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**Development of a Research and Public Service Foundation to
Support Enhanced Energy Research at Alabama A&M University**

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FINAL REPORT

Submitted to

Minority Educational Institutions Assistance Program

Office of Minority Economic Impact

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Project History

In October 1986, Alabama Agricultural and Mechanical University (AAMU) received first-year (FY 1986-87) funding from the U. S. Department of Energy (DOE) Minority Educational Institutions Assistance Program (MEIAP) to develop a viable infrastructure to enhance funded energy research. The project, entitled *Infrastructure Development to Enhance Energy Research at Alabama A&M University*, was renewed and continued in the following year (FY 1987-88) with additional funding received, and extended an additional year (FY 1988-89) with no new funding. Upon addressing three out of four of the original objectives with considerable success, a new proposal was submitted and funded for the remaining project years (1990-1993) addressing the successful implementation of the remaining original objective and extending the framework of the original project goal.

The most recent project thrust, entitled *Development of a Research and Public Service Foundation to Support Enhanced Energy Research at Alabama A&M University*, was enacted to advance and further strengthen institutional capacity to carry out energy related research with the eventual aim of adopting a programmatic research posture to attract long-term, stable, multi-million dollar funding commitments. Benefits from successful project implementation include enhanced prominence, involvement and achievement in the bid for competitive research grants and contracts and the associated attraction of minority individuals to energy related disciplines and research careers.

Project Goal

The primary goal of the project has been to further strengthen institutional capacity to carry out energy related research with the eventual aim of adopting a programmatic research posture to attract long-term, stable, multi-million dollar funding commitments.

Objectives

The specific objectives were:

1. To implement a semiautonomous Research and Public Service Foundation incorporating pre-award through project close-out sponsored program management, fiscal accounting and assistance to investigators.
2. To implement a sponsored programs Document Processing Center to aid in research opportunity notification, proposal development and periodic progress reporting.
3. To continue to enhance the University's research capability in specific energy related disciplines via development of a programmatic posture with sponsoring agencies to ensure stable long-term funding.

Project Accomplishments by Objective

The following project accomplishments and highlights have been summarized according to the specific objectives that they address.

Objective 1 - To implement a semiautonomous Research and Public Service Foundation incorporating pre-award through project close-out sponsored program management, fiscal accounting and assistance to investigators.

A need was recognized at Alabama A&M University to reorganize its administrative research and public service functions creatively so as to encourage greater clarity of purpose, efficiency of operation, and productivity among both investigators and administrators in ongoing research endeavors. This need was to be filled by the establishment of a focused Research and Public Service Foundation, within which Institutes (one each for the research and public service administrative divisions of the University) and Centers (areas of research specialization) within Institutes were to be defined. The fully operational Foundation aimed to: 1) maintain a self-supporting research/contracts program (via accumulating indirect charges), 2) provide proposal development and project initiation support via initiation of an Intramural Research/Service Trust Fund, and 3) support increasing grant-marketing activities.

Progress toward meeting this objective is evidenced by the developing research organizational infrastructure at Alabama A&M University. Toward this end, the originally envisioned specialization centers in Defense, Biotechnology, Space and Health/Environmental Science have been replaced by fully operating research and service centers which include the following:

Center of Excellence in Nonlinear Optics and Nonlinear Optical Materials

A world class center of research in nonlinear optics and nonlinear optical materials coupled with an active effort to attract and channel minority and women students, from grade school through high school, into the science and engineering areas for collegiate education. Initiated via major funding from NSF (MRCE program), this center is equipped with state-of-the-art laboratories, equipment, and facilities, including a Pelletron accelerator, and has attracted over \$15 million in research funding to the AAMU campus since 1987.

Alabama A&M-UAH Regional Inservice Education Center

Provides inservice education/professional development activities to educators in 10 school systems in Madison, Marshall, Jackson, and DeKalb counties, and inservice activities (workshops, seminars, institutes, and conferences) in 10 critical areas: English and Language Arts (Reading, Writing, and Listening); Mathematics; Science; Computer Use; Special Education (MR, LD, Gifted, EMC, etc.); Guidance and Counseling; Health Education (Drug Abuse Prevention, AIDS Education, etc.); Economics Education; Administration and Supervision; and Library Media.

Center for Entrepreneurship and Economic Development

Developed to improve the quality of life in the State of Alabama by increasing profitability and reducing the failure rate of start-up businesses. The center works closely with other organizations with similar goals including the Small Business Administration, ADO/ADECA, the Chamber of Commerce, the Small Business Development Center and especially the Northeast Alabama Regional Small Business Development Center (NEAR SBDC). Assistance includes accounting systems analysis, business plan preparation, marketing strategies, and analysis of organizational structures, also training via workshops and seminars on a wide variety of topics provided at no cost to the entrepreneur.

Alabama Center for Application of Remote Sensing

Addresses agricultural, natural resource and land use problems with respect to inventorying, monitoring and assessment by analyzing multispectral data from land-based and satellite-based instruments. A primary goal is to establish an on-line interactive remote sensing based geographic information system for inventorying and monitoring the natural resources of Alabama. Remote sensing, geographic information systems, digitized map preparation and satellite imaging, and terrain modeling based on data from satellites and other ground and airborne platforms represent the focus of research in the center.

Alabama A&M Center for Urban and Rural Research

Promotes: establishing training opportunities for graduate students in urban and rural research; working with public and private agencies on needs assessments and research requirements; documenting community trends through the analysis of social indicators; making information available to the public; publishing research related documents and monographs; and endeavoring to expand the boundaries of understanding of urban and rural life through the testing of hypotheses and theory building. Research projects have recently been completed in such areas as: fiscal impact studies, housing, primary health care, community needs analysis, rural transportation, urban paratransit needs assessment, and land use planning.

Howard A. Foster Center for Irradiation of Materials

Developed to promote minority interest and participation in materials science and polymer science via training and research at the undergraduate and graduate levels. Specialization includes surface modification and characterization in the following areas: Rutherford Backscattering Spectroscopy; Particle Induced X-Ray Emission, MeV Ion-Implantation; Channeling Capabilities; Nuclear Reaction Microanalysis; and Radiation Damage Studies. The center currently houses a rare Pelletron 2 MeV Accelerator.

Center for Environmental Research and Training

Specializations include: environmental chemistry, water quality and environmental assessment, soil morphology and genesis, wetlands/bio-environmental interaction, groundwater hydrology, pollutant transport and transformation, soil microbiology and bioremediation, soil chemistry and fertility.

Center for Forestry and Ecology

Investigating: clonal propagation and genetics, hardwood propagation, short rotation woody biomass, woody plant stress physiology, upland hardwood silviculture and management, natural resource and environmental policy/law.

Center for Molecular Biology

Focusing on: plant and microbial molecular genetics, plant cell and tissue culture, plant transformation, and characterization of gene products on agronomic, horticultural, and native flora and forest trees.

Plant Science Center

Conducting research in: plant physiology, plant genetics and breeding, plant pathology, plant cytogenetics and microscopy, cropping systems, sustainable agriculture, agronomy and horticulture, crop yield and modeling.

Development and implementation of new and revised research policy to establish standards for human and animal safety, biohazards, radiation safety, scientific misconduct, patent protection, research incentives and facilities improvement funding have been undertaken within the Office of Research and Development (ORD). In addition, infrastructure modifications and a strengthening of administrative personnel support have been enacted to promote and manage increased research and contract activity, and to facilitate the operation of an approved Research Incentives Program. Although transition to an operational Foundation infrastructure has never fully been realized, substantial progress toward this objective has been made possible via DOE MEIAP funding, primarily through strengthening ORD administrative support and by encouraging and facilitating semi-autonomous center development.

Objective 2 - To implement a sponsored programs Document Processing Center to aid in research opportunity notification, proposal development and periodic progress reporting.

An upgrade of existing ORD processing capabilities has taken place in lieu of implementation of a state-of-the-art Document Processing Center. Configuration specifications and capabilities have been modified to match identified in-house needs including: enhanced document processing capability, electronic telecommunication linkages, predefined report generation, scanner and facsimile input/output access, graphics enhancements and user friendliness. On-line hookup and local area networking of document processing equipment has been completed, providing access to University research and development news and general information via an ORD electronic bulletin board (currently under development).

When fully operational, the ORD electronic bulletin board will offer current federal and private sector request for proposal (RFP) listings and targeted notices of research opportunities (NROs), University research capability information, current policies and procedures for principal investigators, examples of winning grant proposals and contract applications, and boilerplate forms and institutional information for document development. Networking will additionally permit report notification, generation and filing. All submissions ultimately will have an electronic option.

Objective 3 - To continue to enhance the University's research capability in specific energy related disciplines via development of a programmatic posture with sponsoring agencies to ensure stable long-term funding.

The primary energy related research thrusts continue to be in the areas of Laser/Optics research, Materials Science, and Biomass/Bioenergy research. The Laser/Optics and Materials Science specializations in Physics have received support in the form of establishment of a one million dollar Eminent Scholars Chair and via a multi-year National Science Foundation (NSF) Minority Research Center of Excellence (MRCE) award totaling over \$15 million for operation of a *Center of Excellence in Nonlinear Optics and Nonlinear Optical Materials* (see Objective 1 above). Additional support has originated from the National Aeronautics and Space Administration (NASA), the U.S. Department of Defense (DOD), and the U.S. Department of Energy (DOE) for an extensive variety of related projects in these specialization areas. Among the most prominent is establishment of the *Howard A. Foster Center for Irradiation of Materials*, which promotes minority interest and participation in materials and polymer sciences via training and research at the undergraduate and graduate levels.

Research endeavors in Biology and Plant and Soil Science are multi-faceted, yet related and tied together with an overall Biotechnology theme. Large-scale experimental tree plantings, microscopic biotechnical applications and genetic matter recombination provide avenues for deriving answers to many processing needs, problems and questions in plant bio-matter production, conversion and utilization. Support in these areas from DOE, the U.S. Department of Agriculture

(USDA) and private foundations continues to increase as University involvement and commitment grows. This growth in activity is reflected in the establishment of a variety of University research centers including: the *Alabama Center for the Application of Remote Sensing*, *Center for Molecular Biology*, and *Plant Science Center*.

Research in Fossil Energy and Hazardous Materials/Waste Management has been undertaken in response to a growing social concern. Alabama A&M University successfully placed students and faculty in summer internships and research scientist exchange programs with the Office of Fossil Energy, DOE and several national laboratories. The University also actively supported and participated in the HBCU Fossil Energy Consortium. In the Hazardous Waste Management area, the University participated in developing a Hazardous Waste Management curriculum in association with Batelle Pacific Northwest Laboratories and project development addressing models for minority recruitment and retention, faculty development and outreach in association with the HBCU/MI Hazardous Materials and Waste Management Consortium. In addition, research centers including the *Center for Environmental Research and Training* and *Center for Forestry and Ecology* were established.

Finally, conceptual models for infrastructure expansion and enhancement were developed, as illustrated on the following pages. Table 1 summarizes the energy research grant activity at AAMU throughout the designated funding period. Figure 1 presents an overall research program model for AAMU with broad areas of research specialization, whereas Figure 2 focuses on energy research and highlights the developing administrative organizational infrastructure. Figure 3 graphically depicts a strong trend of increasing activity in energy related research at AAMU throughout the funding period which may be primarily attributed to the *Infrastructure Development to Enhance Energy Research at Alabama A&M University* and *Development of a Research and Public Service Foundation to Support Enhanced Energy Research at Alabama A&M University* grant projects. Figure 4 presents a graph of the funding status of energy research projects throughout the funding period, which also indicates an increasing trend. The impact of infrastructure development assistance on energy research growth at the University appears to have been demonstrably effective and positive.

**TABLE 1. SUMMARY OF ENERGY-RESEARCH RELATED ACTIVITY
AT ALABAMA A&M UNIVERSITY**

<u>Fiscal Year</u>	<i>PROPOSALS SUBMITTED</i>		<i>GRANTS FUNDED</i>	
	<u>Number</u>	<u>Amount</u>	<u>Number</u>	<u>Amount</u>
85-86	17	3,422,366	8	761,954
86-87	24	3,841,148	12	1,158,521
87-88	34	10,629,801	12	1,072,318
88-89	37	5,551,886	13	2,487,646
89-90	34	6,067,598	15	3,201,963
90-91	42	7,983,119	17	3,439,007
91-92	49	11,974,679	30	5,612,787
92-93	47	9,577,519	25	4,730,268

Figure 1. Alabama A&M University Extramural Research Infrastructure

Figure 2. Alabama A&M University Energy Research Infrastructure

**FIGURE 3. NUMBER OF ENERGY RELATED
PROJECTS**

■ FUNDED □ REQUESTED

FIGURE 4. FUNDING STATUS OF ENERGY PROJECTS