

# ***Grants Awarded***

**From 4/1/06 To 4/30/06**

***Principal Investigator:*** Sastry Munukutla, Energy Systems Research

***Project Title:*** Real Time Performance Monitoring and CO2 Tracking System Validation and Training

***Activation Amount:*** \$18,418.00

***Agency:*** Research and Development Solutions, LLC (via DOE)

With funding from the U. S. Department of Energy, the Center for Energy Systems Research (CESR) installed real time performance monitoring software in one coal fired power plant of National Thermal Power Corporation (NTPC) in India. It is required to give advanced training in the use of the software to the engineers working at the plant. This contract enables 2-4 NTPC engineers to receive training for the software on campus. In addition, Dr. Munukutla will conduct a workshop on the use of this software in India.

***Principal Investigator:*** Yvette Clark, Water Center

***Project Title:*** Local Planning Assistance Office-Geographic Information System Improvement Proposal

***Activation Amount:*** \$132,482.00

***Agency:*** Tennessee Department of Economic and Community Development

# *Grants Awarded*

**From 4/1/06 To 4/30/06**

**Principal Investigator:** Mohamed Abdelrahman, Electrical and Computer Engineering

**Project Title:** An Out-Reach Program to Manufacturing Industries in Tennessee for Introducing and Implementing Novel Energy Savings Materials Processes

**Activation Amount:** \$99,900.00

**Agency:** Tennessee Economic and Community Development

Tennessee's Energy Division has established an industrial outreach initiative combining the elements of the DOE Industrial Outreach Best Practices tools with the Industries of the Future approach (IOF). This program builds on the growth of more than five years of successful involvement in the U.S. DOE IOF program culminating in several Allied Partners agreements between the U.S. DOE and Tennessee institutions and industries. It is entitled "Advancing Tennessee Industrial Technologies." A program grant agreement for \$100,000 has been established with the TTU Center for Manufacturing Research partner to organize and present workshops at different locations within Tennessee through alternative funding as necessary and with U.S. DOE support. Each workshop addresses energy efficient technologies for either steam systems, compressed air systems or pumping systems with the largest industrial energy users in the state.

With this proposal, Tennessee would establish, strengthen, and extend a parallel effort to deliver and implement new technology "Best Practices" to an increased number of industries from the list of largest industrial energy users.

In coordination with the workshops this proposal seeks to establish an additional protocol for a process review and application of several new technologies currently available from the ORNL and TTU for potential industrial candidates. These technologies are focused primarily on the metal working industries but are anticipated to have much broader cross-cutting application for affiliated manufacturing applications. The work will establish the process review, evaluation, and "Best Practices" implementation for this broader set of applications through actual site evaluation, use and monitoring by manufacturing candidates. A final additional workshop will be organized and presented especially for the metal casting industries as the final results are reported. Targeted industries that participate and implement the efficiency recommendations identified will be used to extrapolate transferability of potential savings and system improvements.

These novel technologies to be implemented include:

1. Infrared-based rapid heating
2. Magnetic Processing
3. Advanced Materials
4. Sensor Technologies
5. Expert System for Materials Casting Operations

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**From 4/1/06 To 4/30/06**

***Principal Investigator:*** Margaret Phelps, STEM Center, (supporting professionals – Drs. Wayne Leimer, Kathy Rust, R. Jordan, Steve Robinson, Dewey Thurman, Shelly Forgey, Sheryl Webb, Jeremy Wendt)

***Project Title:*** NSF ATE Eastern Corridor Teacher Education Project

***Activation Amount:*** \$23,328.00

***Agency:*** Pellissippi State Technical Community College (via NSF)

The purposes of the TBR Teacher Preparation Partnership are to:

1. Improve the mathematics, science, and technology preparation of future teachers through a statewide collaboration and systemic change.
2. Improve articulation and advising in the field of teacher education among all institutions involved in this project by offering and requiring the same mathematics, science, and educational technology courses at each institution.
3. Develop student support systems for education majors.
4. Improve the capacity and training of a diverse teaching pool in Tennessee.
5. Provide opportunities for both in-service and pre-service teachers to gain content credit hours to meet NCLB requirements.

At TTU, the project will involve the faculty who regularly teach BIOL 1310, CHEM 1310, GEOL 1310, PHYS 1310, MATH 1410 and 1420, and FOED 2010. These faculty will participate in professional development with faculty with similar teaching responsibilities at the other partner institutions, be provided matching funds for support travel to professional meetings, have access to funds for instructional materials, and receive a summer stipend for course revisions. A campus coordinator will be responsible for articulating the efforts at TTU with the project lead institution.

# ***Grants Awarded***

**From 4/1/06 To 4/30/06**

***Principal Investigator:*** Dennis George and Martha Wells, Water Center

***Project Title:*** Determination of a Water Quality Marker Reflecting System Effectiveness of the Sewanee Utility Districts Land Application System

***Activation Amount:*** \$43,382.00

***Agency:*** Sewanee Utility District

The Sewanee Utility District's (SUD) Wasterwater Treatment and Land Application facility consists of two parallel primary lagoons that discharge into a common secondary lagoon prior to applying effluent to 68 acres of forested land. The facility has a design capacity of 590,000 gallons per day. Irrigation patterns have been altered to limit irrigation from directly entering designated water-of-the-state. The Tennessee Department of Environment and Conservation (TDEC) has required SUD to develop "sampling protocol to monitor the quality of waters leaving the spray fields." Also, SUD must develop "a sampling protocol accounting for the constituents likely to be found in the facilities effluent" (TDEC).

SUD has contracted with Tennessee Tech University through its Center for the Management, Utilization and Protection of Water Resources to determine which effluent parameters are persistent in the discharge from the lagoons that should be removed by the land application system under proper operation and maintenance of the irrigation system. This selected parameter, if present in waters leaving the land application site may be indicative of problems of the land application system to remove lagoon effluent constituents prior to entering surface waters.

***Principal Investigator:*** Kevin Liska, Business Media Center

***Project Title:*** Post-Katrina Marketing for Southern University of New Orleans

***Activation Amount:*** \$18,500.00

***Agency:*** State of Louisiana

## ***Grants Awarded***

**From 4/1/06 To 4/30/06**

***Principal Investigator:*** Thomas Willis, Curriculum and Instruction (supporting professionals – Drs. Helen Dainty and Rhonda Folio)

***Project Title:*** Base-TN Teaching Program 2006-07

***Activation Amount:*** \$75,000.00

***Agency:*** Tennessee Department of Education

***Principal Investigator:*** Joseph Biernacki, Chemical Engineering

***Project Title:*** Supplement to Micro and Meso-Scale Strain Measurements in Cement-Based Materials

***Activation Amount:*** \$5,000.00

***Agency:*** National Science Foundation

# *Grants Awarded*

**From 4/1/06 To 4/30/06**

***Principal Investigator:*** Xubin He, Electrical and Computer Engineering

***Project Title:*** SGER: Distributed Symmetric Active/Active Metadata Management

***Activation Amount:*** \$50,000.00

***Agency:*** National Science Foundation

This project explores high availability data storage services through distributed symmetric active-active metadata management. High availability storage service is critical for scientific high-end computing (HEC) systems, in which there is a demand for continuous non-stop 24/7 availability. The research investigates a group of metadata servers in a symmetric active-active mode to collectively take on the responsibility of managing the system and its respective state information. It treats metadata separately in dedicated metadata servers and allows more than one redundant server to be active. Metadata state replication is performed by totally ordering all state change messages and reliably delivering them to all redundant active metadata servers. A group communication system is utilized to ensure total message order and reliable message delivery as well as metadata server membership management. This research provides a proof of concept for three key problems: global state identification and consistency, group communication overhead, and metadata server membership management. The work will be at the forefront of creating a general framework providing high availability at different system levels. This effort will have impact on the fundamental data storage availability as well as graduate education. Aspects of the research will be made accessible to undergraduate students through an existing NSF-sponsored REU site which the PI currently manages.

# ***Grants Awarded***

**From 4/1/06 To 4/30/06**

***Principal Investigator:*** L. K. Crouch, Civil and Environmental Engineering

***Project Title:*** Rapid Repair of Highway and Airfield Pavements

***Activation Amount:*** \$95,884.00

***Agency:*** Federal Highway Administration

Military and security operations often require the rapid repair of pavements for highways and airfields. Conventional techniques for repairing subgrade damage are time consuming and labor intensive. A very fluid, self-compacting, rapid-setting, high-early strength material which is inexpensive and uses commonly available materials would be ideal for this situation. Tennessee Technological University researchers have developed such a material to make highway and airfield pavement subgrade repairs rapid, easy, and inexpensive.

The Tennessee Department of Transportation asked TTU researchers to develop the materials for rapid highway subgrade repairs. Development began in the laboratory in May 2002. The product called ZOOM! CLSM was used to repair Robertson Road in Nashville on Memorial Day weekend 2003 (less than 13 months from drawing board to application). The product has the consistency of pancake dough initially but rapidly hardens, will support foot traffic in approximately two hours and vehicular traffic in 3-6 hours depending on ambient temperature (the warmer the better). Further ZOOM! CLSM develops the compressive strength of an excellent subgrade in 24-hours. ZOOM! CLSM was truly subgrade repair for people in a hurry. The Rapid Repair of Highway and Airfield Pavements Project will continue the development of this rapid subgrade repair material. Early results indicate the new material (tentatively named Lightning CLSM) will set and develop compressive strength even faster than ZOOM! CLSM further reducing traffic delays due to repair operations.

***Principal Investigator:*** Ferdinand DiFurio, Economics, Finance, Marketing

***Project Title:*** Small Business Energy Loan Program Study

***Activation Amount:*** \$12,162.00

***Agency:*** Tennessee Department of Economic and Community Development

# ***Grants Awarded***

**From 4/1/06 To 4/30/06**

***Principal Investigator:*** James Layzer, Co-op Fisheries Unit

***Project Title:*** Development and Testing of a Protocol for Monitoring Mussels

***Activation Amount:*** \$15,000.00

***Agency:*** U. S. Geological Survey

The Green River flows through the Mammoth Cave National Park (MACA), Kentucky. This river system once contained over 70 species of freshwater mussels. Presently, at least 50 species still exist in the Green River, including at least four endangered species: *Cyprogenia stegaria*, *Obovaria retusa*, *Pleurobema clava*, and *Pleurobema plenum*. A primary responsibility of the MACA is to protect the biological integrity of the Green River. A protocol for long-term monitoring of the mussel assemblage in MACA is needed to insure that all data collected is comparable, and thus indicative of any trends in diversity and abundance. The objectives of this study are to: 1) Using data collected under RWO 47, evaluate alternative sampling designs for determining the species composition, density, and recruitment of the mussel assemblage within the MACA; 2) Develop a sampling protocol for the continued long-term monitoring of the assemblage; and 3) Evaluate the effectiveness and efficiency of the sampling protocol.