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**SOUTH CAROLINA DOE/EPSCoR ENERGY-RELATED
RESEARCH DEVELOPMENT GRANT**

**Final Report Addendum
for period
September 30, 1992 - March 29, 1993**

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ABSTRACT

The South Carolina DOE/EPSCoR Energy Related Research Development Grant was used to develop a comprehensive inventory of the existing energy related research and assets within the State. Faculty leaders, mentors, and young faculty having energy related interests were identified and brought together to form interdisciplinary teams for the development of the research implementation proposal. A DOE/EPSCoR Advisory Board was formed to provide input from energy experts. A review of the existing strengths, such as amount of funding, number of graduate students supervised, number of refereed publications, number of postdoctoral personnel, and the nature and impact of the research on the State of South Carolina allowed for the identification of target areas for research development. These areas included groundwater modeling and environmental restoration. Workshops, seminars, and informal meetings were held in connection with the planning grant. These activities allowed for the establishment of linkages with several DOE laboratories and the development of research cluster proposals which were included in the South Carolina DOE/EPSCoR Research Implementation Proposal submitted March 1, 1993. A summary of these activities is provided herein.

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SUMMARY OF ACTIVITIES

The South Carolina DOE/EPSCoR Energy-Related Research Development Grant addressed three areas on which to concentrate during the planning phase: (1) energy-related research development, (2) human resource development, and (3) linkages of science and engineering interests. A Final Report summarizing the activities during the period September 30, 1991 to September 29, 1992 was previously submitted. Activities during the period of September 30, 1992 to March 29, 1993 are summarized in this Final Report Addendum.

1. Energy-Related Research Development

The first task proposed under the planning grant was to develop a comprehensive inventory of the existing research and research-related assets within the State. This comprehensive inventory was conducted in February/March 1992, the results of which were presented in Tables 1-3 in the Final Report submitted September 29, 1992. The Tables included data on faculty members at the three major research institutions within the State who are carrying out energy-related research; an inventory of the number of graduate students involved in the research enterprise and the number of energy-related publications over the past five years; an inventory of the energy related research activities with the dollar amount of energy research funding; and the facilities and resources utilized in the conduct of the research. Based on these inventories, priority areas of energy-related research were selected for possible development.

In order to maximize the effectiveness in developing a research area, seminar speakers were scheduled and workshops were arranged which included faculty from the three major research institutions and South Carolina State University, a state-supported HBCU. Coordinators were selected and charged with the following duties:

1. Identify scientific questions to be answered and the area on which the cluster proposal should focus.
2. Identify barriers that currently exist and strategies for overcoming these barriers.

3. Identify principal investigator or co-principal investigator for the potential research cluster.
4. Identify faculty that will be resource faculty and those that would be targeted faculty.
5. Develop a long-term strategic plan for the continuation of the research activity after the DOE/EPSCoR funding is terminated.

This information was subsequently used in developing research cluster proposals, two of which were included in the South Carolina DOE/EPSCoR Research Implementation Proposal based on: institutional research priorities; leadership abilities of Principal Investigators; facilities and equipment availability; institutional commitment to faculty size and salaries; and increased university/industry interactions.

Research Cluster 1 -- Environmental Restoration

(4 Research Projects, 4 Mentor Faculty, 4 Targeted Faculty, 6 Graduate Students)

The principal focus of the Environmental Restoration Research Cluster was the development of processes for the characterization and treatment of contaminated soil, water, and sediment. Projects within the cluster focused on physical, chemical, and biological processes that can be applied to chemical and radiological contaminants that are of particular interest within the Department of Energy's weapons complex. Specifically, the focus was on chlorinated organic compounds, metals, long-lived xenobiotic compounds in aerobic sediments, enhanced removal of non-aqueous phase liquids from soils, development of improved techniques for measuring transuranics in soils and sediments, and chemical removal of transuranics and long-lived fission products from soils.

Research Cluster 2 -- Coalition for Groundwater Modeling

(2 Research Projects, 7 Mentor Faculty, 3 Targeted Faculty, 10 Graduate Students)

A coalition between Clemson University and the University of South Carolina (USC) to pursue research in groundwater modeling and contaminant transport was proposed. Numerical models of flow and contaminant transport in porous media play an important role in dealing with the problems of monitoring, risk assessment, management, and restoration of contaminated groundwater sites. Investigators within the USC Department of Mathematics and the Clemson

Department of Mathematical Sciences have been developing expertise in a number of areas related to the numerical modeling of groundwater flow and contaminant reaction/transport processes. The major thrusts at USC are the development of numerical algorithms for multiphase flow models; implementation of such algorithms on massively parallel distributed memory computers; and the use of wavelets for data compression and numerical modeling of heterogeneous hydrogeological structures; design of multiphase flow simulators; and modeling of water and solute transport in the vadose zone.

2. Human Resource Development

During the Planning Grant Phase, the South Carolina EPSCoR Committee formulated strategies to develop the human resources base in energy-related science, engineering, and mathematics in the State of South Carolina based on the following premises:

- South Carolina's science and mathematics educators must become full members of the scientific community composed of energy-related science, engineering, and mathematics professionals.
- Educational programs implemented in the South Carolina DOE/EPSCoR Proposal must aggressively encourage participation by African-Americans, who represent 41% of the State's public school students.
- The South Carolina DOE/EPSCoR Program must take full advantage of the unique scientific facilities, staff, and educational programs available at the Savannah River Technology Center, a major DOE facility in nuclear materials production and defense waste management.
- The South Carolina DOE/EPSCoR Human Resource Development activities must be interfaced with the private sector and other major federal agency programs, especially other EPSCoR programs, currently being implemented in the State to make significant gains in the quality, number, and research competitiveness of scientists, engineers, and mathematicians.

A strategic plan to meet these objectives was included and described in detail in the South Carolina DOE/EPSCoR Research Implementation Proposal. Figure 1 gives a brief outline of the proposed Precollege, Undergraduate and Graduate, and Public Science Programs. Each program

is described in terms of the audience served, typical duration of the program, whether summer and/or academic year activities are included, DOE site involvement specifically with the Savannah River Technology Center (SRTC), the availability of stipends, annual number of *actual* participants, and estimated annual funding. Details of the programs were described in the Proposal.

**South Carolina DOE/EPSCoR
Human Resources Development Plan**

	Audience	Typical Duration in Weeks (w) Months (m) Years (y)	Summer Activities	Academic Year Activities	DOE Site Activities	Direct DOE Staff Involvement	Participants Receive Stipends	Annual Number of Participants	Estimated Annual Funding
	Students(S) Teachers(T) Undergraduates(U) Graduates (G) Faculty/DOE Staff (F)								
Precollege									
Minority Summer Science Camp Program	S (6- 8)	4 w	X	X	X	X		30	75K
HSSR Program for Rural Minority Students	S (11- 12)	4 w	X	X			X	20	41K
Teacher Research Program	T (9- 12)	6 w	X				X	5	9K
Undergraduate and Graduate									
Minority Undergraduate Internship Program	U	6 w	X		X	X	X	10	18K
Distinguished Scientist Seminar Program	F	9 m		X		X	X	50	18K
Graduate Student Practicum Program	G	6 w	X		X	X	X	10	6K
Public Science									
DOE/EPSCoR Newsletters		1 y	X	X					4K
Science for Scouts	S (4- 12)	1 y	X	X	X				1K
Computers for Kids	S (9- 12)	9 m		X					4K

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