

# ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Douglas Airhart, Agriculture

***Project Title:*** Crossville Inventory & UF Plan

***Activation Amount:*** \$3,420.00

***Agency:*** Tennessee Department of Agriculture

This project will allow Tennessee Tech to assist the city of Crossville to complete a city tree inventory and develop a management plan. Specific components to be completed by this project are:

- 1) Complete a tree inventory with data collected on a minimum of 400 trees. Trees to be inventoried will be public trees in Crossville and may include but not be limited to trees in the downtown city business district, major thoroughfares, schools, cemeteries, and parks. Data collected on each tree will include the identification by species, size measurements to include trunk diameter, usually a diameter at breast height (DBH), height and canopy spread, condition rating to include general condition in 10% increments, general hazard assessment, and work needed, if any, and location of the tree that also includes site data.
- 2) Conduct an assessment and summarization of the data collected in item A in preparation of the management plan to be developed in Item 3. The assessment will include, but not be limited to, a summary of species distribution, summary of condition class, summary of size classes, a summary of size by species, a summary of condition by species, and a size/condition summary. These tables will be included in the management plan.
- 3) Develop and present a management plan for the trees and present the plan to the city of Crossville. The management plan will include, but not be limited to, an executive summary, statement of purpose, assessment summaries as outlined in Item 2 above, and components of the plan that include, but is not limited to, community awareness needs, goals, objectives, strategies, actions and tasks, specifically addressing potential hazards identified in the inventory, implantation schedule with timetable and appropriate budgets, budget justification, and appropriate appendices (inventory documentation, community map with management districts, relevant ordinances, map of utilities, technical and safety manual, species lists, equipment and vehicle rates, and list of vendors).

# ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Douglas Airhart, Agriculture

***Project Title:*** Tullahoma UF Plan

***Activation Amount:*** \$600.00

***Agency:*** Tennessee Department of Agriculture

This project will allow Tennessee Tech to assist the city of Tullahoma to initiate the development of a forestry management plan for the city's urban forestry program and achieve managing level status. Specific components to be completed by this project:

A) Develop and establish an Urban Tree Management Program. The city forester will follow the plan guidelines and provide training for other city employees.

B) Management Plan Development: Possible components of the plan will be based on training received from the Municipal Forester Institute but will be consistent to data that has been previously collected to include recent data collection to the existing tree inventory by the city of Tullahoma.

C) The city forester will attend upcoming State Urban Forestry Conference and share knowledge gained with other departments involved with the city's urban forest and the public.

# *Grants Awarded*

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Douglas Airhart, Agriculture

***Project Title:*** Livingston-Inventory and UF Plan

***Activation Amount:*** \$8,450.00

***Agency:*** Tennessee Department of Agriculture

This project will allow Tennessee Tech to assist the City of Livingston to complete a city tree inventory and develop a management plan. Specific components to be completed by this project are:

- 1) Complete a tree inventory with data collected on a minimum of 750 trees. Trees to be inventoried will be public trees in Livingston and may include but not be limited to trees in the downtown city business district, major thoroughfares, schools, cemeteries, and parks. Data collected on each tree will include the identification by species, size measurements to include trunk diameter, usually a diameter at breast height (DBH), height and canopy spread, condition rating to include general condition in 10% increments, general hazard assessment, and work needed, if any, and location of the tree that also includes site data.
- 2) Conduct an assessment and summarization of the data collected in item A in preparation of the management plan to be developed in Item 3. The assessment will include, but not be limited to, a summary of species distribution, summary of condition class, summary of size classes, a summary of size by species, a summary of condition by species, and a size/condition summary. These tables will be included in the management plan.
- 3) Develop and present a management plan for the trees and present the plan to the city of Livingston. The management plan will include, but not be limited to, an executive summary, statement of purpose, assessment summaries as outlined in Item 2 above, and components of the plan that include, but is not limited to, community awareness needs, goals, objectives, strategies, actions and tasks, specifically addressing potential hazards identified in the inventory, implantation schedule with timetable and appropriate budgets, budget justification, and appropriate appendices (inventory documentation, community map with management districts, relevant ordinances, map of utilities, technical and safety manual, species lists, equipment and vehicle rates, and list of vendors).

# *Grants Awarded*

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Douglas Airhart, Agriculture

***Project Title:*** Cookeville-Inventory and UF

***Activation Amount:*** \$13,000.00

***Agency:*** Tennessee Department of Agriculture

This project will allow Tennessee Tech to assist the City of Cookeville to complete a city tree inventory and develop a management plan. Specific components to be completed by this project are:

- 1) Complete a tree inventory with data collected on a minimum of 2300 trees. Trees to be inventoried will be public trees in Cookeville and may include but not be limited to trees in the downtown city business district, major thoroughfares, schools, cemeteries, and parks. Data collected on each tree will include the identification by species, size measurements to include trunk diameter, usually a diameter at breast height (DBH), height and canopy spread, condition rating to include general condition in 10% increments, general hazard assessment, and work needed, if any, and location of the tree that also includes site data.
- 2) Conduct an assessment and summarization of the data collected in item A in preparation of the management plan to be developed in Item 3. The assessment will include, but not be limited to, a summary of species distribution, summary of condition class, summary of size classes, a summary of size by species, a summary of condition by species, and a size/condition summary. These tables will be included in the management plan.
- 3) Develop and present a management plan for the trees and present the plan to the city of Cookeville. The management plan will include, but not be limited to, an executive summary, statement of purpose, assessment summaries as outlined in Item 2 above, and components of the plan that include, but is not limited to, community awareness needs, goals, objectives, strategies, actions and tasks, specifically addressing potential hazards identified in the inventory, implantation schedule with timetable and appropriate budgets, budget justification, and appropriate appendices (inventory documentation, community map with management districts, relevant ordinances, map of utilities, technical and safety manual, species lists, equipment and vehicle rates, and list of vendors).

# *Grants Awarded*

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** David Huddleston, Civil and Environmental Engineering

***Project Title:*** Application of St. Louis Bay Water Quality Model to Develop TMDLs for Tributaries

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

***Agency:*** Camp Dresser & McGee (CDM)

The Mississippi Department of Environmental Quality (MDEQ) requires technical support to apply the existing St. Louis Bay Water Quality Model to develop TMDLs for the water bodies listed in Table 1. In this project, personnel at Tennessee Tech University and Mississippi State University will provide technical support to extend the St. Louis Bay Water Quality Model as needed to develop TMDLs for St. Louis Bay tributaries.

Table 1: List of TMDLs

Water Body - Bayou La Croix

Pollutant - Nutrients, Organic Enrichment/Low DO

TMDL Due Date - June 30, 2007

Water Body - Canal Number 3

Pollutant - Nutrients

TMDL Due Date - June 30, 2007

Water Body -Rotton Bayou

Pollutant - Nutrients, Organic Enrichment/Low DO

TMDL Due Date - June 30, 2007

Primary tasks will be to select appropriate environmental assessment conditions, refine the models to reflect those conditions, run the models, and assist MDEQ with TMDL reporting. Collaboration with MSU and CDM is an important aspect of this project. This project will be used to develop skills among TTU project participants while providing value to the sponsoring agency.

## ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Glen Johnson, Administrative Offices

***Project Title:*** College of Engineering Equipment Fund Grant 2006-07

***Activation Amount:*** \$35,000.00

***Agency:*** Tennessee Department of Commerce and Insurance

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

***Project Title:*** Manufacturing of Lightweight Aggregate from Fly-Ash

***Activation Amount:*** \$48,534.00

***Agency:*** Tennessee Valley Authority

The objective of this project is to develop and explore a sintering-based process for production of lightweight aggregate. Exploration of other alternatives will continue as candidate processes are identified or breakthrough concepts conceived.

# ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Joseph Richardson, Mechanical Engineering

***Project Title:*** Crashworthiness Design Methodology for the Partnership for a Next Generation of Vehicles (PNGV)

***Activation Amount:*** \$264,655.00

***Agency:*** Government Solutions, International, GSI

As a contributing effort in the Partnership for a New Generation of Vehicles (PNGV) Program, the proposed project targets the development of a general computer-based design methodology which can be tailored to offer performance improvement, both in terms of vehicle safety and crashworthiness as well as in vehicle weight reduction. The methodology will perform design optimization based on, but not limited to, genetic algorithms, with breeding among descendent design populations determined based on selected merits including overall weight and performance in various collision scenarios. The design methodology to be developed will employ a commercial finite element package which is able to model the expected nonlinear and time-dependent impact behavior including large deformation, plasticity and buckling. The proposed effort also will verify computer crash simulations through comparison of simulated post-accident deformation in one of the selected frame and body designs with the deformation experimentally observed in a scaled model of the same design subjected to a geometricly similar collision.

# *Grants Awarded*

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Helen Dainty, Curriculum and Instruction

***Project Title:*** Picture This. . .Success for Teachers and Their Students with Autism-ITQ

***Activation Amount:*** \$51,000.00

***Agency:*** Tennessee Higher Education Commission

Teachers participating in the Picture This Success for Teachers and Their Students with Autism Institute will learn about autism and be given research-based strategies for teaching students with autism. The 28 hours of instructional and interactive sessions will provide teachers with content knowledge, pedagogical skills, and professional disposition for working effectively with children who have autism. Teachers will learn about autism and how to create daily and individual picture schedules, academic narratives, social stories, and accommodate and/or modify for students with autism. The main areas of concentration will be communication in language arts and math. In the fall the teachers will be involved in a two-hour follow-up consultation session conducted on an individual basis for each teacher within the classroom.

The following are the main objectives established for this project: The participants will reflect on and evaluate attitudes about children with special needs and their disposition by participating in various activities that simulate an experience of a special need; the participants will recognize the importance of parent involvement and realize that parents can be a valuable resource; the participants will support students with autism by adhering to the nine strategies suggested by Kluth; the participants will learn the disorders and characteristics of each on the autism spectrum; the participants will learn the importance of communication and communication skills; the participants will understand that structure and routine is a key for children with autism to be successful; and the participants will learn about the many research-based methods for working with children with autism including the use of assistive technology.

# ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Kristen Pennycuff, Curriculum and Instruction

***Project Title:*** Empowering Literacy Instruction-ITQ

***Activation Amount:*** \$140,000.00

***Agency:*** Tennessee Higher Education Commission

Empowering Literacy Teachers: Fostering Agency will provide an opportunity for practicing teachers to review, renew, and research literacy strategies for assessment, diagnosis, and remediation of students in third through seventh grade, while creating systemic change in their classrooms, schools, and districts. Teachers will learn effective teaching practice based on scientifically based reading research in assessment and diagnosis, and techniques for correction in the areas of comprehension, vocabulary, decoding, and fluency in reading, as well as crafting, composing, and revising in writing. An emphasis on informational text and content area strategies will be provided. Teachers will implement new knowledge within the TTU Reading and Writing Institute as they assess and diagnose students' literacy skills and create an individualized intervention plan for a client in the third, fourth, fifth, sixth, or seventh grade. At the end of the two-week intervention period, teachers will continue to participate for one Saturday each month of the school year with teachers planning, implementing, and evaluating Institute activities. Upon returning to their own classrooms, teachers will be expected to perform the same intervention procedures with at least two children in their classrooms, to implement content area strategies for enhancing literacy instruction, to differentiate instruction through a series of projects and peer coaching strategies, and to foster agency through school seminars. Empowering Literacy Instruction will conclude with another summer institute with the same participants. Success will be evaluated through surveys, evaluations of Saturday interventions and school seminars, and presentation of final projects at the fall meeting of the TTU Council of the International Reading Association.

# ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Doug Talbert, Computer Science

***Project Title:*** VEHI Subcontract with Vanderbilt

***Activation Amount:*** \$75,319.00

***Agency:*** Vanderbilt University (via AHRQ)

In this project, we will work with a team at Vanderbilt University to make steps toward enabling several of the Memphis-area hospitals to share clinical data in support of patient care through the establishment of a Regional Health Information Organization (RHIO). We will focus on developing the tools and techniques to evaluate the patient matching components of the system and on assisting in the design of a distributed architecture that will be as consistent as possible with the developing national guidelines. More specifically, we are developing a gold standard data set for use in evaluation and a toolkit that uses this data set to help us, in partnership with the team at Vanderbilt, to evaluate the tools and techniques that we develop, and we will be reviewing the recommended architecture standard from Markle and the Connecting Health initiative to determine how the technical architecture for Memphis RHIO needs to be structured to enable interoperability with other RHIOs.

## ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

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

***Project Title:*** Reintroduction of Mussels into the Little Tennessee River into the Bypassed Reach Below Calderwood Dam

***Activation Amount:*** \$25,530.00

***Agency:*** Tennessee Wildlife Resources Agency

Calderwood Dam is the third dam from the mouth in a series of dams that regulate the flow of the Little Tennessee River. Water from the dam is diverted via pipeline downstream to the powerhouse. This diversion creates an approximately 1.6-km-long bypass reach that historically received little flow. The recent institution of a minimum flow release into this bypass reach may provide suitable conditions for the reintroduction of mussels. The scope of this project is to first determine extant species of fish and mussels in the bypass reach, evaluate habitat, and then, if appropriate, augment existing mussel species and reintroduce extirpated species with the ultimate goal of creating viable reproducing populations.

# *Grants Awarded*

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Holly Anthony, Curriculum and Instruction

***Project Title:*** Developing Conceptual Understanding of Fractions and Decimals in K-4 Classrooms-ITQ

***Activation Amount:*** \$71,495.00

***Agency:*** Tennessee Higher Education Commission

This project provides two opportunities for K-4 math teachers and special education specialists who assist in the teaching of mathematics: 1) provide hotel, registration, and mileage for 20 teachers to attend the National Council of Teachers of Mathematics (NCTM) Conference in Atlanta, Georgia, on March 21-24, 2007; 2) provide a 5-day summer institute focused on developing K-4 students' conceptual understanding of fractions and decimals (limited to 45 participants from area school districts).

The first goal is for teachers to learn from others at the NCTM Conference and to then share activities and ideas from the conference with their peers in Middle Tennessee. TTU will host a one-day math conference in the summer to facilitate this goal. Teachers who attended NCTM will be offered incentives to present at this conference.

The goal of the 5-day summer institute is to develop conceptual understanding of fractions and decimals as taught in elementary math classes. Participants will analyze students' work and explore intervention strategies for working with students to increase their conceptual understanding of fractions and decimals. The institute will emphasize conceptual understanding of mathematical content via investigations, problem solving, hands-on and group activities, and use of manipulatives.

Participant teachers will receive manipulatives, books, and lesson plans to use in their teaching of mathematics. Expected outcomes: 1) participant teachers will strengthen and enhance their mathematical content knowledge by developing a deeper understanding of fractions and decimals; and 2) participant teachers will develop strategies for deepening their students' conceptual understanding of elementary school mathematics core content.

# ***Grants Awarded***

**From 1/1/2007 To 1/31/2007**

***Principal Investigator:*** Venkat Subramanian, Chemical Engineering

***Project Title:*** Modeling Capacity Fade and Lifetime of Lithium-Ion Batteries for Satellite Applications

***Activation Amount:*** \$400,000.00

***Agency:*** National Reconnaissance Office, DII

The lithium-ion battery is an ideal candidate for satellite applications because of its high energy/power density and operating voltage. Thermal runaway, leakage of current, side reactions, capacity fade, etc. may cause lithium-ion batteries to fail. Some of these events might happen because of unplanned or man-made events (e.g., overcharge, uncontrolled discharge/charge of lithium-ion batteries).

In this proposal, we plan to develop a mathematical model/software module that will help people use lithium-ion batteries for satellite applications. This module will be able to predict the discharge curves for the battery pack accounting for every unit and every cell in the battery. The module will also incorporate the thermal effects on the spatio-temporal behavior of the battery and its influence on the discharge curves. Advanced mathematical techniques will be used to simplify first-principles models without compromising on accuracy. A technical approach will be established for efficient models based on the effective combination of several approximation and averaging techniques.