Personnel:

PI - Holly Anthony, Curriculum and Instruction

Senior Personnel - Andrzej Gutek, Mathematics

Senior Personnel - David D. Smith, Mathematics

Senior Personnel - Rafal Ablamowicz, Mathematics

Senior Personnel - Shelly Forgey, Mathematics

Abstract:

This project will provide 36 contact hours (with the option of an additional 6 hours) of professional development focused on the new high school geometry standards, in particular the process standard and the use of technology (including Geometer's SketchPad, Maple, and TI-Nspire graphing calculators). The project will be limited to 20 participants with priority given to teachers in high-need districts. The workshop series will emphasize the development of mathematics content via investigations, problem solving, hands-on and group activities, and use of manipulatives/technologies.

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: Tennessee Small Business Development Center at TTU 2010

Activation Amount: \$77,696.00

Agency: Tennessee Small Business Development Center

Personnel:

PI - Vicki Henley, Small Business Development Center

Support Personnel - Charlotte Gentry,

Support Personnel - Jennifer Dangelo,

Abstract:

Tennessee Small Business Development Center funds for 2010

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: Tennessee 3-Star Industrial Assessment Center: Recovery Act Proposal for Enhanced Assessments and Technical Assistance

Activation Amount: \$125,000.00

Agency: U. S. Department of Energy

Personnel:

Co-PI - Kenneth Currie, Manufacturing Center

PI - Glenn Cunningham, Mechanical Engineering

Abstract:

Through the American Recovery and Reinvestment Act of 2009 (ARRA), TTU's Industrial Assessment Center (IAC) will provide enhanced energy efficiency assessments to manufacturers. In addition to regular IAC-type assessments, these enhanced assessments may include activities such as partnership with state government and utilities to assist the client in cost savings, including rebates; pre-assessment surveys targeted at small to medium sized industrial facilities; or multiple-day assessments for larger facilities with additional pre-assessment information to target projects where the clients would require additional assistance in implementing energy efficiency strategies. Under this program, the IAC will also perform Technical Assistance events for selected previous IAC clients. These events will provide additional support to increase adoption of recommended savings opportunities over and above the past assessment implementation results. This could include collaborations with state organizations, utilities, vendor analyses, identification of renewable energy opportunities, or increased analysis and business case development with the objective of increasing implementation and enhancing the energy efficiency of the client.

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: Multi-Level Energy Storage and Controls for Large-Scale Wind Energy Integration

Activation Amount: \$131,309.00

Agency: U. S. Department of Energy

Personnel:

PI - Wenzhong Gao, Energy Center

Support Personnel - Anthony Greenway, Energy Center

Support Personnel - Robert Craven, Energy Center

Abstract:

The objectives of the project are to design innovative energy storage architecture and associated controls for high wind penetration; perform modeling, simulation and analysis of power systems with large-scale wind power and the new energy storage technologies; develop laboratory-scale verification prototypes of wind power generation systems with the new storage concepts. For the research and development work, theoretical study, computer modeling and simulation, and experimental laboratory prototyping will be pursued. The outcome of this project will increase reliability and market acceptance of wind power for Smart Grid applications. The developed modular energy storage technology can be commercialized for job creation in the wind industry. The project will advance the state of the art of utility wind integration technology and have significant impact in our nation's agenda of grid modernization.

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: Incorporating the Geography of Muslims and Islam into Social Studies

Activation Amount: \$2,500.00

Agency: National Council for the Social Studies

Personnel:

Co-PI - Amanda Richey,

Co-PI - Melissa Creek, Curriculum and Instruction

PI - Lisa Zagumny, Curriculum and Instruction

Abstract:

The program is a workshop for the 2010 Tennessee Council for Social Studies annual conference. The objective of the program is twofold: 1) to integrate the geography of Muslims and Islam into middle school social studies, and 2) to equip middle school social studies teachers with authentic multicultural tools to enhance geographic literacy in their classrooms and curriculum. Conference registration will be paid for the first 20 participants to register for the workshop. They will also receive five student tradebooks and a copy of *Geography for Life* in addition to a packet and DVD of supplemental materials available for all workshop participants. The program will blend National Geography Standards into curriculum standards for social studies. By connecting these standards with lesson plans that address Muslim and Islam, we will provide middle school social studies teachers with practical skills and knowledge that are transferrable to their respective classrooms.

Grants Awarded Report

From: 1/1/10 to 1/31/10

Project Title: Monitoring Groundwater Hydrology and Selected Plant Communities at the Three Rivers Mitigation Bank

Activation Amount: \$16,260.00

Agency: Tennessee Wildlife Resources Agency

Personnel:

Co-PI - Kenneth Morgan, Biology

PI - Thomas Roberts, Biology

Abstract:

This study is designed to monitor the hydrology and plant community development at a 760-acre bottomland hardwood restoration site in Obion County, Tennessee. In May 2007 three permanent vegetation-monitoring plots were established in representative areas within each of four elevation zones present. Vegetation sampling was conducted in September. Data collected included species composition, percent cover by species, and tree density. One water level sensor and data logger were installed in one groundwater well located in each zone. The sensors are designed to measure water levels using a pressure transducer. Soils samples were taken within each plot and evaluated to determine if they met the standards for being considered hydric. The hydrology, vegetation, and soil data confirmed that the three lower zones within the project area were jurisdictional wetland. The hydroperiod of the highest zone was not sufficient to meet the criteria for "wetland hydrology." Additional monitoring during periods of normal rainfall are needed to further evaluate the status of this zone.