

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Polymer Microcapsule Pesticide Product Imaging and UV Degradation

Activation Amount: \$19,974.00

Agency: Syngenta Corporation

Personnel:

PI - Holly Stretz, Chemical Engineering

Abstract:

The purpose of this project is to provide polymer microcapsule pesticide product imaging and UV degradation testing.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Center for Energy Systems Research Carryover from 2009-10

Activation Amount: \$154,364.00

Agency: Tennessee Higher Education Commission

Personnel:

PI - Sastry Munukutla, Energy Center

Abstract:

2009-10 carryover funds for Center for Energy Systems Research.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Agricultural Education Inservice Program 2011-15

Activation Amount: \$11,598.00

Agency: Tennessee Department of Education

Personnel:

PI - David C. Frazier, Agriculture

Abstract:

This project will provide professional development of high school Agricultural Education teachers.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Child and Adult Care Food Program 2010-11

Activation Amount: \$33,264.00

Agency: Tennessee Department of Human Services

Personnel:

PI - Matthew Smith, Curriculum and Instruction

Support Personnel - Amanda Taylor, Curriculum and Instruction

Support Personnel - Angie Smith, Child Development Laboratory

Abstract:

TTU will provide all services as required for the child and/or adult nutrition program funded by the state of Tennessee Department of Health and Human Services.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Social Norms Media Campaign 2010-11

Activation Amount: \$2,539.00

Agency: TICUA

Personnel:

PI - Patricia Smith, Counseling Center

Abstract:

To assist in the TICUA campaign related to alcohol and other drug prevention on TTU's campus during 2010-11.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Center for Manufacturing Research Carryover-2009-10 Budget

Activation Amount: \$5,139.00

Agency: Tennessee Higher Education Commission

Personnel:

PI - Kenneth Currie, Manufacturing Center

Abstract:

State carry over funds from 2009-10.

Grants Awarded Report

From: 8/1/10 to 8/31/10

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

Activation Amount: \$10,000.00

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.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: TBR-Ready2Teach Statewide Marketing

Activation Amount: \$10,000.00

Agency: Tennessee Board of Regents

Personnel:

PI - Kevin Liska, Business Media Center

Abstract:

Develop, revise and maintain the Ready2Teach website.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Simplified Live Load Distribution Factor Equations for Tennessee Highway Bridge Design

Activation Amount: \$6,500.00

Agency: Tennessee Department of Transportation

Personnel:

PI - Sharon Huo, Civil and Environmental Engineering

Abstract:

The main objective of the proposed research is to propose new TDOT distribution factor equations by evaluating and simplifying the National Cooperative Highway Research Program (NCHRP) 12-62 distribution factor equations while maintaining the accuracy of the calculations. To pursue this objective, a bridge database that consists of actual Tennessee bridges of various bridge types and a group of hypothetical bridges with structural parameters exceeding the applicable ranges of applicability will be assembled. Simplified distribution factor equations will be proposed based on the evaluations of the results of the NCHRP and AASHTO LRFD equations as well as the results of rigorous analysis of selected bridges in the bridge database. The new questions, with a simplified procedure, will bring economic benefits by minimizing the time, effort, and possibility of making mistakes with refined analysis and give bridge engineers the flexibility to design bridges with structural parameters outside the range of applicability restricted in AASHTO LRFD specifications.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Algebraic Hierarchical Matrix Preconditioners for Two- and Three-Dimensional Saddle Point Problems

Activation Amount: \$50,945.00

Agency: National Science Foundation

Personnel:

PI - Sabine Le Borne, Mathematics

Abstract:

This project deals with the development, analysis and implementation of novel techniques for the solution of large, sparse linear systems of equations of saddle point type. Despite much recent progress, the solution of large systems of equations remains one of the main bottlenecks in many numerical simulations. Applications include fluid dynamics, magnetohydrodynamics, image processing, and many more.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Monitoring the Plant Community at the Yuchi Waterfowl Project

Activation Amount: \$5,181.00

Agency: Tennessee Wildlife Resources Agency

Personnel:

Co-PI - Kenneth Morgan, Biology

PI - Thomas Roberts, Biology

Abstract:

The TWRA will construct an impoundment on a small, unnamed drainage adjacent to the Tennessee River in Rhea County, Tennessee. The purpose of this project is to provide flooded habitat that would benefit waterfowl during a period of the year that the Tennessee Valley Authority draws the lake level down to its winter pool elevation thereby eliminating flooding drainages such as occur at Yuchi. Data collected will serve to determine what, if any, changes occur to the existing forest community as a result of the impoundment.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Modeling the Hydrologically-Relevant Features of Uncertainty of NASA's High Resolution Precipitation Products for Advancing Global Applications Over Ungauged Regions (Ling Tang)

Activation Amount: \$27,600.00

Agency: NASA (NESSF Program)

Personnel:

PI - Faisal Hossain, Civil and Environmental Engineering

Abstract:

In the post 2013 era of the NASA's Global Precipitation Measurement (GPM) mission, high resolution precipitation products (HRPP) from satellites will become increasingly common for various global hydrologic applications overland (such as flood detection using distributed models). For advancing the application of these datasets, the associated uncertainty information will therefore be critical for users to understand the realistic limits to which these HRPPs can be applied over an ungauged region. However, this represents a paradox. Satellite rainfall uncertainty estimation requires ground validation (GV) data. On the other hand, satellite data will be most useful over ungauged regions in the developing world that are lacking in GV data. The primary objective of this proposal is therefore to reconcile this paradox with the motivation to further unleash the potential of NASA's HRPPs for the developing world. This will be achieved as follows: 1) First, pertinent spatio-temporal characteristics of satellite rainfall uncertainty will be mathematically modeled as a function of season and location using a nine year archive of NASA's TRMM Multi-satellite Precipitation Analysis (TMPA) precipitation data. This step will help understand the spatial extent of the error regime and then evolve to a Koppen-type climatologic classification system for uncertainty; 2) second, a geostatistical mapping scheme will be developed and tested for spatial interpolation of error information from small-domain GV regions to the vast ungauged regions. Two important science questions are hoped to be answered through this project as follows: 1) how much climatologic classification of error regime is possible for characterizing uncertainty of NASA's HRPPs?; 2) if "error" is defined on the basis of ground validation (GV) data, then how can uncertainty be estimated for NASA's global rainfall data products without the need for extensive GV data?

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: CCLI: Expanding the use of the CAT: Assessing and Improving Critical Thinking

Activation Amount: \$506,831.00

Agency: National Science Foundation

Personnel:

Co-PI - Ada Haynes, Sociology and Political Science

Co-PI - Michael Redding, Biology

PI - Barry Stein, Counseling and Psychology

Senior Personnel - Anthony Baker, English

Senior Personnel - Glenn Cunningham, Mechanical Engineering

Senior Personnel - Jann Cupp, Counseling and Psychology

Senior Personnel - Joseph Biernacki, Chemical Engineering

Senior Personnel - Sharon Berk, Water Center

Senior Personnel - Thomas Timmerman, Decision Sciences and Management

Abstract:

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: RUI: Controlling the Properties and Performance of Concrete Using Computer Aided Molecular Design

Activation Amount: \$103,430.00

Agency: National Science Foundation

Personnel:

Co-PI - Donald Visco, Chemical Engineering

PI - Joseph Biernacki, Chemical Engineering

Abstract:

Modern concrete is no longer portland cement, aggregate and water but may include sophisticated additives known as admixtures. These chemicals are designed to modify specific properties of the concrete including those that make it easier to place the fresh, fluid concrete, alter the hardening process and improve the resulting hardened properties. A team of researchers at Tennessee Tech University (TTU) propose to use computer-aided molecular design (CAMD) to invent new and non-intuitive admixtures for concrete. CAMD is an approach that enables the discovery of new molecules from the behavior of known substances. The team will be collaborating with colleagues from the National Institute of Standards and Technology (NIST) as well as industrial partners from W. R. Grace. Inventing new admixtures for concrete promises to improve the life cycle performance and reduce the cost of using concrete for a wide range of infrastructure applications. Since production of portland cement is responsible for about 7% of the world's carbon dioxide emissions, anything that can be done to reduce the amount of concrete used, by extending service life for example, would benefit society and reduce the burden of green house gas emissions on the environment. The research team at TTU also recognizes that CAMD is an important and enabling technology for future scientists and plan to work with regional high school teachers to develop modules that help pre college age students to learn about the science behind CAMD and the powerful benefits of using such tools.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Nanoscale Characterization of Expansion Due to Delayed Ettringite Formation

Activation Amount: \$75,716.00

Agency: National Science Foundation

Personnel:

PI - Benjamin Mohr, Civil and Environmental Engineering

Abstract:

The primary objective of this research is to investigate the nano- and micro-scale mechanisms of late age ettringite formation and how these mechanisms relate to macro-scale expansion in concrete materials, enabling possible mitigation strategies for damage due to the late age formation of ettringite. This research will examine the chemical and physical structure of the reactants and products, as well as, the pore structure evolution involved in the process of late age ettringite formation and subsequent expansion and cracking. A more thorough understanding of the crystalline pressures induced on the microstructure will result by refining existing models with analytical techniques such as nanoindentation and residual stress analyses. Concrete is the most widely used engineering material in the world, yet it is still poorly understood in many regards. The prevention of delayed ettringite formation, which is known to cause concrete cracking, would significantly improve the infrastructure life span of the United States and abroad. Educational activities will include traveling to local middle and high schools to provide hands-on experiments that give the students a real-life view of how engineering is an important part of the modern world. Local primary school groups will be invited to campus to participate in hands-on learning experiences at Tennessee Tech's STEM Center. In addition to the educational activities, a residual stress analysis workshop is proposed at the end of the project to disseminate the strong background in this field at Tennessee Tech to other cement and concrete researchers; thus expanding beyond traditional K-12 outreach.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: TTU Millard Oakley Center for Teaching and Learning in Science, Technology, Engineering and Mathematics (STEM Center)

Activation Amount: \$400,000.00

Agency: National Aeronautics and Space Administration

Personnel:

Co-PI - Mark Hutchins, University Advancement

PI - Sally Pardue, STEM Center

Abstract:

TTU has requested funds to obtain instructional equipment and programmatic support materials for the Millard Oakley Center for Teaching and Learning in Science, Technology, Engineering and Mathematics (STEM Center). The specified equipment will support earth sciences and engineering activities in the Center's learning studios.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Assessment of Biotic Integrity, Water Quality and Habitat, Fishing Pressure, and Economic Value of the Fishery in the Caney Fork River below Center Hill Dam

Activation Amount: \$109,433.00

Agency: U. S. Geological Survey

Personnel:

PI - Phillip Bettoli, Cooperative Fisheries Unit

Abstract:

The objective of this project is to monitor water quality seasonally at five stations in the Caney Fork River below Center Hill Dam, assess temporal and spatial variation in biotic integrity in the river, and assess key attributes of the recreational fishery for trout in the river and estimate its economic value.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Predicting the Effects on Endangered Mussels from Incremental Decreases in Minimum Flows

Activation Amount: \$113,666.00

Agency: U. S. Geological Survey

Personnel:

PI - James Layzer, Cooperative Fisheries Unit

Abstract:

In the past 15 years, much has been learned about the effects of high discharge on mussel recruitment and behavior. In contrast, the effects of low flow on mussels are poorly understood. Effective and scientifically defensible environmental water allocations require specific information on the effects of incremental reductions in flow below normal low flow conditions. The objective of this study is to determine the level of reduction in minimum flows that affect the behavior, growth, gametogenesis, spawning and survival of freshwater mussels. The research includes short-term flume studies in Tennessee Technological University, long-term studies in flow-through raceways, field measurements and experimental manipulation of mussel distributions, and hydraulic modeling. Defining sublethal and lethal effects at various levels of flow coupled with hydraulic modeling will allow prediction of possible effects of various low-flow conditions.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Establish Non-essential Populations of Two Endangered Mussel Species in the Lower French Broad River, Tennessee

Activation Amount: \$27,736.00

Agency: U. S. Geological Survey

Personnel:

PI - James Layzer, Cooperative Fisheries Unit

Support Personnel - Benjamin Davis, Biology

Support Personnel - Kendall Moles, Water Center

Abstract:

In 2007, the Fish and Wildlife Service published a Final Rule to establish non-essential populations (NEP's) for 15 mussel species in the French Broad River below Douglas Dam and in the Holston River below Cherokee Dam. The biodiversity of the French Broad River once was among the richest in the southeast; at least 100 fish species and 53 mussel species including the oyster mussel, and the birdwing pearlymussel occurred in the lower river. The fauna was devastated following the construction and operation of Douglas Dam that released water with low DO and released no water during periods of no generation. By 1988, only 56 fish species and 12 mussel species remained. In 1987, TVA instituted a minimum flow release and mechanisms for oxygenating the dam's discharge; subsequently, the fish fauna began to increase suggesting that restoration of the mussel fauna might be possible. Based on improved habitat conditions, abundance and behavior of host fishes, and the occurrence of large donor populations, Layzer and Scott (2006) concluded that 30 species of mussels could be reestablished in the French Broad River. The oyster mussel and the birdwing pearlymussel are among the best candidates for reintroduction because their hosts are benthic species which are abundant in the river. Each year, 200 adults will be hand-collected from the Duck and Clinch Rivers, PIT tagged, and translocated to the French Broad River. Each year a stratified random sampling design will be used to quantitatively assess survival. After the first year, adults will be examined to determine if gametogenesis and spawning has occurred.

Grants Awarded Report

From: 8/1/10 to 8/31/10

Project Title: Tennessee Association FFA Camp Clements Maintenance Worker 2009-12

Activation Amount: \$32,386.00

Agency: Tennessee Association of FFA

Personnel:

PI - Ben Byler, Agriculture

Abstract:

The purpose of this contract is to provide staff for one full-time Maintenance Mechanic to perform a variety of skilled maintenance tasks at Camp Clements FFA Leadership Camp near Doyle, Tennessee. The maintenance mechanic will assist the camp director of facilities with the facilities and equipment including maintenance and repair of the housing facilities for campers, administration building, classrooms, auditorium, boating facilities, amphitheater, recreation hall, cafeteria, swimming pool, and staff housing facilities.