ANNUAL REPORT 1990 / 1991

THE HBCU/MI CONSORTIUM

THE HBCU/MI
COLLEGE
MINORITY INSTITUTION
ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT
CONSORTIUM

THE HBCU/MI

The Historically Black Colleges and Universities / Minority Institutions Environmental Technology and Waste Management Consortium

CONSORTIUM

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U. S. DEPARTMENT OF ENERGY

Dr. Clyde W. Frank
Deputy Assistant Secretary
for Technology Development
Office of Environmental
Restoration and Waste Management (EM)

For more than 40 years, the Department of Energy was responsible for designing, developing and producing our nation's nuclear arsenal. Its work, however, has resulted in environmental contamination of nearly 3,700 sites throughout the United States. The cost of cleaning up these sites is estimated to be in the billions of dollars over the next several decades. To successfully meet this environmental challenge, the Department of Energy needs to develop a talented and technical workforce. Yet, a critical shortfall in technically trained environmental management personnel exists nationwide and the Department anticipates a projected shortage of over 10,000 scientists, engineers and technicians in Environmental Restoration and Waste Management (ER/WM) in future years. To meet our technically trained human resource needs, the Department has initiated cooperative partnerships with academia and industry.

In 1990, the Office of Environmental Restoration and Waste Management (EM) funded the Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) Environmental Technology and Waste Management Consortium. This was one opportunity to reach out to historically underutilized and underrepresented groups and provide them access to environmental fields. The HBCU/MI Consortium program supports the commitment of the Secretary of Energy to education, specifically in encouraging more demographically and culturally diverse persons to pursue mathematics and science disciplines at the precollege through university levels.

We believe the Consortium would play several roles. It would:

- Combine the efforts of the participating minority institutions and expand the nation's capability in both the public and private sectors in the management and minimization of radioactive, hazardous and solid wastes;

- Provide curricula and hands-on experiences that have personal and cultural meaning for precollege students and teachers;

- Develop and implement technology-based environmental education and training programs for AA and BS degrees at community colleges and four-year institutions and master's and Ph.D. degrees at the universities;

- Develop long-term partnership programs in environmental research, technology development, and cooperative workforce development with industry, government agencies and private sector companies; and finally

- Increase environmental literacy among minorities by working with community groups, parents and citizens.

As we approach the 21st century, the HBCU/MI Consortium is emerging as a national resource for establishing environmental literacy, environmental career awareness among minorities and research partnerships with government agencies and private entities. The Office of Environmental Restoration and Waste Management of the Department of Energy is proud to be affiliated with the Consortium and share in its commitment to prepare minority personnel for all aspects of leadership in the environmental restoration, waste management and technology development challenge. ■

COUNCIL OF PRESIDENTS' REPORT

Dr. Edward B. Fort
Chairperson, Council of Presidents and Chancellor, North Carolina A&T State University

The HBCU/MI Environmental Technology and Waste Management Consortium was established in January 1990, through a Memorandum of Understanding (MOU) among the member institutions. This group of research-oriented Historically Black Colleges and Universities and Minority Institutions (HBCU/MI) agreed to work together to initiate research, technology development and education programs to address the nation's critical environmental problems. As a group we are uniquely positioned to reach women and the minority populations of African Americans, Hispanics and American Indians.

As part of our initial work, we developed the Research, Education, and Technology Transfer (RETT) Plan to actualize the Consortium's guiding principles. In addition to developing a comprehensive research agenda, four major programs were begun to meet these goals.

- A 5-year, $35 million Academic Partnership Agreement was signed with the U.S. Department of Energy (DOE) to strengthen the academic infrastructure for training minority scientists and engineers for the environmental professions. The DOE funding of $25 million will be matched by another $10 million from industry, foundations, state governments and our member institutions.

CONSORTIUM REPORT

Dr. Kofi B. Bota
Director

The United States is moving into the 21st century with serious energy and environmental problems. There are problems not only with dwindling natural resources, but also confronting past decisions that created pollution due to our energy, defense and commercial activities. Several laws, principal among them the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund, target wastes and hazardous substances so that there is now a clear national mandate to find safer, faster and cost-effective solutions for waste elimination and reduction, treatment, storage and disposal, and clean-up of contaminated environments.

The greater the need for creating new environmental technologies and new solutions, the greater the need for a technologically and scientifically trained workforce. Unfortunately, our educational system has lagged in producing the scientists we need to solve these problems.

Numerous studies have painted a bleak picture of our dilemma. The December 1989 report of the *Task Force on Women, Minorities and the Handicapped* estimates that between 1989 and 2010, the nation will be dangerously short of scientists and engineers. A recent EPA study estimates that we would require 9,000 Ph.D.'s a year to meet projected needs while universities are producing only 2,000 per year.

The same report, *Changing America: The New Face of Science and Engineering*, extended the warning, stating that "The education pipeline—from kindergarten through the Ph.D.—is failing to produce the workers needed to meet future demand. Indeed, unless ...(everyone)...acts in concert, our national science and engineering workforce will continue to erode and the prospects for maintaining an advanced industrial society will diminish."

Our competitiveness in the global marketplace depends upon taking corrective action to reverse existing downward trends in the number and availability of skilled technical manpower. The U.S. has to improve its 7-10 year lag between formulating new ideas and commercial concepts and bringing them to market. The U.S. can no longer continue to segregate academia and industry in its R&D efforts. Technological innovations are so rapid that it is almost impossible for academia to keep up without effective interactions with industry. To the extent faculty lags, so will the advent of new courses. Ultimately, graduates arrive into the new industrial culture that may be five to seven years ahead of them. Industry cannot expect this novice staff to begin solving technological problems immediately.

To address this lack of effective technology transfer mechanisms, government, academia, and industry must foster alliances, building collaborative research efforts and teaching students research skills and the ways of their profession before they leave academe. Besides bolstering the science and mathematics instruction for students and teachers in the precollege environment, educators also must promote the attitude of and opportunities for lifelong learning. Technology changes so quickly--a generation of computer hardware barely lasts five years--that our educational institutions must teach problem solving and learning skills more than knowledge that becomes obsolete. Adults will have multiple careers in the coming decades, and the requirements for change mean continuing education for all adults.

In August 1989, DOE released its Environmental Restoration and Waste Management (ER/WM) Five-Year Plan, which included supporting strong educational programs at all levels. Several months later, in October 1989, the Secretary of Energy and the Chairman of the Lawrence Hall of Science convened a Mathematics and Science Education Conference in Berkeley, California. One of its recommendations was to "increase participation of female, minority, disabled, and disadvantaged students in mathematics and science." Targeting minority groups makes sense: there is a large pool of talent; these groups have been underrepresented despite our nation's commitment to equal opportunity and, moreover, minority populations are becoming a larger percentage of our nation's population.

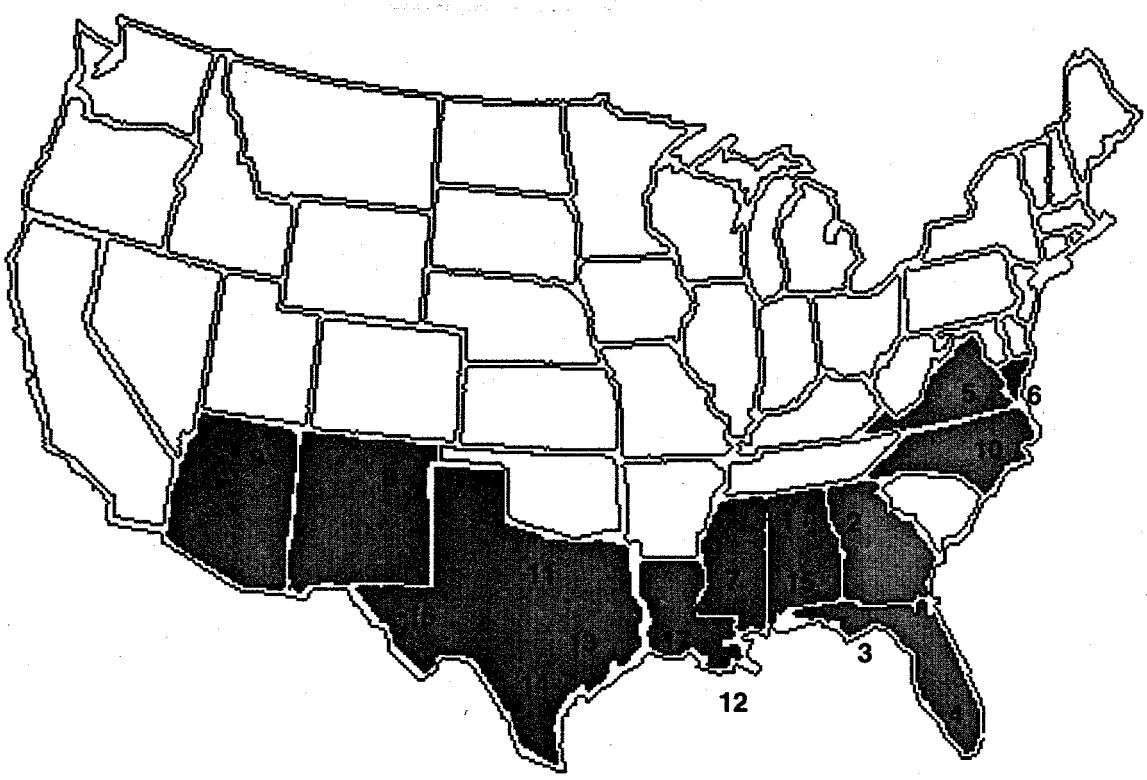
Hispanics, American Indians, Native Alaskans, and African Americans are projected to constitute more than one-third of the nation's population by the early 21st century, but they have decreased enrollments in our colleges and universities. Another source, Rawls, in "Minorities in Science" in *Chemical and Engineering News* (April 15, 1991), reports that 42% of the new entrants into the U.S. labor force are expected to be minorities by the first decade of the 21st century, but currently minorities represent only 4% of the natural scientists or engineers. A greater scientific literacy must be promoted nationally and particularly among the minority populations since therein lies the greatest potential of untapped human resources.

The member institutions of the Consortium are well known for their significant role in training the nation's minority technical workforce. Twelve of the institutions are HBCUs, four are predominantly Hispanic and two have a sizeable population of American Indians. Figure 1 shows the location of these institutions spanning almost from coast-to-coast.

While approximately 80% of African American students attend majority institutions, HBCUs graduate more than half of those who receive bachelor's degrees. The top five higher education institutions producing minority B.S. engineering graduates are members of this Consortium, as are the top two

Figure 1

HBCU/MI Consortium Institutions



Location	University	Minority Population Represented
1	Alabama A&M University	African American
2	Clark Atlanta University	African American
3	Florida A&M University	African American
4	Florida International University	Hispanic, African American
5	Hampton University	African American
6	Howard University	African American
7	Jackson State University	African American
8	New Mexico Highlands University	Hispanic, American Indian
9	Northern Arizona University	Hispanic, American Indian
10	North Carolina A&T University	African American
11	Prairie View State University	African American
12	Southern University	African American
13	Texas A&I University	Hispanic
14	Texas Southern University	African American, Hispanic
15	Tuskegee University	African American
16	University of Texas- El Paso	Hispanic
17	Xavier University	African American

producers of minority Ph.D.'s in pharmacy. Two member institutions produce 16% of the B.S. Engineering Technology degrees awarded to African Americans, while two institutions produce 7% of the B.S. engineering degrees conferred on Hispanics.

With this track record and its existing programs for K-12 educational reforms in science and mathematics, this Consortium is uniquely qualified to develop environmental restoration and waste management programs to fill the workforce gap for the next several years. The HBCUs/MIs provide the role models and nurturing atmosphere to produce minority engineers and scientists and are the best situated resource to make a significant impact on the number of minorities entering the workforce.

While the planning for the Consortium's program was underway, DOE ran a Notice of Program Interest in the April 1990 Federal Register requesting proposals from academic organizations which wanted leadership roles in academic partnership programs for ET/WM. The program's focus was environmental restoration and waste management, with the goal of increasing the number of scientists, engineers, and other professionals (e.g., technicians) in these fast-growing career areas.

Thirteen proposals were received; in September 1990, the Secretary of Energy announced that the HBCU/MI ET/WM Consortium won the competition. In October 1990, a five-year agreement between DOE and the HBCU/MI Consortium was signed.

CONSORTIUM MEMBERS

The Consortium expanded its membership from the original fifteen schools to include Florida International and Texas Southern in November 1991. Institutional descriptions follow this section.

Student Populations

Table 1 lists the demographic data on students at the 17 HBCU/MI schools. Twelve have between 78% and 99% African American students (Alabama A&M, Clark Atlanta, Florida A&M, Hampton, Howard, Jackson State, North Carolina A&T, Prairie View A&M, Southern, Texas Southern, Tuskegee and Xavier). Four institutions have substantial representations of Hispanic students: Florida International, Texas A&I, University of Texas-El Paso and New Mexico Highlands. These institutions show from 44% - 66% minority students. A third minority group, American Indians, have a 4% - 5% representation at New Mexico Highlands and Northern Arizona.

CONSORTIUM PURPOSES AND STRATEGIES

The HBCU/MI ET/WM Consortium's response to the national environmental crisis is to increase minority participation in environmental professions by improving outreach and precollege education; undergraduate education and postsecondary training; graduate and postgraduate education and research; and technology transfer. This plan is called the RETT Plan for Research, Education, and Technology Transfer (See Tables 2 - 5). Highlights of the Consortium programs are described below.

Table 1

HBCU/MI Consortium Institution Demographics*

	AAMU	CAU	FAMU	FIU	HaU	HoU	JSU
Type	public	private	public	public	private	private	public
Faculty	280	250	585	900	325	1,870	380
Students	5,200	4,000	6,500	23,300	5,300	11,200	7,200
% Male	45	31	48	42	38	45	41
% Female	55	69	52	58	62	55	59
% African Am.	79	99	85	10	90	78	95
% Hispanic	<1	<1	1	44	0	<1	<1
% Native Am.	<1	0	0	<1	0	<1	<1
% Asian	<1	<1	0	3	0	1	<1
% Anglo	13	<1	11	38	8	2	3
% International	7	4	2	5	2	18	2

	NMHU	NCAT	NAU	PVAM	SU	TAIU	TSU
Type	public	public	public	public	public	public	public
Faculty	130	420	900	200	530	240	510
Students	2,000	7,100	15,000	5,300	9,100	5,900	10,000
%Male	45	50	47	52	42	51	49
% Female	55	50	53	48	58	49	51
% African Am.	3	86	1	89	91	4	79
% Hispanic	66	<1	6	1	<1	55	7
% Native Am.	4	<1	5	<1	0	<1	0
% Asian	<1	1	<1	1	<1	<1	1
% Anglo	21	12	83	8	5	36	3
% International	6	1	4	<1	2	1	14

	TU	UTEP	XU
Type	private	public	private
Faculty	240	720	260
Students	3,400	16,800	3,100
% Male	49	47	32
% Female	51	53	68
% African Am.	95	3	90
% Hispanic	1	59	<1
% Native Am.	<1	<1	0
% Asian	0	1	2
% Anglo	3	28	6
% International	<1	8	2

Total Enrollment	**>140,400**
Total Faculty	**8,740**
% Male	**46**
% Female	**54**

*As of December 1991

Table 2

MINORITY OUTREACH AND PRECOLLEGE EDUCATION

Goal: To increase the amount, access and quality of mathematics and science education and information dissemination in minority communities.

Objectives	Actions
Develop and institute Math and Science Programs for Minority Parents and Children (Pre-K-12) and pre-college Teachers	• Literacy Programs • Formal/Informal; School-Based/Home-Based Activities • Parental Recognition Programs • Work/Study Programs • Math & Science Enrichment Programs (Saturday & Summer) • Career Awareness and Orientation Activities • Parenting Skills
Promote Public and Private Industry Linkages with Minority Elementary and Secondary Schools	• Adult and Youth Awareness Programs • School-Based Interventions and Awards/Recognition Programs • Industry/Education Developed Learning Materials • Industry Speakers, Precepts, Laboratory Experiences • Student Interactions such as Science and Math Fairs
Develop Core Elements of precollege Programs in the Energy Sciences and Waste Management	• State/Local Education Department Joint Curriculum Planning and design with Energy and Waste Management Industry and national laboratories • Instructional Materials Development • Video Development and Presentation on the range of science-based activities and applications within the energy industry; simple "How to" experiments conducted by industry, university, and national laboratory scientists that can be relocated within local school districts.
Accelerate Certification and Training for the Professional Training of Science and Mathematics Teachers	• Scholarships • Specialized Institutes and Workshops • Participation in Federal, State and Private Industry Research and Development Projects • Teacher Retraining and Continuing Education with Specialities in the Energy Sciences and Waste Management

Table 3

UNDERGRADUATE EDUCATION AND POSTSECONDARY TRAINING

GOAL: To increase the number of qualified minority professionals available to teach and work in the sciences and engineering, especially the energy, materials and environmental sciences.

Objectives	Actions
Develop and implement activities at the undergraduate level that will increase the number of minorities retained in the pipeline for graduate training in the sciences	• Scholarships • Career Counseling Resource Materials • Undergraduate Research Participation • Summer Internships and Coops • Role Model Training Programs for Minority Science Student Mentors
Develop programs to retain minority faculty and trainers as mentors and role models	• Undergraduate Research Programs • Faculty Exchanges • Institutional Rewards for Faculty • Faculty Retention Incentive Programs • Summer Industry Enrichment Programs
Identify elements and recommend implementation of strong undergraduate course of study in the sciences, mathematics and engineering disciplines with minor programs in the energy, materials and environmental sciences	• Special Emphasis Courses - Hazardous Materials, Radioactive and Hazardous Waste Management, Survey Techniques, etc. • Teaching Materials - Textbooks with Industry-defined Programs and Exercises; Computer Software Development; Hands-on training • State-of-the-art Environmental Process and Product Information Conversion to Teaching and Training Materials

Table 4

GRADUATE AND POSTGRADUATE EDUCATION AND RESEARCH

GOAL: To develop nationally recognized capabilities within the Consortium to provide graduate research, education and support to minority students at the master's and Ph.D. levels in those sciences and engineering that support the energy, environment, and solid, hazardous and radioactive waste handling industries.

Objectives	Actions
Develop a clear statement of HBCU/MI Consortium capabilities consistent with federal, state and industry priorities and needs.	• HBCU/MI Consortium Capability Statement
Plan and coordinate the development and support of the Consortium's interdisciplinary academic and research programs that build upon: (a) institutional strengths and track records in the sciences and engineering; and (b) resources of its Associate and Affiliate Members	• HBCU/MI Consortium's Interdisciplinary Program Description • RETT Plan Update Consistent with DOE's Annual RDDTE Plan • RETT Plan Update Consistent with Other Federal, State and Private Industry Programs in Environmental Policy, Hazardous Materials and Waste Management
Provide competitive fellowship support and industry access to minority graduate students pursuing master's and Ph.D. studies at Consortium institutions in energy and environmental sciences and engineering.	• HBCU/MI Consortium Fellowship Program • Summer and Coop Placement in the Public and Private Sectors
Establish partnerships with the public and private energy, environmental and waste management industry for long-term commitment to the development of skilled minority manpower to meet specific industry needs.	

Table 5

TECHNOLOGY TRANSFER

GOAL: To effect technology transfers among HBCUs/MIs, the environmental and ER/WM industry, and federal and state governments.

Objectives	Actions
Create Consortium Technology Development Centers that establish linkages with ER/WM industry and national and federal laboratories and technology centers for the development and application of specific, priority technologies.	• Student/Faculty Placement with Industry as Research and Development Staff • HBCU/MI and Industry Joint Technology Development • Contract and Subcontract Opportunities • Information Clearing House • Faculty Exchange with Industry and Government Personnel
Promote the development of competitive minority technical entrepreneurial talent and businesses in ER/WM areas.	• Resource Exchanges--personnel, specialized equipment, facilities • Joint Technology Development • Minority Technical Businesses (MTB) Resource and Incubator Centers--support services in contract management, business plan development, accounting, patent and non-disclosure policies, marketing, research, prototype development, etc.
Establish ER/WM Minority Manpower Training Centers and Programs	• Credit and Non-Credit Short Courses • ER/WM Management Training Institutes • Joint Development and Sponsorship of Certified Training Programs for Industry and Government Personnel

Table 6

HBCU/MI Consortium Member Institutions Degree Offerings

DEGREES	AAMU	CAU	FAMU	FIU	HaU	HoU	JSU	NMHU	NCAT	NAU	PVAM	SU	TAIU	TSU	TU	UTEP	XU
Allied Health		B				B						B		B		B	
Argribusiness	BM		B						BM		B	B	BM		B		
Biology	BM	BMD	B	BMD	B		B	BM	BM	BMD	BM	BM	BM	BM	BM	B	B
Biochemistry		MD				MD						B					B
Biomedical Eng.														B	B		
Chemical Eng.		B*	B		B	BM			B		B	B*	BM	B		B	
Chemistry	B	BMD	B	BM	B	BMD	B	BM	BM	BM	BM	BM	BM	BM	BM		
Civil Eng.	B	B*	BM	BM		BM		B	B	B	B	BM	BM	B			
Civil Eng. Tech.	AB		B							B		B					
Comp Info Sys		BM	B							B						B	
Computer Sci	BM	BM	BM	BMD	B	BM	BM	AB	B	B	B	BM	BM	B	B	BM	B
Economics		BM	B	B	B	B	B		B	B		B	B	B	BM	B	
Electrical Eng.		B*	B	BMD	B	BMD			BM	B	B	B	BM	BM		BM	
Electromech. Eng.																	
Electronics Tech.																	
Elec Eng. Tech.	AB		B							B	B	B					
Envir. Chemistry										B							
Envir. Science	B			M		B	M	BM		B		M		M	M		
Geochemistry										B							
Geology				BM						BM			BM				
Geophysics										B							
Industrial Eng.		B*	BM	BM					BM								
Ind. Eng. Tech.							B		B								
Law																	
Mechanical Eng.		B*	BM	BM		BMD			BM	B	B		BM	BM	BM	BM	
Mech. Eng. Tech.	AB		B							B	B	B					
Medical Tech.		B		BM						B		B		B	B	B	
Metallurg. Eng.																B	
Marine Science					B												
Microbiology						BMD				BM		B					B
Occup. Therapy				BM								B		B	B		
Pre-Pharmacy										B							
Pharmacology						MD											
Pharmacy			BMDP			B D											B D
Physics	BMD	BM	B	BM	B	BMD	B		B	B	B	B	B	B	B	BM	
Plant/Soil Sci.	D								BM			B	BM	BM	BM		
Political Sci.	B	BMD		B		BMD	M	M		BMD		BM		B	B	B	B
Urban Planning	BM			BM		BM	B					M					

B: Bachelor's Degree
M: Master's Degree
D: Doctorate Degree
A: Associate Degree
***** Dual Degree

Faculty and Curriculum Development

The Consortium institutions have strong science and engineering programs. Table 6 lists the degrees offered in the science and engineering disciplines. Consortium goals include expanding course selections, updating the content of existing courses, and creating multidisciplinary courses to accommodate the requirements of the environmental restoration and waste management area. Member institutions will also develop training and certification programs to certify technicians, increase faculty expertise and promote research activities with the national laboratories, industry, and other institutions.

Recruitment and Retention

The institutions are actively recruiting students into mathematics and science programs, emphasizing the opportunities in environmental science careers. Other activities include peer tutoring and mentoring activities to increase academic skills and support base for students and early involvement in research opportunities to build laboratory skills and provide financial support for college careers. The intention is to bring students as far along into the scientific careers as they may be interested. Bridge programs that reach out to the junior and community colleges expect to recruit some students into continued education. While some may stop at two year degrees with technician training, others may be encouraged to complete bachelor's, masters, or doctoral work in the environmental restoration areas.

Outreach into the Public School System, Community-at-large and Minority Businesses

The Consortium's programs offer support for developing or disseminating environmental science materials or curriculum enhancements for students. The emphasis for K-12 faculty is on updating not only teaching methodologies (e.g., adopting more of a hands-on, process model of instruction) but also content and technology knowledge base to reflect the current work in the scientific community.

Other programs actively market the sciences and involve students in year round programs. School year efforts range from science fairs and classroom demonstrations to after-school and Saturday Academy programs where students are given a hands-on involvement to arouse their interests in science and mathematics. Summer programs vary from two days to six weeks, with residential or commuting arrangements on campus so that students may gain skills and experiences in the sciences, meet and interact with college students and faculty, take college courses and learn about the opportunities and requirements of careers in the environmental sciences and technology.

Outreach activities also target the greater community. Good environmental practices are being fostered, such as establishing and publicizing recycling programs. Programs address community issues in each locale to increase the awareness and involvement of minority communities.

A related outreach activity will target minority businesses in an effort to transfer technology skills so they may become more involved in the environmental restoration and waste management industry. Compared to their larger industrial counterparts, these businesses have limited R&D facilities and limited training dollars. Both factors affect their ability to compete for the technologically sophisticated contracts in environmental restoration and waste management. This outreach work includes assessing the skills and interests of existing

D: Doctorate Degree
A: Associate Degree
* Dual Degree

companies and then directing them to the necessary education or training programs that will make them more competitive.

Evaluation activities will begin during the second year to determine the progress the Consortium is making to increase the scientific literacy and workforce representation of minorities.

The Consortium activities are guided by the Steering Committee and the Council of Presidents. The Council makes policy and approves decisions recommended by the Steering Committee. The Steering Committee, made up of one member from each institution, carries out the programmatic business of the Consortium and directs the work of the Standing Committees. Four standing committees address the basic areas of Consortium activities:

- Minority Outreach and Precollege Programs
- Undergraduate Education and PostSecondary Training
- Graduate and PostGraduate Education and Research
- Technology Transfer

Two *ad hoc* committees also have been formed. The Communications Ad Hoc Committee is addressing the development and implementation of an inter-institutional communications electronic network and newsletter. The Quality Assurance/Quality Control Ad Hoc Committee is developing procedures which will include 1) QA/QC standards and 2) recommendations for a research management system including scheduling, setting budget priorities, establishing technical baseline information, monitoring milestones, evaluating program effectiveness and prepublication materials review.

Strengthening Institutional Infrastructures

Before the member institutions could begin to address these goals, a major part of the Consortium's efforts has been devoted to assessing current institutional infrastructures and determining what systems had to be developed in each institution to address the Consortium goals. Typical activities of this nature include:

- Self-study projects to understand the unique needs of the academic environment and the greater community;
- Hiring administrative staffs;
- Creating new centers;
- Establishing advisory committees to address curriculum updates or interdisciplinary and interdepartmental issues;
- Surveying physical facilities, classroom space, laboratories, and technology requirements;
- Establishing links with national laboratories such as Battelle Pacific Northwest, Oak Ridge, Lawrence Livermore, and Savannah River Ecology Laboratories and government agencies such as the Army Environmental Policy Institute (AEPI) and major research universities;

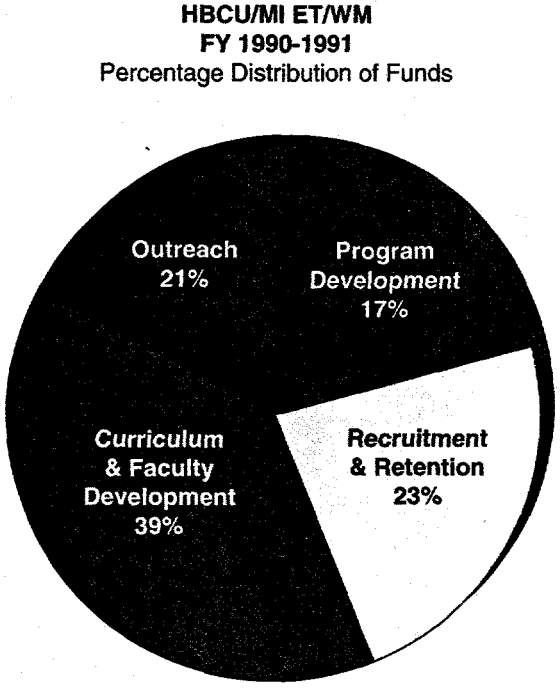
- Producing brochures that promote the environmental science programs at the respective institutions;
- Developing pamphlets on community environmental topics;
- Expanding library resources to enhance institutional support for the new curriculum focus; and
- Departmental meetings to align institutional goals with those of the Consortium and the local and national agenda for environmental restoration and waste management.

CONSORTIUM ACTIVITIES

The Consortium conducted and sponsored several consortium-wide activities. In addition to individual institutional programs, Figure 2 describes the overall distribution of the DOE funding for all programs. These activities included:

April 1991	The Second Annual DOE Weapons Complex Applied Research and Technology Colloquium held in Phoenix, AZ
July 1991	Jackson State University hosted a curriculum workshop to disseminate information about program and course enhancements.
August 1991	A Conference on Mining in the 90's and Beyond: Partnerships, Environmental Demands, Educational Needs and Technology
Sept. 1991	A Conference on Health Effects of Toxic Substances, Remediation and Contingency Planning
Ongoing	Environmental Management Career Opportunities for Minorities (EMCOM) Program--managed by the Associated Western Universities, Inc. (AWU)
Ongoing	Environmental Management Precollege Analytical Chemistry (EMPAC) Program
Ongoing	Partnerships in Industry (PIP)
Ongoing	Prototype workshops designed by the American Association for the Advancement of Science

Figure 2



The Second Annual DOE Weapons Complex Applied Research and Technology Colloquium

At this conference the Consortium was introduced to industry companies which hold major DOE contracts in environmental restoration projects. Speakers provided information on integrating new technologies to solve hazardous and radioactive waste clean-up at DOE weapons sites. More than 30 speakers made presentations on topics related to ongoing research, technology development demonstration, testing and evaluation projects.

Curriculum Workshop at Jackson State University

Ongoing Consortium activities include curriculum development workshops. These provide a forum for sharing the environmental courses and curricula developed at each institution so that they may be replicated or refined and adopted at other institutions.

The first workshop was held at Jackson State. Eleven technical presentations covered topics from regulations to hazardous waste, risk assessment, the business of environmental restoration, specific issues addressed by individual sciences, such as toxicology, and a sample of course and program descriptions at several Consortium institutions.

Working groups met after each technical session to discuss the utilization of each topic at their respective institutions. Work sheets guided the members in preparing an action plan to describe where they would place their curricula focus in the following academic year.

Mine Waste Conference

The conference, *Mining in the 90's and Beyond: Partnerships, Environmental Demands, Educational Needs, and Technology*, had four goals:

- To provide the latest intelligence on upcoming environmental requirements that demand the use of innovative technologies;

- To update technology development priorities within the Bureau of Mines (BOM) and EPA;

- To report on Research, Development, Demonstration, Testing and Evaluation (RDDT&E) projects within the Department of Energy that could be applied to mine waste problems;

- To extend partnerships among DOE, EPA, BOM, United States Geological Service (USGS), Bureau of Land Management (BLM), the states, and the industry to address mine waste management needs.

The conference also disseminated information about the Consortium agendas for improving research training for students and faculty as well as exploring opportunities to become involved in research projects for developing environmental technology and clean-up strategies.

Conference on Health Effects of Toxic Substances, Remediation and Contingency Planning

This conference was designed to bring together HBCU/MI representatives with government and industry professionals involved with health and environmental issues. With a focus on minority perspectives, speakers addressed:

- Local contingency planning issues for emergency situations involving toxic and hazardous materials, including campus procedures necessary for Occupational Safety and Health Administration (OSHA) compliance;

- Environmental legislation;

- Hazardous materials management;

- Epidemiological studies and health effects of toxic substances;

- Risk assessment and communication;

- Curriculum and infrastructure development for environmental science, health and engineering; and

- Scholarships, internships, training, and research opportunities from federal agencies and industry.

In addition to sharing information on these vital topics, the objectives of the conference were for the HBCU/MI representatives to incorporate this information or adapt program components into their individual environmental science programs. Over 150 people attended the conference, representing 24 universities, industry, health and environmental professions, and federal and state agencies. In addition to the DOE funding of the Consortium, the conference received funding from the Agency for Toxic Substances and Disease Registry (ATSDR) and EPA.

The Environmental Management Career Opportunities For Minorities and the Environmental Management Precollege Analytical Chemistry Programs

The Associated Western Universities, Inc. administers two programs for the Consortium: the Environmental Management Career Opportunities for

Minorities (EMCOM) and the Environmental Management Precollege Analytical Chemistry Program (EMPAC). AWU, a consortium of 42 universities, was established to provide a more effective and economical mechanism to plan, coordinate, and administer DOE projects with academic institutions. This mechanism supports an important DOE mission to promote the kinds of educational and training activities in academia that are required by the energy R&D community.

EMCOM

An important Consortium program, the EMCOM program, has as its primary goal to increase the number of qualified minority professionals available to work and teach in environmental science and engineering. Students who are pursuing degrees in fields related to the mission of DOE's Office of Environmental Restoration and Waste Management may qualify for the program. Once accepted, students receive support during the academic year and an opportunity to conduct summer research activities at one of the DOE national laboratories.

The academic year component enables students to study full time, by providing a monthly stipend of $500 for undergraduates and $1,000 for graduate students. Students receive a $1,000 allowance for their projects and are expected to engage in academic year research. Award benefits also include full tuition and fees.

For a minimum of 10 weeks during the summer, EMCOM students conduct research at a DOE laboratory. Summer stipends are $1,000 per month for undergraduates and $1,400 at the graduate level. Travel and housing allowances are also included in these awards. The required summer research experience allows students to actively conduct research in environmental management topics. These experiences blend theory and practice, providing students with a look at the real world applications of their academic pursuits.

While EMCOM focuses primarily on students, it also provides up to a 12-week summer fellowship for faculty R&D opportunities. This opportunity is especially helpful to younger faculty who want to establish new collaborations with DOE laboratories. Faculty stipends are a minimum of $4,000 per month or academic year salary equivalent, plus travel and housing allowance.

While students are at the laboratories primarily to conduct research, the internship is also intended to give students a chance to get the feel of the professional and research environment. The process skills that students learn are best guided by faculty mentors. A New Mexico Highlands faculty member discussed the importance of this role. He was able to help students understand and interface with the new environment and, at the same time, developed a new collegial framework for communication and interaction with the students. Laboratory personnel also appreciate this facilitator role, which eases the student transition to laboratory life.

In FY 1991, students and faculty conducted research at these laboratories:

- Ames Laboratory
- Fermi National Accelerator Laboratory
- Idaho National Engineering Laboratory
- Inhalation Toxicology Research Institute
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory

- National Renewable Energy Laboratory
- Pacific Northwest Laboratory
- Sandia National Laboratory

Twenty-one undergraduates, 5 graduatestudents, and 6 faculty members were appointed to the program, with 12 undergraduates, 3 graduate students and all of the faculty participating in the summer research fellowships. Figure 3 shows the funding distribution. Table 7 shows participants by institution and type. Table 8 lists the 1990-91 participants.

Figure 3

ENVIRONMENTAL MANAGEMENT CAREER OPPORTUNITIES FOR MINORITIES
FY 1991 Program Expenditures

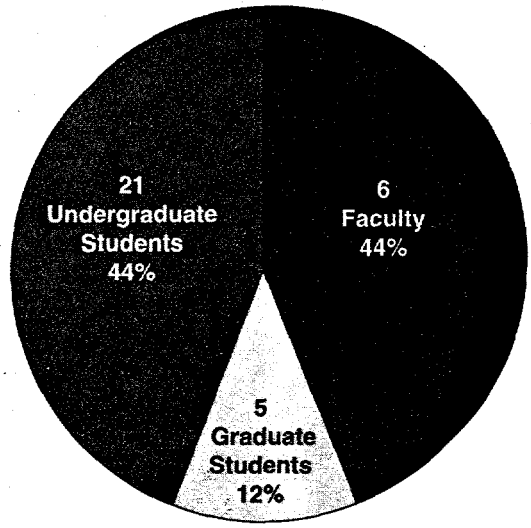


Table 7

ENVIRONMENTAL MANAGEMENT CAREER OPPORTUNITIES FOR MINORITIES

UNIVERSITIES	UNDERGR (U)	GRAD(G)	FAC(F)	TOTAL
Alabama A & M		1		1
Clark Atlanta University	2	1	1	4
Florida A & M University				0
Hampton University	1		1	2
Howard University	1	2		3
Jackson State University	3			3
New Mexico Highlands	3		1	4
N. Carolina A & T	2		1	3
Northern Arizona	1		1	2
Prairie View A & M				0
Southern University	3		1	4
Texas A & I University	1	1		2
Tuskegee University	1			1
Univ. of Texas-El Paso				0
Xavier University	3			3

Table 8

EMCOM Program Participants

University	Name	Status	Lab	Major
Alabama A&M	Charles Woods	G	LBL	Soil Micro.
Clark Atlanta	Lavonn Jones	U		Physics/ME
	Angel Torres	U	AP	Mathematics
	Victorine McDonald	G	AMES	Chemistry
	Lebone Moetl	F	AMES	Chemistry
Hampton	Shawn Galnor	U	LLNL	Chemistry
	Wing Leung	F	LLNL	Chemistry
Howard	Willie Johnson	U	AP	Civil Engineering
	Jocelyn Buckley	G	NREL	Environ. Engineering
	Roberto Smith	G		Elec. Engineering
Jackson State	Sherice McElroy	U	INEL	Mathematics
	Rogers Morris	U	INEL	Math/Engineering
	Pamela Weathersby	U		Biology
New Mexico Highlands	Anita Archibeque	U	LANL	Environmental Science
	Armando Furlano	U	LANL	Environmental Science
	Crystal Furlano	U	LANL	Environmental Science
	Robert Lessard	F	LANL	Geology
North Carolina A&T State	Vardry Austin	U	SNLA	Civil Engineering
	Linwood Peele	U	AP	Civil Engineering
	Keith Schimmel	F	INEL	Chemical Engineering
Northern Arizona	Herbert Kaye	U	ITRI	Biology
	Harold Speidel	F	INEL	Biological Science
Southern	Barbara Lynch	U	PNL	Mech. Engineering
	Felicia Smith	U	PNL	Civil Engineering
	Tolya Thompson	U	PNL	Biology
	Chukwu Onu	F	PNL	Civil Engineering
Texas A&I	Jimmie L. Welborn	U	FER	Physics/Elec. Engineering
	Allen D. Walzel	G		Math/Engineering
Tuskegee	Randy Howard	U		Elec. Engineering
Xavier	Crystal Lewis	U		Chemistry
	William Washington	U		Chemistry
	Alexandra Zippert	U		Physics/Engineering

EMPAC

The Environmental Management Precollege Analytical Chemistry Program (EMPAC) is a campus-based program adopted by the Consortium. EMPAC was initiated by AWU/DOE at San Jose State University in 1985 with the goal of motivating high school students to pursue science and engineering careers. Program highlights of the 7-8 week summer program include:

- Independent and team projects;
- Small class size;
- 4-6 college credit hours, if program satisfactorily completed;
- Mentor relationships with program coordinator, university instructor, and laboratory instructors (high school chemistry teachers) and
- Stipends for students and allowances for laboratory fees, etc.

The choice of analytical chemistry is particularly important to the overall goals of the program. Analytical chemistry teaches research skills, independent thinking and problem-solving in a team environment. The required hands-on experiments develop important analytical and quantitative skills and the emphasis on experiments with an environmental science focus contributes directly to student understanding of environmental issues. Students emerge with a greater respect for their world--both as consumers and potential scientists.

During FY 1991, five Consortium schools planned and developed their individual programs so they could implement the program in summer, 1992:

- Clark Atlanta University
- Hampton University
- Jackson State University
- Southern University
- Texas A & I University

Chemistry faculty members attended AWU workshops on how to develop course objectives and course content, design appropriate laboratory experiments, develop recruitment and selection processes, establish budgets and manage the program in general. Seven faculty members received summer fellowships to participate in this development process.

Partnership Internship Program (PIP)

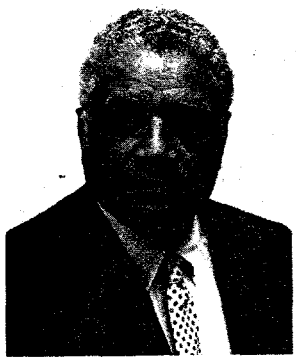
This Consortium program is a pilot internship program that will serve as another link between the HBCUs/MIs and the environmental and waste management industry. PIP will support minority students who have expressed an interest in environmental science and engineering areas by providing industry the opportunity to sponsor internships. A $1,500 monthly stipend will include a housing allowance for the 8-12 week summer internships. The experience will allow industry to serve as mentors to students, establish a direct program planning relationships with HBCUs/MIs and their minority students, and foster increased understanding of professional careers in the environmental restoration and waste management industries.

The internship objectives are either to have students analyze an existing or potential problem related to environmental restoration, waste management, or other related science or technology discipline or work on an existing industry project, conducting research or developing a program or policy initiative. Students would submit internship/ research summaries that would be eligible for entry into Consortium research competitions.

Enviro-Links: Community Outreach Initiative

BTI and the American Association for the Advancement of Science have produced workshop planning documents that will be available for the Consortium institutions to use in their communities. The overall agenda for a community outreach program has four stages: design, development, implementation and assessment/revision. The booklet prepared for the design stage presents a four-part agenda for planning a Community Science and Engineering Directory, Community Science Encounters outline and a Community Outreach Plan:

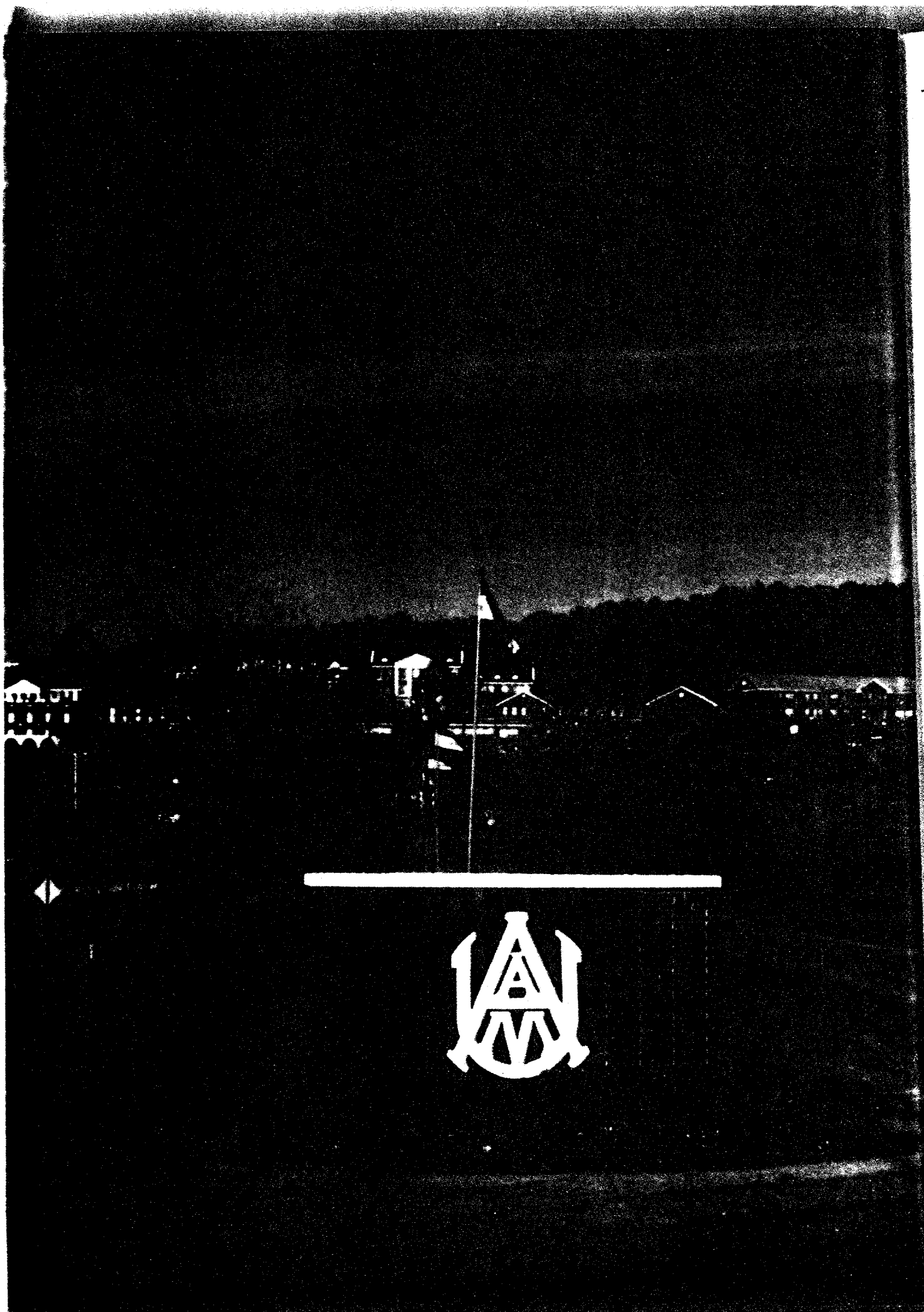
- Awareness of community activities, concerns, interests and connecting scientists and engineers to important community issues;
- Awareness of careers and technology in environmental sciences and workforce requirements;
- Selecting community contexts to make mathematics and science instruction more meaningful; and
- Planning a community science encounter event that will engage students and parents in activities.



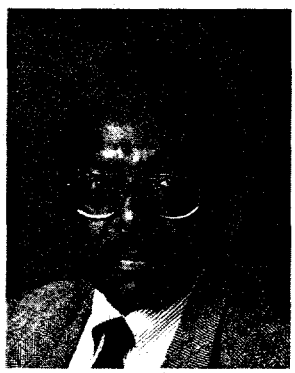
Currently on an Intergovernmental Personnel Assignment (IPA) to Clark Atlanta University, from the EPA, August O. Curley is the program director of the HBCU/MI Consortium. Mr. Curley graduated with degrees in biology, chemistry, and pharmacology from Morehouse, Atlanta University, and the University of Rochester, with advanced training at MIT. After his early teaching career, Mr. Curley worked for the CDC and EPA, with five years as environmental advisor to Egypt's Minister of Industry and the Office of the Prime Minister.

The next section of the annual report describes the individual activities of the seventeen Consortium institutions. ■

Institutional Program Descriptions



ALABAMA A&M UNIVERSITY



Dr. David Henson
President

Alabama Agricultural and Mechanical University (AAMU) is a public, co-educational, land grant institution. The University was organized in 1875 specializing in industrial education. Located in Huntsville, Alabama, AAMU is part of one of the fastest growing science and engineering technology centers in the South that is home of the NASA Marshall Space Flight Center, the U.S. Army Missile Command, Strategic Defense Command and the Redstone Arsenal.

Alabama A&M University reflects the unique tradition of land grant institutions by combining professional, vocational and liberal arts programs. The University offers degree programs at the bachelor and master's levels in five schools: Agriculture and Home Economics, Arts and Sciences, Business, Education, and Engineering Technology. Doctoral degree programs are offered in physics with specializations in optics/lasers and materials science, food science, and plant and soil science. Twenty-eight departments offer 73 undergraduate majors and graduate programs.

Research Interests

Over the past decade, scientific research has made AAMU prominent among the HBCUs/MIs. The University currently manages more than 200 grants and contracts from major funding agencies such as USDA, DOD, DOE, NASA, NSF, NIH and other federally funded programs promoting research in institutions of higher learning.

Alabama A&M has a Center of Excellence in Optics and Nonlinear Materials. Environmentally related research areas include assessment of radioactive waste packaging, acid mine land reclamation, impact of radon gas on genetic mutations of drosophila, variations in chemical properties of New England forest soils, and agricultural crop tolerance to acid soils. The University was selected by USDA as a field site for its forestry program and recently has received a grant to train women and minorities for careers in forest service. One of AAMU's research projects perhaps has traveled farther than a project of any

other HBCU/MI institutions: solution crystal growth experiments have flown aboard two U.S. Space Shuttle missions in the International Microgravity Laboratory.

Research interests in environmental restoration have led to involvement in the Experimental Program to Stimulate Competitive Research (EPSCoR), with DOE and EPA funds targeting energy and environmental activities. This Consortium of Alabama academic, governmental and industrial organizations promotes science and engineering research and education. Under the DOE EPSCoR program, researchers propose to study the transport of volatile organic compounds that are common in DOE sites and then develop mathematical models to predict the fate of contaminants in unsaturated zones of the soil. In general, DOE sites are unique in that they contain mixtures or residues of radioactive materials, metal ions, salts, organic solutes and organic liquids that have created unique environmental problems.

Enrollment at AAMU has increased from an initial 61 pupils with two instructors in 1875 to nearly 5,200 students with 280 active faculty members in 1991. The predominantly African American student body consists of 76% Alabama residents but has significant representation of international students from 45 countries. The student population is 79% African American, with 45% male and 55% female; 76% undergraduate and 24% graduate.

Dr. David Henson is Alabama A&M's eighth president. Dr. Henson obtained degrees in biology and biochemistry and has served in numerous teaching and administrative positions at several institutions, including Howard, Florida Atlantic, Yale and the University of Colorado. Dr. Henson has been extensively involved in civic and community activities and was honored with the *African Americans Who Make a Difference Award* by the Denver *Urban Spectrum.*

FACULTY and CURRICULUM DEVELOPMENT

Center for Environmental Research and Training (CERT)

The Center, with a staff of three, was designed to implement Consortium goals. The Center plans to infuse environmental science, toxicology and hazardous waste management courses into existing programs. Two new courses have been developed through support from the Center--Hydrogeology and

Environmental Instrumental Analysis. Training materials such as textbooks, audiovisuals and video equipment and tapes have been acquired for faculty and student use.

Alabama A&M faculty participated in Consortium sponsored workshops and conferences. They include:

- A University of California-Davis summer intensive course to certify one faculty member in Hazardous Waste Management;
- A three-day faculty development workshop in how to infuse environmental sciences in existing agriculture courses; and
- A forty-hour OSHA training course on Hazardous Waste Management on AAMU's campus by G&S Safey, Inc., of Oak Ridge, TN. Three faculty and two students received certification.

RECRUITMENT and RETENTION ACTIVITIES

Summer apprenticeships were arranged for 23 high school seniors. The students took basic mathematics, English, and science courses in the mornings and conducted research experiments in the afternoon under the guidance of faculty mentors. Students presented papers at the end of the program. Students who successfully completed the academic courses received college credits. Faculty actively recruit these students into the environmental science program.

AAMU created six slots for students to enter the Environmental Science program with emphasis on environment restoration and waste management. Also, one of the major retention activities arranged on campus was establishing a computer laboratory with computer-assisted instruction and tutorials for environmental science students.

OUTREACH ACTIVITIES

AAMU pursued opportunities with community colleges to recruit minorities into four-year and graduate programs in science, mathematics, and engineering disciplines. A cooperative agreement with Oakwood College, J. F. Drake Technical College and several community colleges in Alabama was established.

AAMU's Consortium outreach programs for K-12 students and faculty built upon an extensive base that was already in place (see Table 9).

Programs highlights of the 1990-91 ET/WM activities are as follows:

- A campus recycling program got underway in conjunction with City of Huntsville.
- Seminars were presented 25 Chicago high school students who spent the summer at AAMU to become acquainted with environmental science and its relationship to pollution, remediation, and hazardous waste management.
- A one-week Environmental Science Camp was conducted for high school seniors. Faculty members within environmental sciences described environmental restoration issues and the research they are doing to address these issues.

Table 9

Program Name	Duration	Grade Level	Description
Minority Biomedical Research Support Summer Program	8 weeks	9 - 12	Program designed to create an interest in students to pursue careers in the biomedical fields and conduct biomedical research.
Health Careers Opportunity Program-Project SHARP	4 weeks	Pre-Freshman	The Summer Honors Academic Reinforcement Program, Project SHARP, is designed for academic enrichment in science and mathematics, study skills, test-taking skills, problem-solving, reading skills and comprehension, time management, and ethics.
Project SHARP II	6 weeks	Community College Students	College visitation and outreach in select science disciplines.
Scientist of Tomorrow	1 day	7 - 12	Help low-income first generation college-bound students complete high school and get into and out of a postsecondary institution of their choice.
Upward Bound	12 months	9 - 11	
Elementary School Student Science Training Program (NSF)	2 weeks	4 - 5	Enrichment program in science, math, English, test-taking, career exploration, and computers.

Steering Committee Member
Dr. Jeanette Jones
Vice President for Research and Development
Alabama A&M University
Huntsville, AL 35762
(205) 851-5673 Office
(205) 851-5030 Fax

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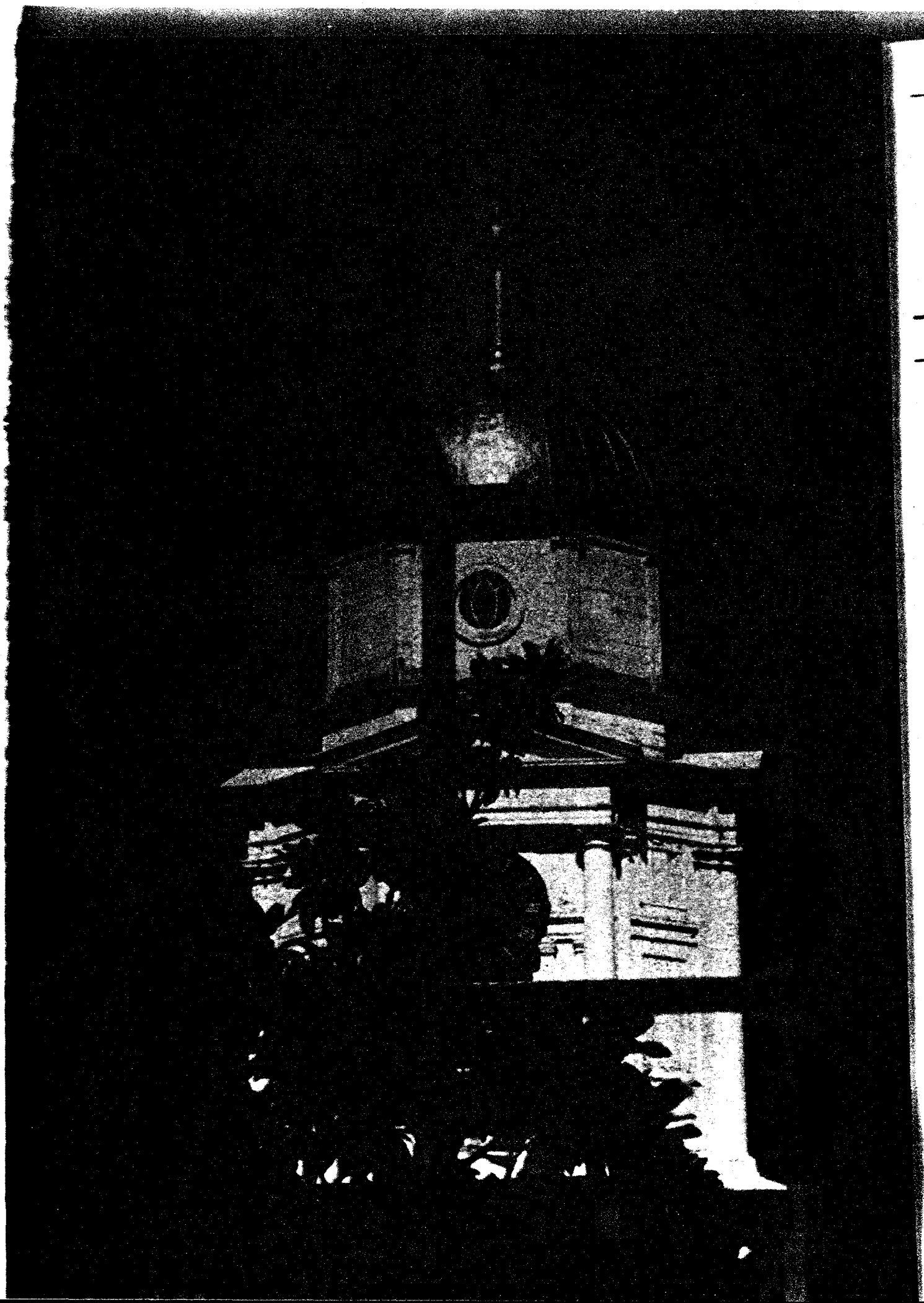


CLARK ATLANTA UNIVERSITY

Dr. Thomas W. Cole, Jr.
President

Clark Atlanta University (CAU), formed in 1988, is the only totally private, predominantly African American coeducational institution of higher education in the United States. CAU inherited and is building upon the mission and heritage of its parent institutions, Atlanta University (founded in 1865) and Clark College (founded in 1869).

The University has five schools: Arts and Sciences, Business Administration, Social Work, Education, and Library and Information Studies, offering 32 undergraduate, graduate and professional degrees as well as nondegree programs. The School of Library and Information Studies has the only accredited graduate program in Georgia. The dual bachelor's degree in Engineering is offered in cooperation with Georgia Institute of Technology, Boston University, Auburn University, Rochester Institute of Technology and Rensselaer Polytechnic Institute.

CAU is a member of the Atlanta University Center (AUC). The AUC comprises six independent, historically black institutions located on contiguous campuses: CAU; Morehouse, Morris Brown and Spelman Colleges; the Morehouse School of Medicine; and the Interdenominational Theological Center. Undergraduates in the AUC have the opportunity to cross register, thus giving them a wider selection of curricula and degree programs.

CAU serves over 4,000 students representing 50 countries and nearly every state in the nation. More than 250 full-time faculty teach and mentor over 2,900 undergraduate and 1,100 graduate students. Located in Atlanta, Georgia, the CAU campus is five minutes from the downtown business and recreational district. This residential campus covers 67 acres.

Research Interests

CAU's natural and engineering sciences, mathematics and computer sciences faculty are very active in research and have major grants and contracts

from the DOE, NASA, NSF, DOD, NIH, other federal agencies and industry. The newly established CAU Research Center for Science and Technology will facilitate interdisciplinary research and collaborative research between the University and national federal laboratories, industry and small high-technology companies. The Center will enhance CAU's role in the Georgia Research Alliance (GRA), a special consortium that includes CAU, Emory University, Georgia Institute of Technology, Georgia State University, the Medical College of Georgia and the University of Georgia. The GRA establishes cooperative R&D projects with private industry and increases the awareness of the exceptional technological capabilities in Atlanta, especially in the environmental, information systems, telecommunications, and biomedical technologies.

CAU has also established a Center for Environmental Policy, Education and Research (CEPER) whose programs will encompass information and data systems, environmental restoration and waste management, atmospheric chemistry and physics, health and ecological effects, environmental policy and analysis, and socioeconomics of pollution control and abatement. An exciting project of the Department of Computer and Information Sciences, for example, involves a cooperative research project with Digital Equipment Corporation and Georgia Tech on multimedia tools for environmental databases.

Dr. Thomas W. Cole, Jr. is the first president of CAU. His Ph. D. in organic chemistry, led to faculty and research scientist positions in academia and industry. He held other high administrative positions at the former Atlanta University and was president of West Virginia State College and chancellor of the West Virginia University System prior to assuming his current position. Dr. Cole has been listed in *Who's Who in the South* and serves on numerous national committees and boards.

CURRICULUM and FACULTY DEVELOPMENT

Under the auspices of the Consortium, the CEPER center staff organized two half-day workshops to introduce administrators and faculty in the natural and social sciences to research, education and policy issues in environmental restoration and waste management. This activity laid the groundwork for:

- Developing concentrations in environmental biology and toxicology in the B.S., M.S., and Ph.D. programs in the biological sciences.

- Promoting Consortium goals with faculty from Atlanta Metropolitan College (a junior college in Atlanta) and Morehouse, Morris Brown and Spelman Colleges; and

- Implementing environmental curricula in the natural and social sciences.

Five faculty members were recruited in environmental, analytical and inorganic chemistry, materials engineering and atmospheric sciences.

RECRUITMENT and RETENTION

Undergraduate Research Experiences Program (UREP)

The retention and mentoring program for undergraduate students is facilitated by the large number of environmentally related projects being conducted by faculty and research scientists at CAU. Stipends and fellowships were provided for undergraduates to work as research assistants to faculty who also served as mentors and role models. UREP has been very effective and will be expanded during the second year. Some of the undergraduate students, in turn, will be assigned as mentors to the elementary and secondary school students in an after-school energy and environmental sciences program to be initiated in the second year.

OUTREACH ACTIVITIES

Several pre-freshman and secondary school programs conducted by CAU in Summer 1991 provided an opportunity to introduce students through talks and seminars to the emerging career opportunities in environmental technology and waste management. These included:

- The Health Careers Summer Program

- The Howard Hughes Scholars Program

- The Minority High School Students Research Apprentice Program

- The Natural Sciences and Engineering Advancement Program

- The Pre-Enrollment Engineering Program

- The Research Careers for Minority Scholars in Geosciences Program

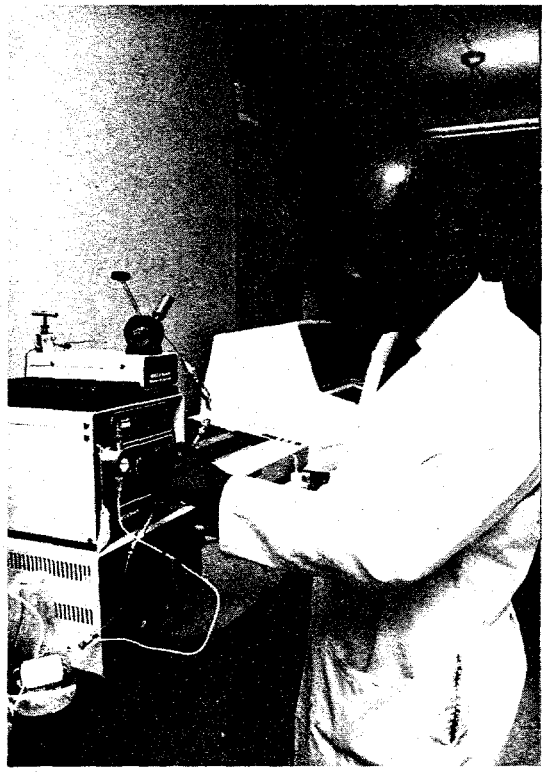
- The Rowland Scholars Program

- The Summer Science, Engineering, and Mathematics Institute

- The Young Scholars Program

The Saturday Science Academy

The Saturday Science Academy is an academic program designed for elementary and middle school students in grades 3-8. The Academy is designed to encourage females and minorities to choose careers in science and engineering. Teachers address barriers and problems that begin in elementary school and continue throughout the public school experience.



Consortium funds enabled the Saturday Science Academy to increase its enrollment in each of the two ten-week sessions. Sixty percent of the participants were females and 95% were African American. Classes were taught by college professors and exceptional middle and high school teachers, assisted by graduate and undergraduate students from the Atlanta University Center.

Inservice Training Programs In Science, Mathematics and Computer Science For Teachers

The goals of the program for K-12 teachers were:

- To introduce new curriculum materials and technological advances, including computer software and interactive video;
- To describe effective teaching strategies appropriate for specific topics and learners; and
- To integrate community resources into science and mathematics education.

This program was designed to upgrade teaching skills, provide resources for teachers who needed to improve their pedagogical skills and help them overcome the fear and anxiety of teaching science and mathematics.

This program was molded after the In-Service Space Science Education Program for K-12 teachers by adding an "environmental theme." The environmental teaching materials were collected from various sources such as EPA's *Lets Recycle, Project Pride*, and Tennessee Valley Authority's *The Energy Sourcebook.*

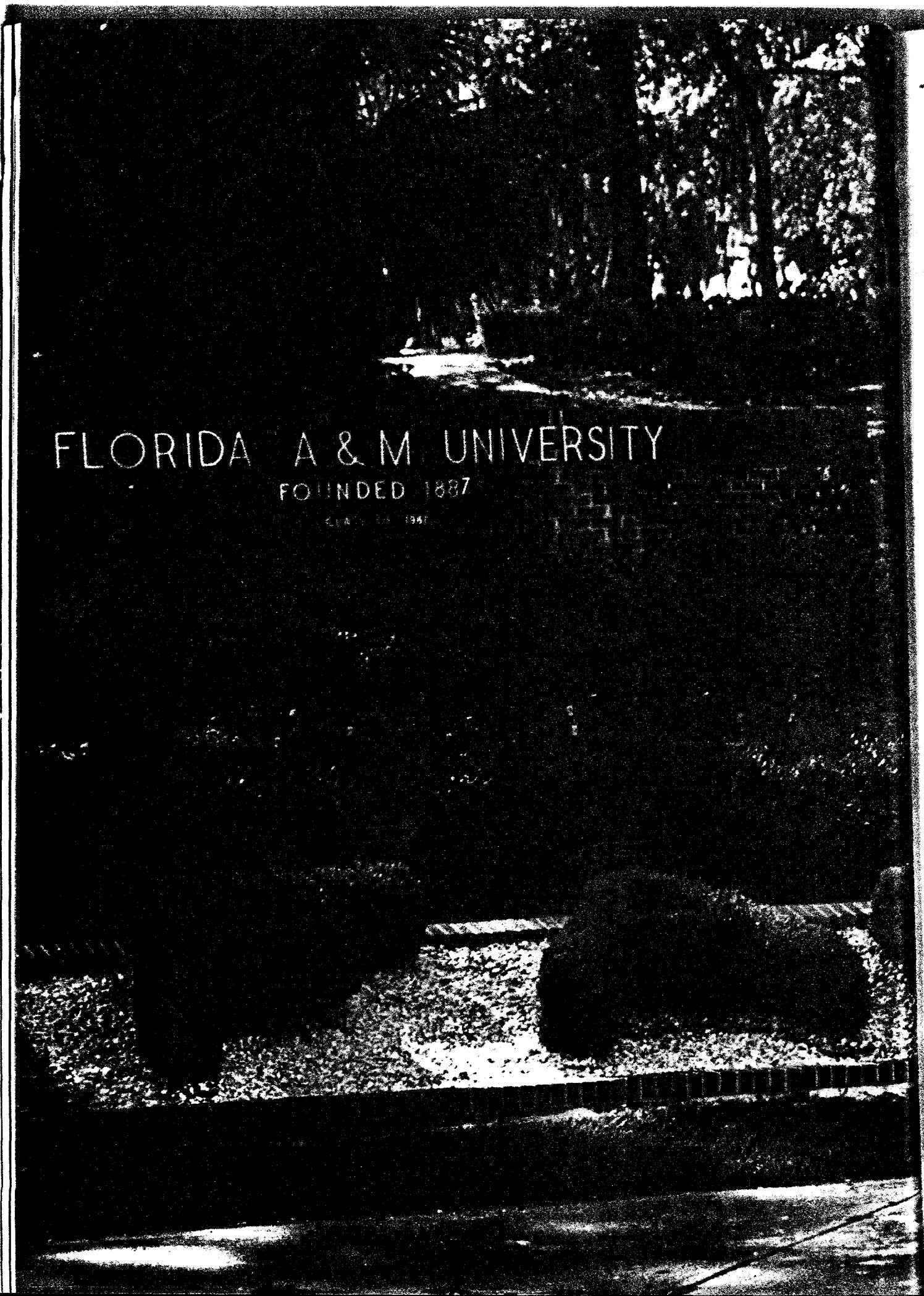
Outreach: Four-year Institutions

Two projects were proposed to develop environmental science curriculum. With Talladega College, CAU will develop beginning in the second year

environmental and analytical chemistry modules. The second project will combine efforts with Central State University and Alabama A&M to 1) develop an environmental science(ES) track; 2) infuse existing biology courses with ES topics; and 3) develop an ES course for non-biology majors.

The plan is to integrate environmental issues into existing course materials, using computers and video technology, and training faculty in the new content and delivery strategies. Pilot studies will allow for an update in procedures and documentation before the curricula are disseminated to other minority institutions.

Steering Committee Member
Dr. Kofi B. Bota
Vice President for Research and Sponsored Programs
Clark Atlanta University
223 James P. Brawley Drive
Atlanta, GA 30314
(404) 880-8597 Office
(404) 880-8522 Fax


FLORIDA A & M UNIVERSITY
FOUNDED 1887

FLORIDA A & M UNIVERSITY

Dr. Frederick S. Humphries
President

Florida A&M University (FAMU) was founded in 1887 and is one of the three oldest universities in the State University System of Florida. It is a land grant institution and offers a wide selection of programs. FAMU's primary purpose is to advance learning and thereby contribute to improving the quality of life for the individuals it serves and their society.

Baccalaureate degrees are offered in 63 fields and master's degrees in 18 fields. The University also offers the Doctorate of Philosophy in Mechanical Engineering, Chemical Engineering and Pharmaceutical Sciences with a specialty in medicinal chemistry or toxicology. A Doctorate of Pharmacy degree is also offered. Recent approvals include two B.S. degrees, six M.S. and two new doctoral programs. Environmental programs are available in civil and chemical engineering in the FAMU/FSU College of Engineering, the toxicology M.S. and Ph.D. programs in the College of Pharmacy and Pharmaceutical Sciences, and M.S. track in environmental sciences in the Biology and Chemistry Departments of the College of Arts & Sciences, and a M.S. program in environmental science in the College of Engineering Science, Technology and Agriculture (CESTA).

Located in Tallahassee, Florida, the FAMU campus covers 419 acres. Current student enrollment is more than 9,100, with 470 full-time faculty. The population is 97% undergraduate, 3% graduate. Approximately 91% are African American; 72% of the student body are Florida residents and 3% are international students.

Research Interests

Faculty provide environmental research opportunities for undergraduates and graduate students in the environmental science and engineering programs. For example, faculty in the College of Engineering Sciences, Technology and Agriculture have several research projects in water quality, wetlands, pollution of soil and water, habitat loss and biological control of aquatic weeds, sustainable agriculture, biotechnology, small animal systems, and aquaculture and rural

development. To enhance the University's research capability in these areas, FAMU is proposing to establish a Center for Water Quality to conduct basic and applied research to protect and improve water quality. Additionally, researchers at FAMU have been monitoring freshwater streams of the Ochlockonee River Basin in North Florida to develop a biotic index for monitoring water quality. These studies have shown that wetlands have all the basic functions of a water treatment plant, except that wetlands operate automatically with little human intervention or extra cost.

Dr. Frederick S. Humphries, FAMU's eighth president, has degrees in chemistry from FAMU and the University of Pittsburgh. Dr. Humphries' accomplishments as educator have won him numerous honors such as the Thurgood Marshall Education Achievement Award and the Pittsburgh Bicentennial Medal of Distinction. He has served on many boards and commissions, including The White House Board of Advisors on HBCUs and chairperson of the Science and Technology Advisory Committee of the National Association for Equal Opportunity in Higher Education (NAFEO).

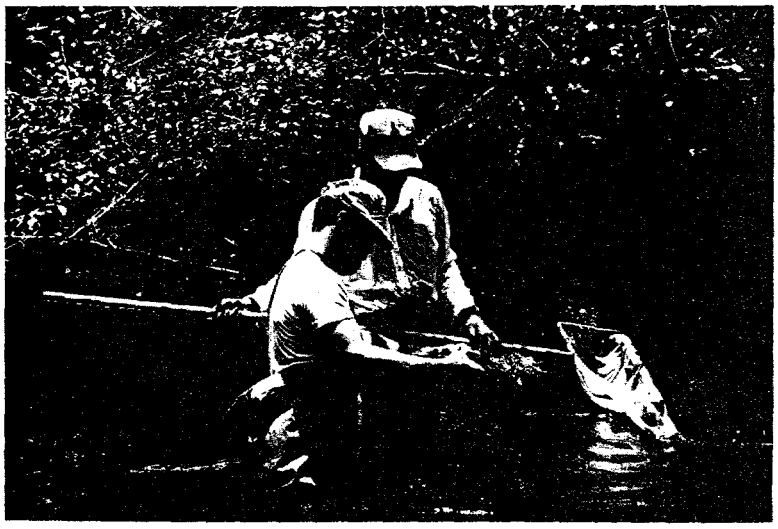
FACULTY and CURRICULUM DEVELOPMENT

To facilitate the infusion of environmental issues throughout the academic programs of the University, an Environmental Studies Group has been organized. This group of faculty and administrators meet regularly to discuss environmental issues and plan activities and programs to support the Consortium goals. During the first year, the Environmental Studies Group developed a new interdisciplinary graduate program in Environmental Sciences, environmental options for the Civil Engineering Technology undergraduate program and the Agricultural Sciences master's program. In addition a Ph.D. program in Environmental Toxicology was implemented.

Faculty participated in Consortium-sponsored conferences and workshops, as well as attending the 14th Annual Conference of the American Association of Blacks in Energy.

RECRUITMENT and RETENTION

At Florida A&M, the School of General Studies enrolls an average of 900 students who have not declared majors. In the fall and spring semester, unde-



clared majors received recruitment information on environmental-related science careers at FAMU. Students with 3.0 GPAs and strong backgrounds in science and mathematics were actively recruited. For students with lower GPAs and less background in science, tutorial services were available to enhance their academic success in environmental related science careers. Career seminars and a Career Day were also offered, as well as academic advisement from the various schools and colleges.

At the graduate level, students were also actively recruited. This aggressive approach led to five students enrolling in the M.S. degree program in Agricultural Sciences with emphasis on an environmental science curriculum with four additional students expected to enroll in 1992.

In an effort to expand FAMU's link with business and industry, the Environmental Studies Group is approaching several local organizations to discuss student internships and collaborative research activities.

OUTREACH ACTIVITIES

Several outreach activities were partially supported by the DOE Consortium funds. They include:

Summer Camp for Careers in Agricultural and Environmental Sciences and Natural Resource Management

FAMU'S College of Engineering Sciences, Technology and Agriculture sponsored a week long camp for 64 minority high school students. The camp site at Lake Placid, Florida, provided the opportunity for hands-on experiences to stimulate the students' interest in agricultural and environmental science careers. Of the five seniors in the 1991 summer camp, three have enrolled in FAMU environmental science programs.

KIMS

The "Kids Involved in Math and Science" (KIMS) program was designed to enhance mathematics, science and reading skills of children ages 4-10. This innovative program is offered Saturday mornings on FAMU's campus throughout the academic year. By focusing on pre-kindergarten and elementary students, intervention can begin during the most important stages of a child's development. This program not only helps prepare children to meet the challenges of a changing society, but also stimulates their interests in the sciences and engineering. Since literacy begins at home, parents play an integral role in this program. They are used as volunteers to promote more individualized instruction during the sessions and later encourage their children's interest at home.

Local Educational Opportunities

Faculty from the Environmental Studies Group collaborated with Florida Institute of Oceanography (FIO), the state's oceanographic and marine research consortium. FAMU will identify a group of teachers and students from northern Florida and southern Georgia and three FAMU students to participate in research and educational programs.

The Panhandle Center of Excellence in Mathematics, Science, Computers and Technology serves 18 school districts in the area. The center promotes mathematics, science and computer activities by conducting in-service training for K-12 science teachers in the 18 districts of the Florida panhandle. Center staff disseminates initiatives from local, state and national groups and assists in

curriculum and resource development. The director of this center is a member of the Environmental Studies Group and will target future efforts to provide information and curriculum guidelines for environmental education.

Both the Institute and Center programs are designed to increase exposure of elementary and secondary teachers to new research opportunities, increase their awareness of environmental science careers and encourage the infusion of environmental science issues and experiments in their curricula. They also provide the foundation for alternative teaching strategies to improve students' academic performance in disciplines critical to their success in environmental careers. Teachers from these programs serve as members of the Elementary/ Secondary Educators Advisory Committee for Environmental Sciences to insure program success.

Florida Comprehensive State Center for Minorities (FCSCM)

The FCSCM program is a career access program at FAMU designed to increase the interest and enrollment of minority students in science, engineering, and technology, particularly Hispanics and African Americans. This Center serves 200 students in grades 4-12, community college transfer students, undergraduate and graduate students. The Center's programs are designed to:

- Identify and track with a database academically promising students who demonstrate a propensity for learning mathematics and science subjects;
- Improve the quality of mathematics and science instruction received by minority students in Florida;
- Improve academic achievement of minority undergraduate students in science, mathematics, and engineering programs; and
- Increase the number of Florida minority students who earn graduate degrees in science, mathematics and engineering.

The FCSCM engages the community, government and business in collaborative efforts to deliver these programs. Some of the activities are described below.

Summer Programs

The Minority Introduction to Engineering (MITE) Program supported 75 high school juniors and seniors for a two-week workshop. Students were introduced to the science and engineering professions while learning mathematics and research skills to improve their ability to succeed in an engineering curriculum. The Minority High School Research Apprentice Program (MHSRAP) brought 15 high school students for a six-week research experience with faculty mentors. The Engineering Concepts Institute (ECI) is a rigorous six-week preparation for freshman calculus, physics, and chemistry offered to 30 newly admitted engineering students prior to their fall semester at FAMU.

Ongoing Activities

- The Environmental Studies Group coordinated activities for the Developmental School Science Fair for high school students.

- Faculty in the FAMU/FSU College of Engineering supervised research projects of two groups of students: seventh and eighth graders (sponsored by the county's Junior Scientist Program) and of juniors and seniors state-wide (sponsored by the NSF Young Scholars' Program).

TECHNOLOGY TRANSFER

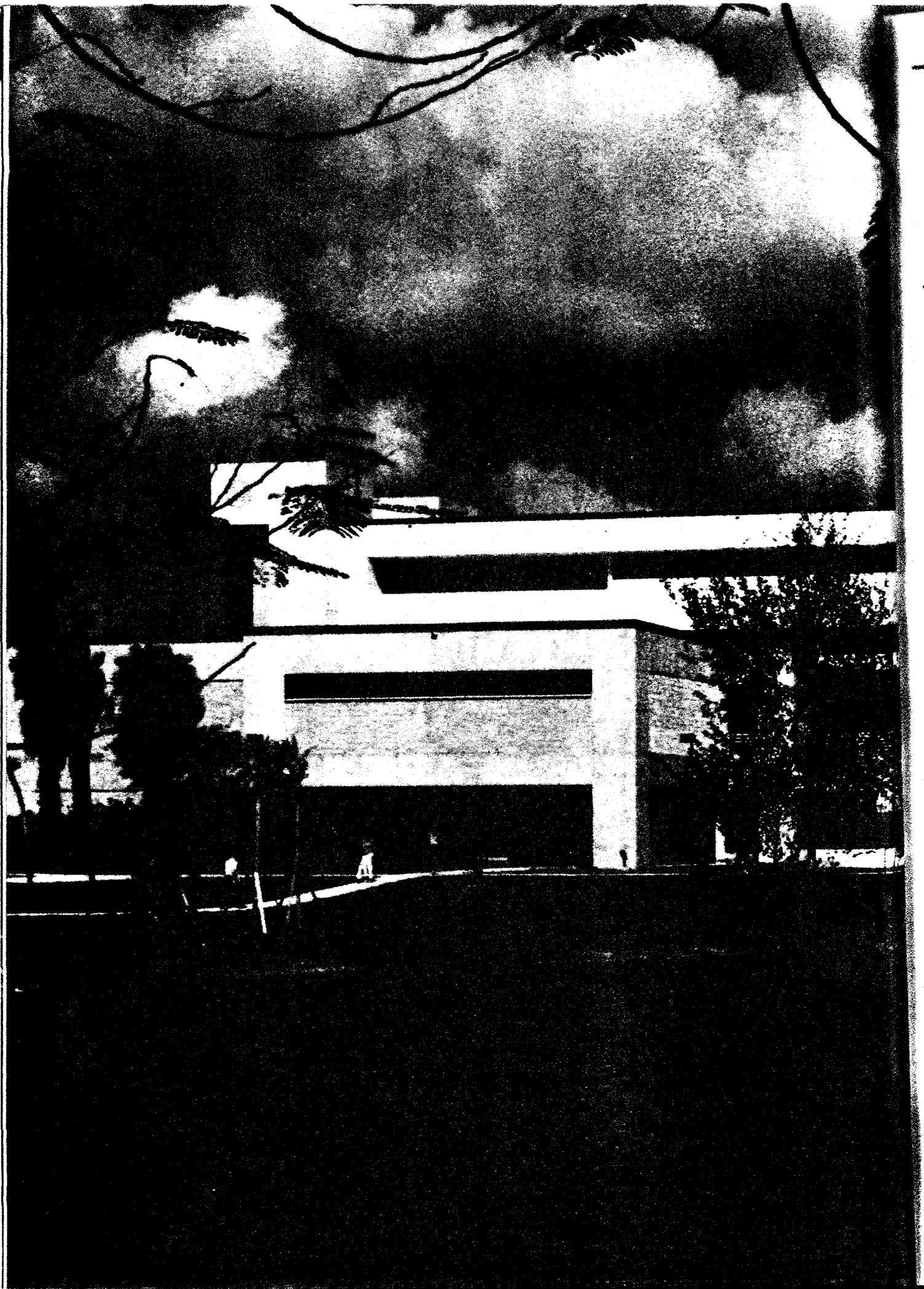
Demonstration Farm Projects

FAMU's Cooperative Extension Program won a Florida Governor's Energy Office award for an agricultural energy conservation project using demonstration projects on two small-scale farms in Gulf and Gadsden counties. Researchers will investigate alternative technologies for small farmers that are environmentally sound, socially acceptable and economically viable. The project will educate small-scale farmers about improving soil sustainability with energy-saving techniques while encouraging less reliance on chemical fertilizers, herbicides and pesticides. Internships and joint collaborative efforts are being explored.

Establishing Links with Minority Contractors

As part of the Consortium's efforts to encourage more minority firms to become involved in ET/WM projects, FAMU staff members have been contacting agencies to provide lists of minority contractors. The intent is to establish links with contractors in order to promote transfer of skills and technology necessary for these contractors to bid on more ET/WM projects.

Steering Committee Member
Dr. Charles Kidd
Dean, CESTA
Florida A&M University
P. O. Box 338
Tallahassee, FL 32307
(904) 599-3550 Office
(904) 561-2248 Fax



FLORIDA INTERNATIONAL UNIVERSITY

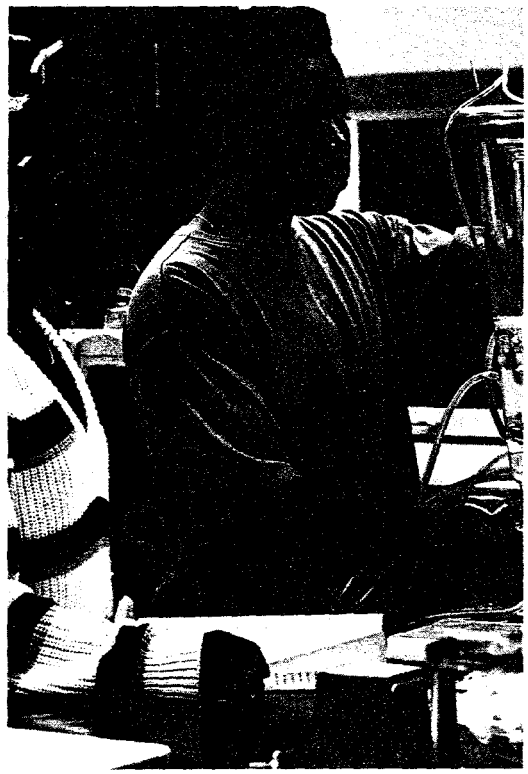
Dr. Modesto Maidique
President

Florida International University, a member of the State University System of Florida, is a comprehensive multi-campus institution offering a broad array of undergraduate, graduate and professional programs. FIU is the largest university in southern Florida and the fastest-growing public university in the United States. The youngest of the Consortium institutions, FIU began offering classes in 1972 with 6,000 students enrolled in upper-division and graduate programs. The University has two campuses, University Park in southwest Dade County and the North Miami Campus on Biscayne Bay, and two academic centers that serve Broward County.

Through its 12 colleges and schools, FIU offers more than 180 bachelor's, master's, and doctoral degree programs, conducts basic and applied research, and provides public service. Committed to both quality and access, FIU meets educational needs of traditional students and serves the increasing number of part-time students and lifelong learners. Interdisciplinary centers and institutes are responsible for teaching and research in economic, environmental, scientific and social concerns.

In the sciences and engineering fields, Florida International offers 10 B.S. degree programs and 12 M.S. degree programs. Also, doctoral degree programs have been established in biology, computer science and electrical engineering, and mechanical engineering. FIU enrolls approximately 23,000 students and has 800 full-time faculty, making it the fifth largest public university in the state. Of the total student body, 45% are Hispanic; 10% are African American; 3% are Asian; international students represent 5% of the population; 87 percent are undergraduate students; 58% are female; and 42% are male.

During 1990-91, the School of Engineering graduated more Hispanic engineers than any other engineering school in the nation. Each of the six engineering programs ranks in the top ten in the number of Hispanic students enrolled. For the past three years, FIU has been listed in the *U.S . News and*



World Report survey of "America's Best Colleges" as one of the best comprehensive universities in the country. It is also cited in "Barron's Guide to the Most Prestigious Colleges" and Fiske's "Best Buys in College Education."

Research Interests

FIU is actively conducting research in environmental and hazardous waste management areas. Research funding per faculty member within the College of Engineering is the second highest of all the engineering schools in the state. FIU has leading-edge facilities and equipment, with a high caliber faculty who have applied their experience to environmental research. Examples of current environmental research of the faculty include the following topics:

- Producing a liquid concentrate by evaporating water from waste water (Mechanical Engineering);
- Using high energy electrons for treating and purifying water and waste water (Drinking Water Research Center);
- Oil pretreatment technologies to improve performance of reverse osmosis systems (Civil Engineering);
- The effects of mercury pollutants on biological organisms (Biology);
- The effects of electromagnetic pollution on humans (Electrical Engineering);
- Toxic chemicals and materials in the soil and atmosphere (Chemistry);
- The effects of overdevelopment on the local environment and economy (Environmental Studies);
- Theoretical half-lives of radioactive materials in industrial waste products (Physics); and

- Decontaminating radioactive concrete surfaces using microwave technology (one of three institutions in the world conducting this research).

The president, Dr. Modesto Maidique, has three degrees from MIT and one from Harvard. He has distinguished himself as scholar, teacher, corporate executive and business consultant. He has been listed as one of the "100 Influential Hispanics" in America by *Hispanic Business Magazine*.

CURRICULUM and FACULTY DEVELOPMENT

FIU, led by the Mechanical Engineering Department, plans a two-pronged focus to expand its environmental science and engineering curriculum. As part of the required core curriculum for all entering freshmen, the University has provided academic departments with tools to develop courses on "world prospects and issues." This topic is ideal for infusing environmental science and waste management issues. Initially, College of Engineering and Design courses will be revised to include environmental issues. The second focus addresses the development of a Hazardous Waste Management option within Mechanical Engineering and the addition of a B.S. and M.S. degree in Bioenvironmental Engineering. FIU plans to hire additional faculty to support these programs.

The Mechanical Engineering Department is also sponsoring guest lectures on environmental science and engineering, and promoting interdepartmental contacts among faculty scientists from Environmental Studies, Environmental Engineering, Biology, Chemistry, Physics, the Drinking Water Research Center, and the Florida Atlantic University (FAU)/FIU Joint Research Center. The Department of Environmental Resources Management (DERM also proposes to design a lecture series emphasizing ER/WM.

RECRUITMENT and RETENTION

Black Educational Scholarship Trust

FIU has created the Black Educational Scholarship Trust (BEST), an aggressive program of recruitment, retention, and graduation of outstanding young African American students in South Florida. FIU's commitment is to double African American student enrollment within the next five years. Under the auspices of the HBCU/MI Consortium, faculty will work with these students to promote their interest in environmental sciences.

Academic Opportunity Program

Academic success is the foundation on which the Academic Opportunity Program (AOP) is based. Since 1988, talented African American students who have potential for academic success have been recruited to remain in South Florida for their higher education. Qualifying students must have a recommendation from their school principal, at least a 3.0 GPA, a record of school and community involvement and an acceptance score on either the SAT or ACT exams. AOP includes full tuition awards, financial aid counseling for families, and attendance at summer (a residential program) and fall orientations.

OUTREACH ACTIVITIES

The following programs have been part of FIU's efforts to recruit students into mathematics and science programs. Consortium efforts will go toward

increasing an environmental research and waste management awareness in the K-12 student and teacher programs.

The Minority Biomedical Research Support Program

The Minority Biomedical Research Support (MBRS) program taps into NIH funds set aside for minority educational institutions to support student participation in faculty research. Student exposure to the latest in biomedical research nurtures their interest and skills to allow them to move into medicine or medical research. The program currently involves 8 senior research faculty members, 9 graduate and 13 undergraduate biomedical students.

Student Achievers in the Black Life Experience

Student Achievers in the Black Life Experience (SABLE) is a cooperative venture among FIU, the Dade County Public School System, and a variety of community agencies, businesses, and organizations. It is designed to provide educational motivation and preparation of minority high school students and support for parents in completing college admissions and financial aid processes. High school students participate in a variety of college activities and have the opportunity to participate in another FIU program, Partners in Progress (PIP).

Partners In Progress

The Partners in Progress Program (PIP)is a cooperative effort between FIU and the Dade County Schools. Its objective is to increase the representation of African Americans and other minorities in Florida's public colleges and universities. In PIP-I participating tenth graders receive intensive mathematics and English instruction to prepare for college entrance exams. Workshops also coach students on how to prepare for college. These students qualify for the PIP-II segment. In this phase, participants receive a scholarship to attend college courses at FIU during the summer. Any of these students who are admitted to FIU are awarded four-year tuition scholarships.

Florida Action for Minorities in Engineering (FLAME)

The Florida Action for Minorities in Engineering (FLAME) has the following 6-phase approach to recruiting students into the sciences and engineering, covering their last three years in high school:

Phase I	A 3-week summer residential program for students entering the tenth grade.
Phase II	During their sophomore year, students take "Introduction to Engineering and Critical Thinking Skills" in addition to their regular mathemathics, science and English high school courses.
Phase III	In this phase, the students attend the Engineering Summer Institute, their second residential program.
Phase IV	During their junior year, students attend FIU every day for two class periods and take Applied Mathematics and Applied Engineering Principles in addition to their regular load.
Phase V	In this phase, students participate in a 6-week "Executive Internship Summer Program" in which students are placed in engineering or engineering-related companies.
Phase VI	During their senior year, students take 6 credits of dual enrollment courses at FIU and also take Applied Mathematics II and Applied Engineering Principles II.

The program has been in existence since 1988. It has grown from 35 African American students from the Dade County Public School System to 110. The program's success led Dade County to create the first engineering magnet school in Florida. This program has significantly increased the number of African American students entering engineering at FIU as well as other institutions.

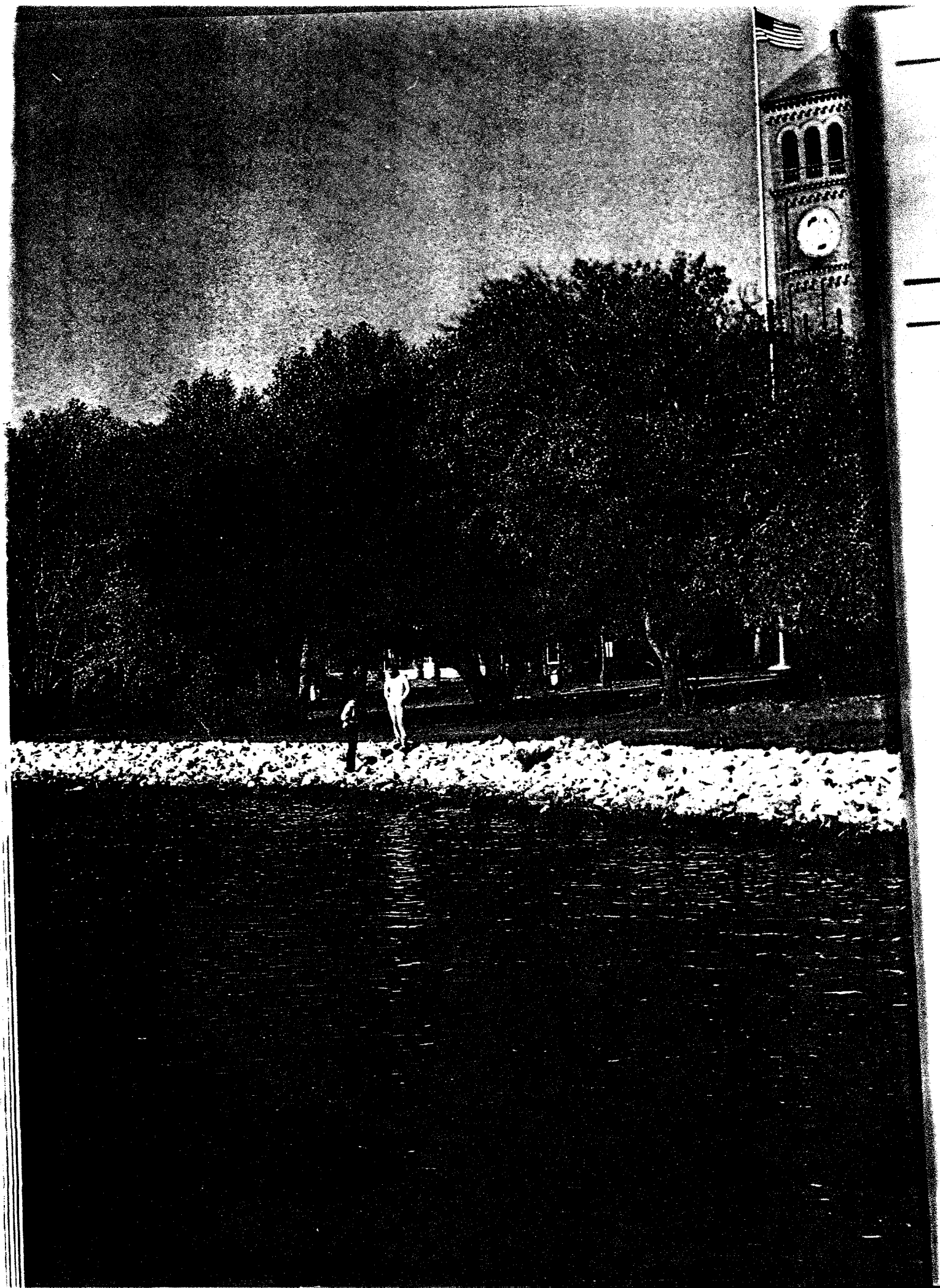
Project Second Step

This pilot program likewise has joint sponsorship with the Dade County Schools. The audience this time is adults at any of several stages in their education: those who have not completed high school; high school graduates and those who would like to begin college studies, possibly to pursue a career in engineering. The goals are to provide motivation and background to assist them in getting a high enough SAT score in order to enroll in FIU's engineering programs. Students receive intensive training in mathematics, English, science and computer literacy. At least one day a week is spent on campus providing students with hands-on laboratory experiences.

Recycling

FIU has long provided the local community with a central location for disposing recyclable paper and newsprint. FIU is currently participating in an intense recycling program that impacts each student, faculty and staff member on its campuses. All university offices are required to separate recyclable paper and place it in special receptacles.

Steering Committee Member
Dr. M. A. Ebadian
Chairperson, Department of Mechanical Engineering
College of Engineering and Design
Florida International University
University Park, Miami, FL 33199
(305) 348-2446 Office
(305) 348-1932 Fax



HAMPTON UNIVERSITY

Dr. Willam Harvey
President

Hampton University, founded in 1868, is located on 204 acres of Virginia's Peninsula. Hampton is a privately endowed, coeducational, nonsectarian institution. It is organized into three colleges: Hampton Institute (The Undergraduate College), the Graduate College, and the College of Continuing Education. The Undergraduate College has five schools: Arts and Letters, Business, Education, Nursing, and Pure and Applied Sciences. Within these schools, the bachelor's degree is offered in 39 areas and the master's in 27 majors. The College of Continuing Education offers nontraditional degree programs.

Currently, the University has an enrollment of 5,300 students representing 49 states and U.S. Possessions. Of these, 90% are African American and 2% are international students. Hampton has 330 faculty members who have strong commitments to education, research, and public service.

Research Interests

The School of Pure and Applied Sciences participates in a number of cooperative agreements with private industry. Among these are Brookhaven National Laboratory, the Upjohn Company, Battelle Memorial Institute, AT&T Bell Laboratories, and IBM Research Laboratories. In 1981, Hampton joined the Southeastern Universities Research Association (SURA). The Consortium consists of 38 institutions extending from Maryland to Louisiana. SURA is dedicated to the development and conduct of large-scale scientific projects primarily in the physical and engineering sciences. A recently funded environmental assessment project is aimed at studying the impact of the storage of dredge spoils landfill on water systems.

Hampton's president, Dr. Willam Harvey, received his doctoral degree from Harvard in College Administration and has held several high level administrative positions at universities, including Fisk and Harvard. A businessman and author, Dr. Harvey has been recognized by many publications, including *Who's Who in America* and the international *Who's Who of Intellectuals*.

FACULTY and CURRICULUM DEVELOPMENT

A curriculum committee designed an enrichment module for undergraduates majoring in the traditional sciences for future training and employment in the field of environmental science. Students involved in the Environmental Science program will fulfill all degree requirements for one of the majors in the School of Pure and Applied Sciences while also obtaining background that will enable them to apply aspects of their basic science training to solving environmental restoration and waste management problems. Students will begin the module in their junior year. The module consists of four required core classes (12 hours), and one elective course.

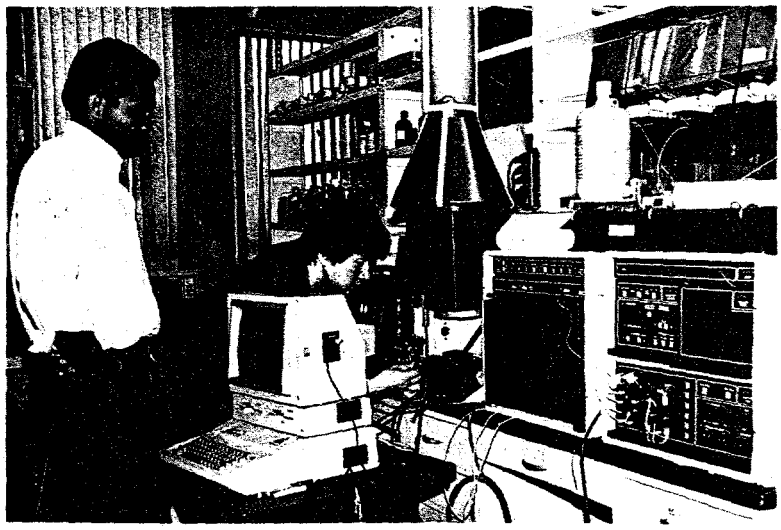
The Environmental Science Curriculum Enrichment Module includes six existing and four new courses, selected from the biology, marine science, chemistry and engineering disciplines. The four new courses are 500 level courses and include:

- Environmental Toxicology
- Environmental Sciences Seminar
- Research Problems in Environmental Science
- Environmental Science Internship

Electives options for the Environmental Sciences Enrichment include:

- General Ecology
- Advanced Analytical Chemistry
- Environmental Chemistry
- Introduction to Environmental Engineering
- Research Problems in Environmental Science
- Environmental Science Internship.

Faculty development activities included Consortium-sponsored activities. Hampton faculty also participated in a number of other faculty development



activities including:

- The International Environmental Analytical Chemistry/Metal Speciation Symposium
- The American Chemical Society - EPA Waste Testing and QA Symposium
- A Toxicology Course

RECRUITMENT and RETENTION

Scholarships

Three $4,000 scholarships were awarded to juniors, one in chemistry, one in marine science and the third in engineering. These scholarship recipients will fulfill degree requirements in their respective majors, and will take the Environmental Science Enrichment Curriculum Module leading to matriculating in the planned M.S. degree program in Environmental Sciences.

OUTREACH ACTIVITIES

Summer Program

A two-week summer program was offered to junior high school students. Twenty students drawn from several schools in the Hampton Roads area participated in a variety of environmental science activities including the following:

- Using videos addressing a variety of environmental issues and phenomena to stimulate classroom discussion
- Demonstrations
- Field trips
- The development of an environmental project

Proposals for projects to be done by students with assistance from participating faculty were completed during the summer. The proposed projects will

be executed by students when they return to school in the fall, with assistance and mentoring by Hampton University faculty.

Hazardous Materials and Waste Management Program

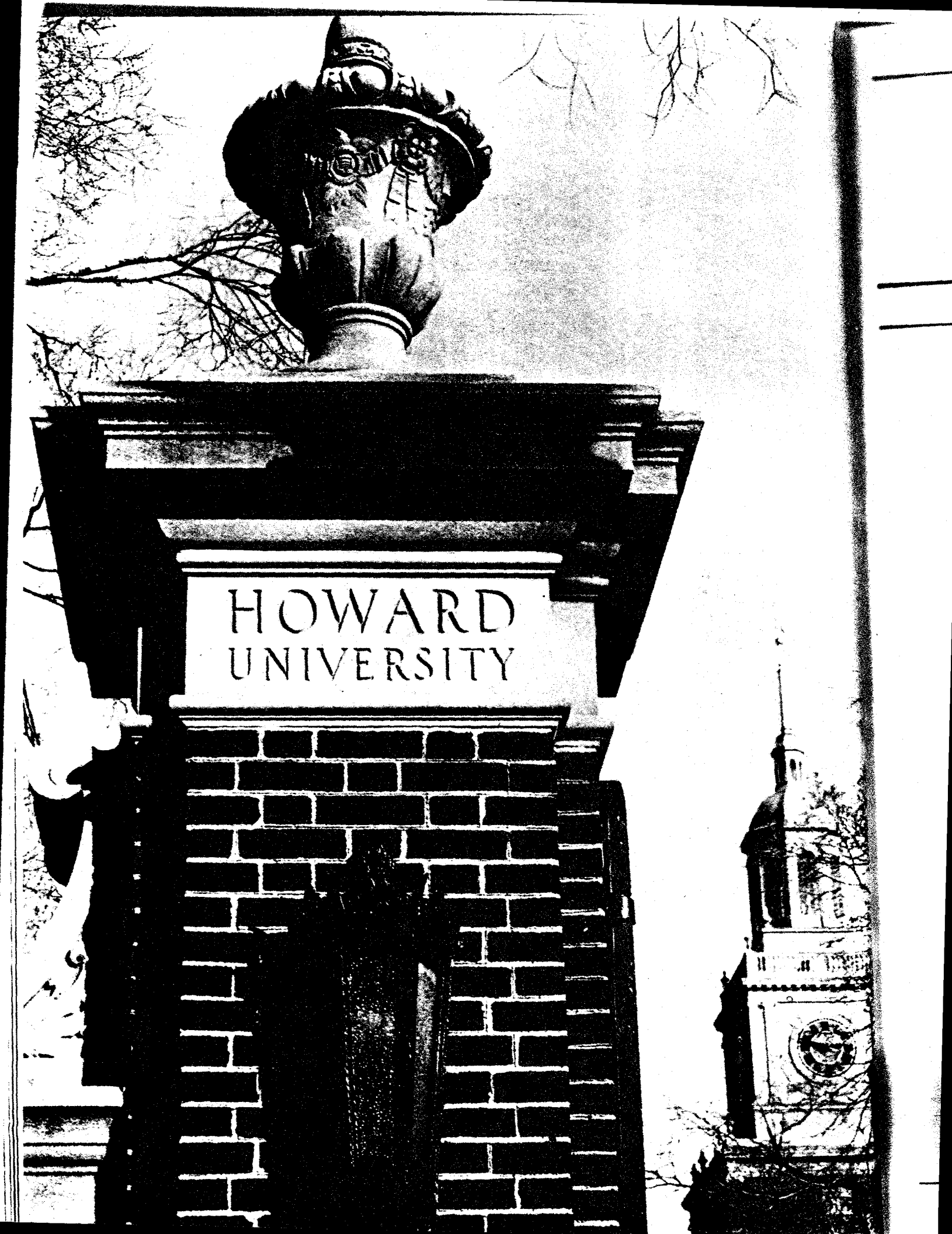
This university-wide program addresses the handling of hazardous materials, waste disposal, and the overall safety of individuals who may be exposed to these kinds of materials. It encompasses chemical handling from reviewing safety data sheets to the removal of chemical and radioactive waste. Under the leadership of the Radiation Safety Officer, a Radiation Safety Program ensures that the University community is protected from exposure to radioactive materials.

Recycling Program

A comprehensive university-wide recycling program is being developed involving staff from the University's Buildings and Grounds Department. Initial efforts targeted selected buildings and sites on campus. An alliance with the City of Hampton which just implemented a mandatory recycling program for city residents was established. All standard recyclable materials were included.

Once the pilot program is implemented, a pellet-making system will be developed to convert newspapers, corrugated cardboards, and other materials into pellets. These pellets will then be used in steam plants as fuel. The pelletization project was implemented in 1983 and then discontinued. The community is enthusiastic about reviving it to complement the recycling efforts. The University is underwriting most of the cost for this program. A program brochure is being disseminated to a wide range of groups and organizations including area high schools, junior high schools, and community colleges.

Steering Committee Member
Dr. Isai Urasa
Chairman, Chemistry Department
Hampton University
Hampton, VA 23668
(804) 727-5396 Office
(804) 727-5084 Fax


HOWARD
UNIVERSITY

HOWARD UNIVERSITY

Dr. Franklyn Jenifer
President

Howard University, founded in 1867, is a coeducational private institution located in the northwestern section of Washington, D.C. The University has achieved worldwide recognition for its standards of excellence and for its contributions to many professions, including medicine, dentistry, engineering, science and law. Howard has become a national resource for individuals who are underrepresented in the sciences and engineering. In a survey entitled "America's Best Colleges," by *U.S. News and World Report* (September 30, 1991), Howard was ranked as one of the country's best national universities.

Howard University consists of eighteen schools and colleges: the Graduate School of Arts and Sciences, the Schools of Architecture and Planning, Business and Public Administration, Communications, Continuing Education, Divinity, Education, Engineering, Human Ecology, Law and Social Work; and the Colleges of Allied Health Sciences, Dentistry, Fine Arts, Liberal Arts, Medicine, Nursing, Pharmacy and Pharmaceutical Sciences. These schools offer the bachelor's to the doctoral degree in over 200 areas of concentration.

Howard had a 1990-1991 enrollment of 11,200 students. Approximately 13% of the students are from Washington, D.C.; 70% are from other states; and 18% are international students representing over 100 foreign countries and U.S. possessions. Howard has over 1800 faculty. Approximately 78% of the students are African American.

The Howard University campus covers 241 acres, including a 22-acre West Campus on which the School of Law is located, a 22-acre School of Divinity campus and support service facility in northeast Washington, and a 108-acre tract of land in Bettsville, Maryland. Howard students have access to the local consortium of 12 universities of the Washington Metropolitan Area. Students may share the facilities and take courses from the member schools: American University, Catholic University, Gallaudet University, Georgetown University, George Mason University, George Washington University, Marymount University, Mount Vernon College, Trinity College, University of the District of

Columbia, and University of Maryland, College Park.

Research Interests

Howard has a goal to become one of the major research universities in this country. With the proximity of facilities such as the Library of Congress and executive government agencies as NIH, National Institute of Standards and Technology, NASA and NSF, Howard students have access to several research resources. Additionally, Howard has major individual and institutional grants and contracts in the sciences and engineering from NSF, NIH, DOD, DOE, NASA, other federal agencies and industry.

The president, Dr. Franklyn Jenifer, is the first alumnus to head Howard University. His Ph.D. is in plant virology from the University of Maryland. He has held numerous academic positions, including department chair, associate provost, and vice chancellor of the New Jersey Department of Higher Education. He currently chairs the American Association of the Advancement of Science's National Council for Science and Technology.

CURRICULUM and FACULTY DEVELOPMENT

The University sought proposals for developing undergraduate courses on environmental issues and for initiating research in the environmental technology and waste management area. Of the seven proposals, two research initiatives and one curriculum development project were funded. The research topics were:

- A Simple Biochemical Assay to Test the Capability of Microorganism to Biodegrade PAHs; and

- Optimal Field Sampling Strategy for Groundwater.

The curriculum project involved developing an environmental microbiology course, complete with syllabus, a detailed outline for each lecture and related outside activities. Investigators are planning to serve as team organizers and lead instructors for the initial course offering projected for fall 1992.

One faculty member attended a Consortium-sponsored activity, the Second Annual Weapons Complex Colloquium on Waste Management and Cleanup in Phoenix.

RECRUITMENT and RETENTION

Several ongoing programs were conducted with partial support by Consortium funds. They include:

Preface

This program is offered to entering freshman during the summer for 6 weeks. The goal is to increase academic proficiency, learn about engineering and make a smooth transition to college life.

Admissions Study

Another unique activity Howard undertook was to support an admissions study for the School of Engineering. The goals of the study were to gather information from prospective students and to encourage them to apply. Final recommendations from the study will include ways of upgrading the recruiting and admissions process to capture a larger percentage of students who express an interest in this school.

OUTREACH ACTIVITIES

Science and Engineering Summer Academy for Students

This 2-week program is designed for grades 6-8. Faculty members offer hands-on experiences, team activities, field trips, and interaction with scientists, engineers, and college students.

Armed Forces Orientation To Engineering Careers

This program is designed for junior and senior high school students. The focus is engineering-oriented discussions, field experiments, and career counseling.

Metcon Engineering Science Career Orientation

This program is designed for junior and senior high school students for 7 weeks during the summer. Held at the Engineering Science facility, the workshop affords students the opportunity to gain technical work experiences. Students are exposed to the day-to-day experiences of scientists and engineers.

Precollege Materials Science And Research Program

This program is designed for junior and senior high school students for 7 weeks during the summer. This program exposes students to various aspects of

electrical engineering such as power systems and control engineering, artificial intelligence and many others.

Science And Engineering Summer Academy For Teachers

This program is designed for middle school teachers to help them become more knowledgeable and resourceful in teaching minority youth principles and applications of science, engineering and technology.

Program Brochure

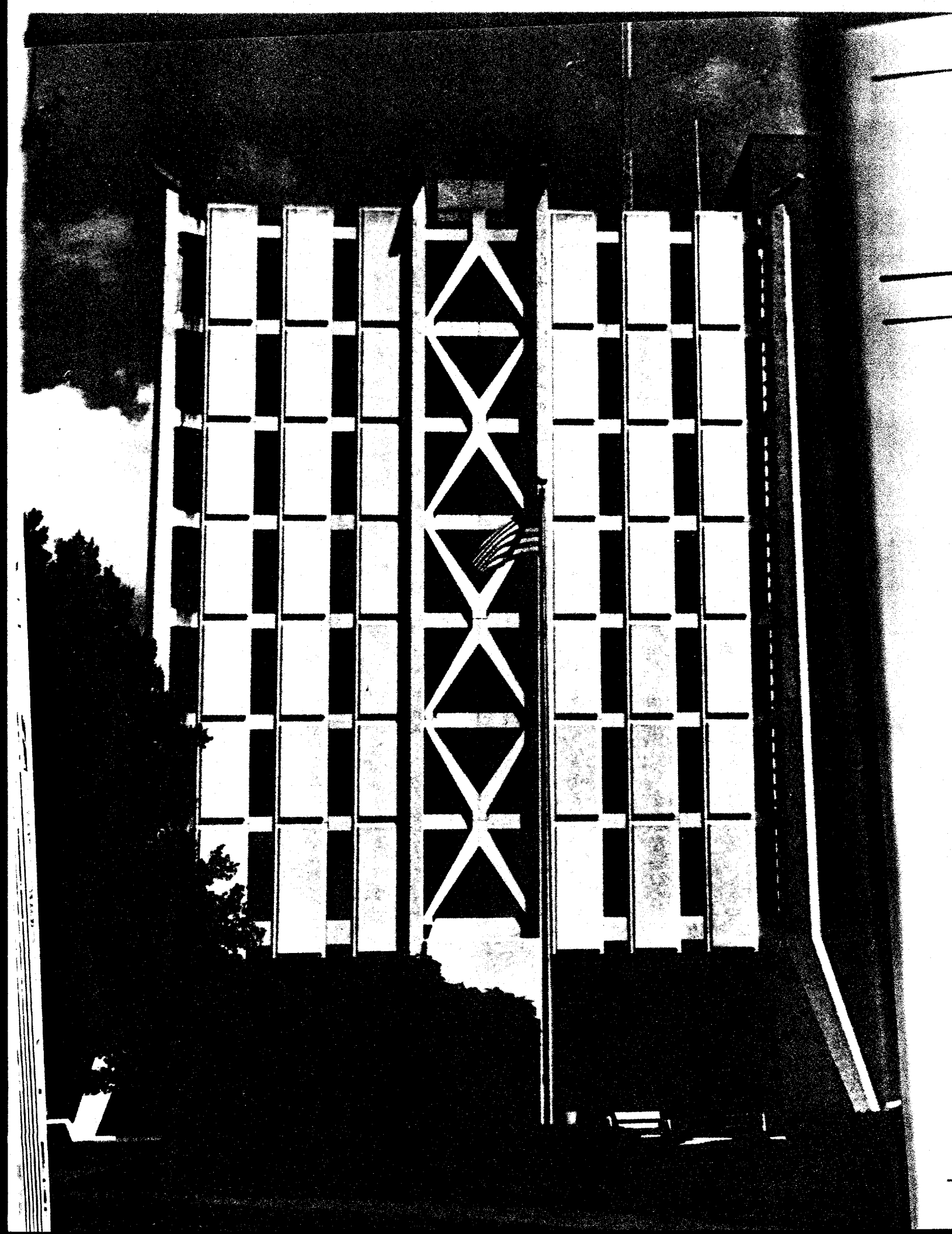
In an effort to market the opportunities available at Howard, brochures were created to describe the undergraduate and graduate civil engineering programs. Each description points out that environmental engineering is an option within the respective programs.

Recycling Program

A recycling program was promoted and implemented thanks to the student chapter of the American Society of Civil Engineers. The project provided containers for recycling four common types of office materials. These efforts, along with other projects, won them recognition on campus and from the national parent society. The recycling program is currently being expanded campus-wide.

Steering Committee Member

Dr. James Johnson
Chairman, Civil Engineering Department
2300 Sixth Street, NW
Howard University
Washington, D.C. 20059
(202) 806-6570 Office
(202) 806-5960 Fax



JACKSON STATE UNIVERSITY

Dr. Herman Smith
Interim President

Jackson State University has a distinguished history, rich in the tradition of educating young men and women for leadership. Founded in 1877 by the American Baptist Home Mission Society in Natchez, Mississippi, the school was later relocated to Jackson, a more central location in .the state. The University has the unique distinction of being Mississippi's only urban university. Its earliest mission was to provide training for rural and elementary teachers. By 1942, the school expanded its offerings to a four-year education program and in 1954, the school became a state-supported institution.

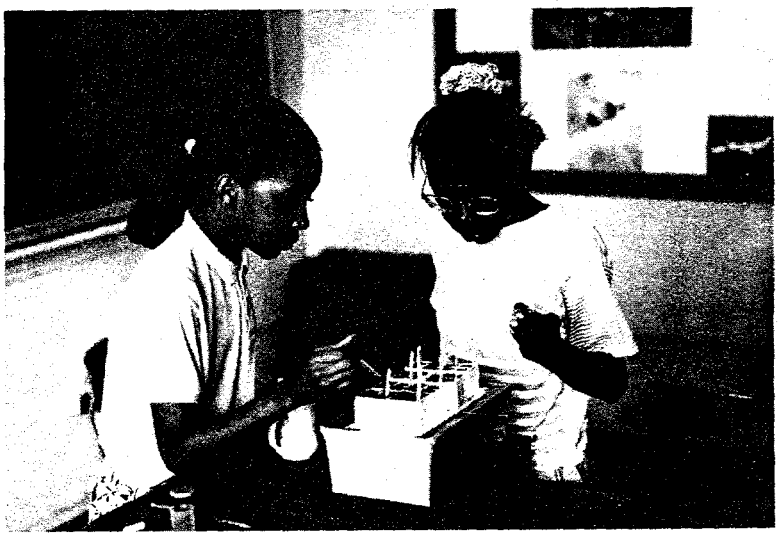
Jackson State University is the sixth largest of the 117 Historically Black Colleges and Universities. The University offers bachelor and master degree programs in four schools: Liberal Arts, Business, Education, and Science and Technology. A doctoral degree in Education also is offered.

Jackson State's current enrollment is 6,600 students, with 87% at the undergraduate level and 13% at the graduate level. The student population is 94% African American and 2% Asian.

Research Interests

JSU maintains a commitment to using its expertise to identify and resolve urban problems and issues. To this end, the University fosters cooperative relationships with business, industry, national laboratories, and other universities. A Community Development Corporation was established with the help of the Ford Foundation.

The University has research expertise in the following areas: materials science, environmental science, information science, life sciences, health sciences, physical sciences and electronics engineering technology. The faculty is actively involved in doing research work in a variety of areas such as microbiology, entomology, genetics, marine science, environmental science, marine toxicology, plant pathology, biochemistry, endocrinology, algal physiology and preventive medicine. The Technology and Industrial Arts Department is



currently conducting research in robotics and other national critical technology areas.

The interim president, Dr. Herman Smith, has served as professor and administrator in several institutions, including chancellor of the University of Arkansas at Pine Bluff. He served for over ten years as senior consultant with the Kettering Foundation and was founding director of an association that promotes publicly funded HBCUs.

CURRICULUM and FACULTY DEVELOPMENT

The School of Science and Technology was formed through a merger of the School of Industrial and Technical Studies and the Division of Natural Science. The goal is to develop and implement educational, research and outreach activities aimed at increasing the number of students in the science and technology pipeline at all levels.

The Environmental Science Doctoral Program is a new interdisciplinary program designed to prepare students for environmental science careers, conduct research and make the public aware of environmentally related issues. The program requires approximately two years of course work (36 semester hours) and dissertation research. An MS in Environmental Science is available through the Environmental Science Program with courses selected from the Departments of Biology, Chemistry, Physics/Atmospheric Science, Computer Science and General Science. Although there is no BS degree, the program provides for a number of environmentally related undergraduate courses. The Master of Science Degree in Marine Science also is available through this school.

The Hazardous Materials Management Program and undergraduate concentration also is offered. In addition to the four-year program, Jackson State offers a certification program with a number of courses available to practitioners in the field. These courses are taught as workshops during the summer and on weekends throughout the year. There are six required and one elective courses for the certification.

A master's degree program in Hazardous Materials Management has been submitted for consideration. This program would be interdisciplinary, thus drawing from various majors, including nonscience undergraduate degrees. JSU also has developed articulation programs and agreements in areas of ER/WM

between JSU and precollege schools, two-year, and Ph.D. granting institutions.

In addition to curriculum development activities, Jackson State promoted faculty development by encouraging participation in Consortium-sponsored activities and several other workshops and short courses, including:

- Effective Techniques for Contaminated Groundwater Treatment
- Radiation Safety
- Environmental Science Experiments for Precollege Students

RECRUITMENT and RETENTION

The retention efforts were focused primarily on grants to students to give them the financial support they needed to remain in college. Two students received grants during this period. In addition, students were also taken to workshops and conferences to promote their interests in the environmental science field. Job opportunities and tutorial programs also were used as part of the retention efforts.

OUTREACH ACTIVITIES

Jackson State University has developed articulation programs and agreements in areas of ER/WM with precollege schools and Ph.D. granting institutions. An A.A. degree curriculum was developed for junior or community colleges.

Jackson State actively worked with two junior colleges in Mississippi: Hinds Junior/Community College and Coahoma Junior College to develop an environmental science curriculum and train faculty.

Academy for Science, Engineering, and Technology (ASET)

Jackson State faculty members addressed the goal of developing a more aware student at an early age in science-related areas. JSU faculty and students worked with 36 students from four Mississippi School districts (Jackson, Madison County, Vicksburg-Warren and Hinds County) in this two-week residential program. The participants were in grades 5-10 with a B^+ science average.

In addition to field trips and tours, students attended classes in such topics as:

- Bottle Biology: Students used plastic bottles and disposable containers to make apparatus for a wide range of experiments and life science explorations. Activities offered a means for low-cost equipment for classroom, laboratory, or home use as well as a creative strategy for understanding ecosystems, biological principles, and the process of scientific inquiry.
- Exploring with Fast Plants: Students planted Brasica rapa seeds early in the program and studied the life cycle of the plant as well as plant nutrition and ecology.
- Laboratory Report Writing: Students practiced writing the standard components of a laboratory report.

- Engineering--Making a Mini-Landfill: Students examined products they use and classified them as renewable or nonrenewable resources. They observed what occurs in landfills and considered alternate disposal strategies.

- Earth Literacy and Planet Zeta: These courses gave a fundamental understanding of the environmental crisis and empowered students to find personal solutions for the ecological problem. Students learned about the cycles and systems of the earth. They studied ecosystems with their finite supply of raw materials, land space for food, recreation, living, forests, etc. and a finite capacity for handling waste. Students took on the roles of government and examined resource, waste, and people management.

- Mississippi's Black Scientists and Engineers: Students researched famous Mississippians who have made significant contributions in science, engineering, and technology.

- Chemical Education for Public Understanding: This class provides community and workplace groups an understanding of chemicals and their impact on people and the environment; to promote the use of scientific principles, processes, and evidence in public decision making; and to contribute to improving the quality of science education.

In addition, career information sessions, faculty mentoring activities, and parental involvement were an integral part of the summer program. Guest speakers served as positive role models, offering persuasive examples of the values of a good science-based education.

Saturday Academy

JSU designed a Saturday Academy for students who participated in the summer ASET Program. The eight Saturday sessions used computer programs to enhance mathematics instruction. Topics included spreadsheets; matrices and applications; the Fibonacci sequence and applications; using calculators in natural science, industrial arts, language arts, and social science; study skills; and consumer economics. Students also were given advanced lessons in Chemical Education for Public Understanding, including the use and disposal of toxic chemicals in the home.

ESC

Environmental Safety Clubs (ESC) were established at eight elementary and secondary schools with students participating in the ASET program. These clubs afford students an opportunity to

- get involved in community cleanup activities;
- assist with monitoring health and safety standards at their schools;
- share program experiences with their peers;
- encourage peers to consider math/science- related areas; and
- advocate safe and clean environments.

Students from various schools were encouraged to submit proposals for exciting ways of implementing a ESC program at their school. Winning proposals were funded in September 1991.

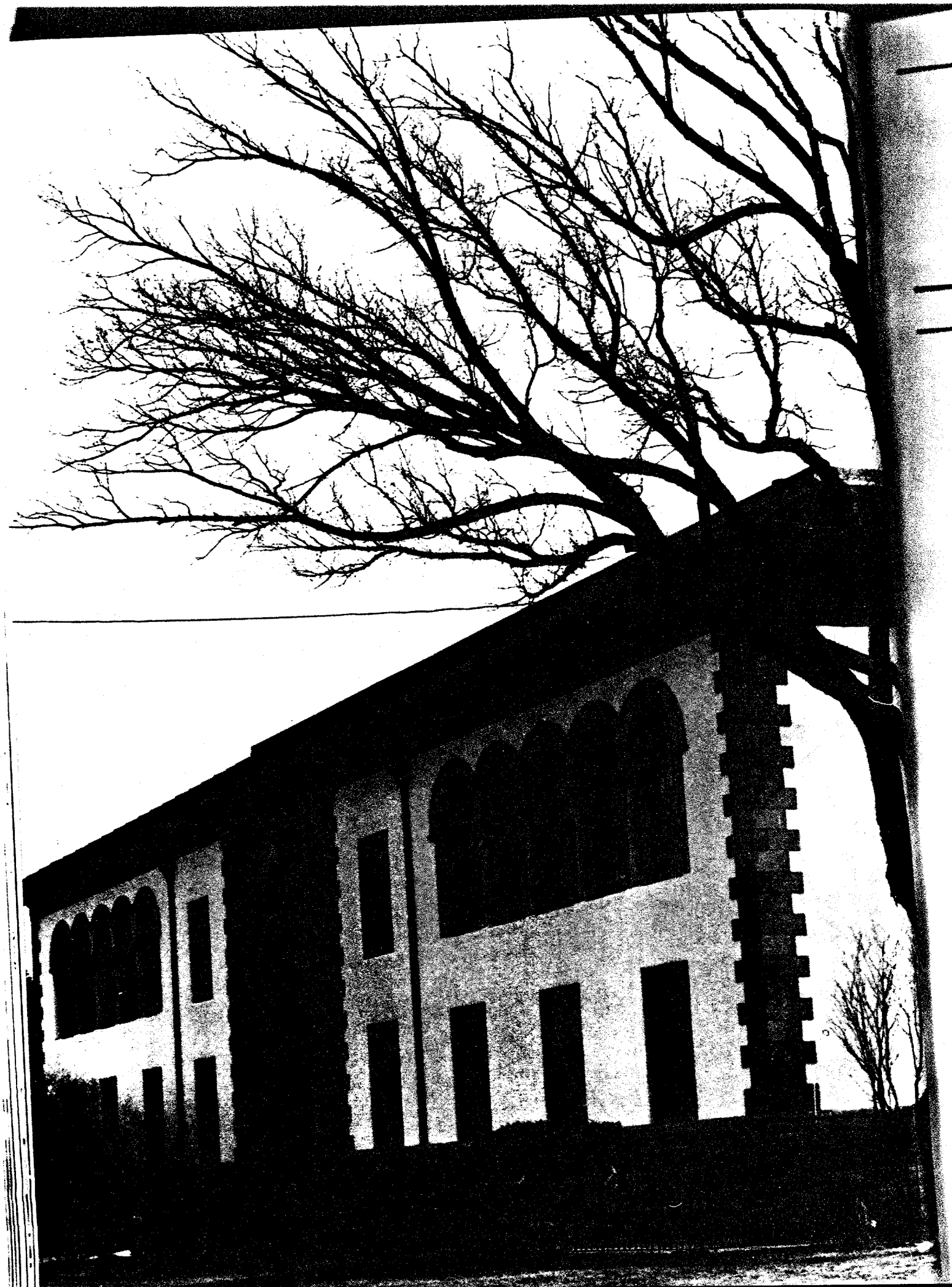
TRAINING

Jackson State University has trained industry personnel at several locations throughout the state of Mississippi. A two-day seminar, a worker right to know program, was designed for industry and education employees using a train-the-trainer format. These forums will be expanded into other communities to discuss ER/WM educational programs, cleanup efforts, and opportunities for professional/community organization involvement. Other topics discussed were methods of transporting hazardous materials, laws and regulations, emergency response in transporting hazardous materials, and the community's right to know. A brochure was published and distributed to the general community.

Steering Committee Member
Dr. Abdul Mohamed
Dean, School of Science and Technology
Jackson State University
Jackson, Mississippi 39217
(601) 968-2153 Office
(601) 968-2058 Fax

Alternate Steering Committee Member
Dr. Sonny Bolls
Jackson State University
Jackson, Mississippi 39217
(601) 968-2153 Office
(601) 968-2058 Fax

sbolls(a)



NEW MEXICO HIGHLANDS UNIVERSITY

Dr. Gilbert Sanchez
President

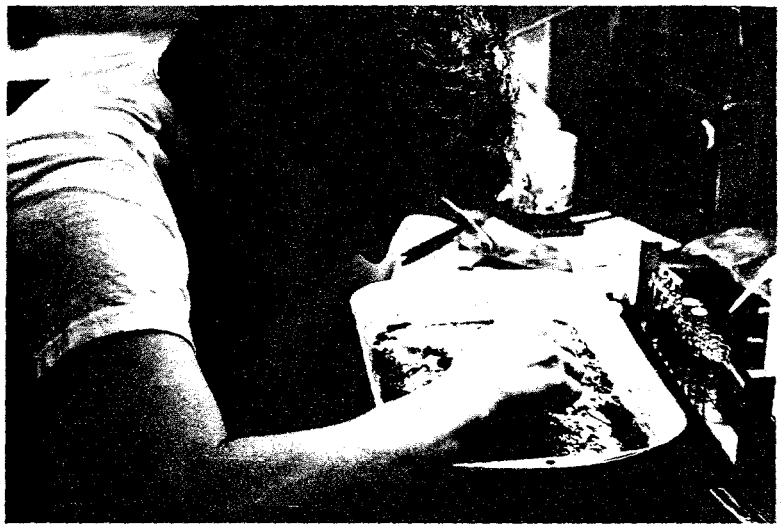
New Mexico Highlands University (NMHU) was established as New Mexico Normal School in 1893 by the Territorial Legislature as one of the first institutions of higher education in the state. To reflect the expanding importance of the institution to the state's higher education mission, the school's name was changed in 1941. As early as 1903, the *New England Journal of Education* identified the school as "one of the best schools in the country." The University continues to be recognized for its distinguished record of excellence in teaching and producing quality graduates.

In 1986, a reformation plan focused attention on research in science and technology. NMHU is currently a member of several alliances including the DOE-funded Science and Technology Alliance, the Quality Education for Minorities Network and the Coalition to Increase Minority Degrees. The University is comprised of three schools: Liberal and Fine Arts, Science and Technology and Professional Studies. New Mexico Highlands offers 26 bachelor's and 14 master's degree programs. The University's faculty is committed to instruction and is willing to nurture and mentor students to support their academic growth.

NMHU enrolls one of the largest percentages of Hispanic students in the nation. Of the 2,600 students enrolled, 68% are Hispanic, 3% are American Indian and 2.5% are African American. NMHU attracts the majority of its students from rural northern New Mexico.

Research Interests

Research areas in the School of Science and Technology include anthropology, biology, chemistry, engineering, environmental science, psychology and sociology. The University has well equipped labs for a school of its size, particularly in chemistry and engineering. Student use of modern instrumentation is an important part of their educational experience.



NMHU has funded projects in biotechnology (NASA-JOVE), bone chemistry/anthropology (NIH-MBRS), high performance ceramics (NSF, LANL, MNRDI) and biological markers/alcohol abuse (ADAMHA). Other research areas include studies of natural product synthesis, plant molecular genetics, microbiology, climatic change and aquatic invertebrates.

Ongoing faculty research for the U.S. Department of Game and Fisheries focuses on the biological monitoring of fish and aquatic macroinvertebrates. This is one of the first concentrated studies in New Mexico which integrates the physical, chemical, and biological components of the aquatic environment. Data will be used to develop an index of biotic integrity for surface waters of the state. Another grant supports faculty involvement in long-term monitoring of stream vegetation for the U.S. Forest Service in the Carson National Forest.

Dr. Gilbert Sanchez, the president, is a New Mexico native who has degrees in biology and microbiology. He has served as professor, department chair, dean and vice president of academic affairs and authored numerous scientific publications. He has been named one of the "100 Influential Hispanics" by *Hispanic Business Magazine.*

CURRICULUM and FACULTY DEVELOPMENT

One of the unique curriculum development activities under the auspices of the Consortium was New Mexico Highlands' preliminary task analysis of waste management and environmental restoration jobs in industry. An outside firm surveyed 55 companies and state and federal agencies in New Mexico, Texas and Louisiana to determine which job skills and content knowledge they expect of students graduating with a B.S. in Environmental Science. The results showed that students need:

- Toxicology
- Soil Sampling Analysis
- Hydrology
- Basic Sciences

- Business Skills

- Communication Skills

NMHU is modifying its curriculum with this multidisciplinary focus in mind. Departments outside of environmental science are formulating new courses and redesigning specific courses to implement the revised curriculum. For example, biology is creating a new course in environmental microbiology and bioremediation while geology is putting a greater emphasis on pollution in its ground-water course. Additionally, the environmental science department is modifying and creating new courses including, several dealing with environmental law, waste management and restoration, and a summer field course.

In addition to Consortium-sponsored activities, the faculty attended a variety of other national and regional conferences and workshops, including:

- Groundwater Pollution and Hydrology Course;
- U.S. Forest Service Symposium on Conservation;
- Sixth Conference on Environmental Engineering Impact Study;
- Workshop on Integrated Use of Computers in the College CurriculumWorkshop; and
- A Seminar on Vocational Needs and Current Environmental Issues.

This faculty training will assist in implementing the new course work that will be part of the revised environmental sciences curriculum.

RECRUITMENT and RETENTION

Research Assistantships

Two graduate students have been investigating mercury and other metal concentrations in water from different lakes and streams in Northern New Mexico. Heavy metal contamination in aquatic insects and sediments in the Pecos and Red Rivers and streams in the northern part of the state have been investigated.

A database was created on the campus mainframe which lists environmental science programs around the country and career development options for students. The data were gathered as part of the research for NMHU's revision of its environmental science program. Faculty will use the data to encourage students to continue in advanced environmental science degrees.

As part of New Mexico Highlands University's program to recruit students into upper division environmental science courses, the Environmental Science Department is developing an extensive recruitment program and is interfacing with a coalition of community colleges in Northern New Mexico which are developing a two-year degree in Waste Management. The University is also working with the SWOOPE program (described below) to recruit students.

OUTREACH ACTIVITIES

Students Watching Over Our Planet Earth

Students Watching Over Our Planet Earth (SWOOPE) is an annual K-12 outreach program developed with Los Alamos National Laboratory. NMHU is

helping implement the program in Northern New Mexico and currently is working with 27 teachers and their students. SWOOPE personnel created developmentally appropriate experiments for K-12 students to test water quality and detect radioactive materials in the environment. Teachers attend workshops that teach how to use SWOOPE equipment and conduct the environmental monitoring research. They are provided equipment for their classrooms as part of an expanded science program. During the school year, K-12 students use field research skills to collect data and then send them to Los Alamos National Laboratory where a database is being compiled. The information is tabulated and results are sent to the students. Some of the informaiton is being used by the EPA.

Eagle Peak Camp

This two-week camp recruited 30 primarily Hispanic and American Indian students to teach them about natural and cultural resource management and environmental professions, so critical to the economic well-being of Northern New Mexico. Since motivating students toward college degrees was a primary goal, workshop coordinators selected juniors with C+ averages who potentially could qualify for early admissions to public colleges.

Students were first taught fundamental concepts in aquatic biology, anthropology, hydrology, and other related sciences and then shown how these concepts interacted with human goals and activities. Students met resource managers from state and federal agencies and visited anthropological sites that must be preserved or restored. Students performed simple field experiments such as measuring tree population density.

Project Learning Tree and Project Wild

Facilitators for Project Learning Tree and Project Wild included almost 30 state and federal agency personnel and public school educators. The program's goal was to provide environmental information and teaching methods that would in turn be shared with other teachers in their system. Included was a streamside

program on aquatic macroinvertebrates as monitors of environmental health. Participants learned how to collect and identify common aquatic organisms. A 20-specimen museum kit was given to several teachers for classroom use.

U.S. Forest Service Centennial Celebration

New Mexico Highlands University hosted the U.S. Forest Service Centennial Celebration in September, 1991. One of three such celebrations in southwest U.S., the program attracted national speakers and community involvement.

Science Fairs

The 35th Northeastern New Mexico Regional Science and Engineering Fair was held on the NMHU campus in spring, 1991. Environmental Science was the largest category of entries, representing 8% of the total. Over 400 students participated, with 80% from rural northern New Mexico schools. Of these, 75 went to the state science fair and four competed in the international fair in Florida.

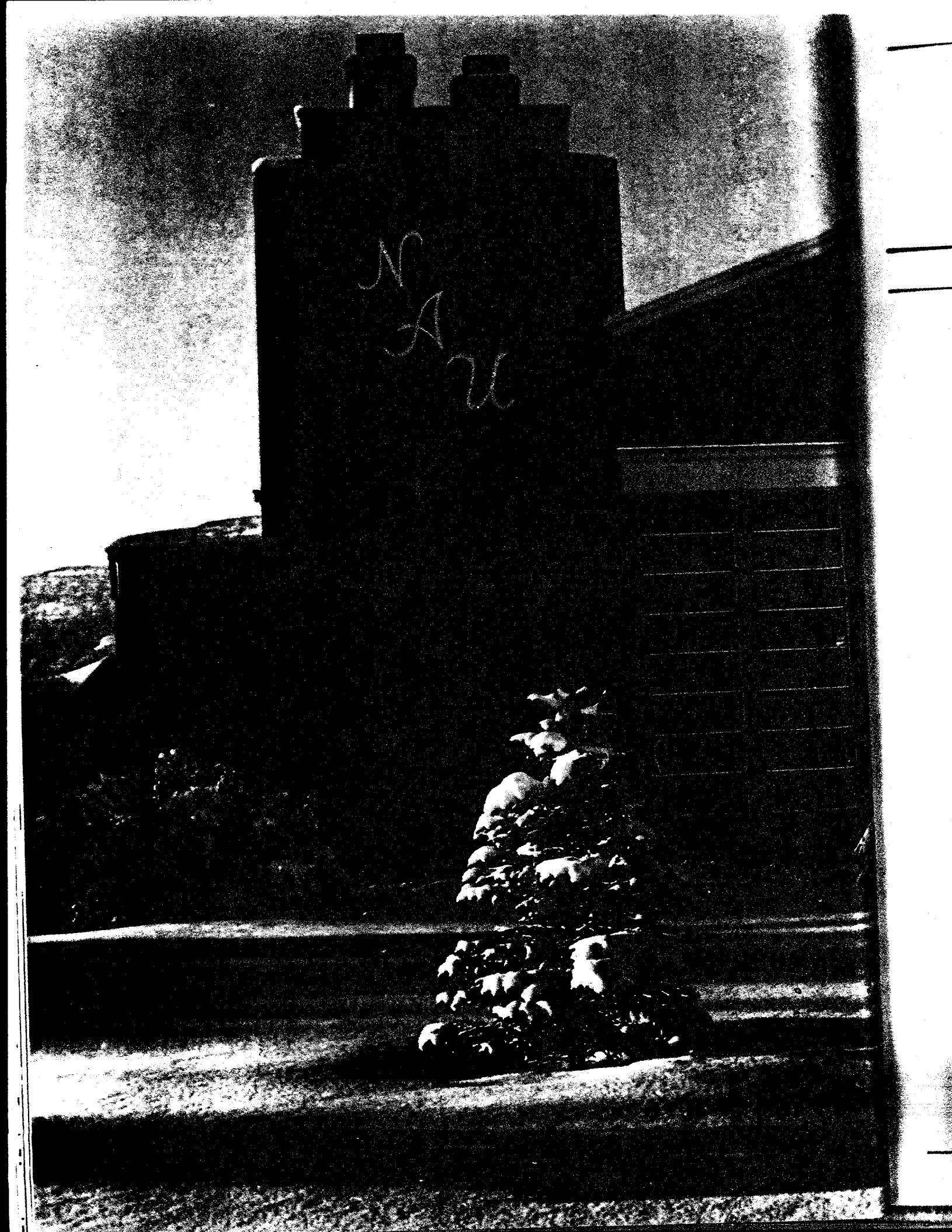
Visiting Scientist Program

Sponsored by the New Mexico Academy of Science, this program provides the opportunity for secondary schools to have lectures and demonstrations by some of the most distinguished scientists and mathematicians in the New Mexico area. Fifteen faculty from New Mexico Highlands visited public schools to present programs.

Recycling Programs

A state-wide recycling program is being mandated. Three faculty have submitted an Integrated Waste Management Plan for NMHU to the state for approval and implementation in July, 1992.

Steering Committee Member
Dr. Melinda McClanahan
Dean, School of Science and Technology
New Mexico Highlands University
Las Vegas, New Mexico 87701
(505) 454-3564 Office
(505) 454-0026 Fax



NORTHERN ARIZONA UNIVERSITY

Dr. Eugene Hughes
President

Northern Arizona University was founded in 1899 as Northern Arizona Normal School. In 1925, it became a four-year, degree-conferring college; in 1966, a university. It is now one of three in the Arizona university system.

The University offers degrees in nearly 200 disciplines at the undergraduate level and 50 at the master's and doctoral levels. NAU is organized into 9 colleges and schools: College of Engineering and Technology, College of Arts and Sciences, College of Business Administration, College of Creative and Communicative Arts, School of Forestry, College of Social and Behavioral Sciences and the Center for Excellence in Education.

NAU is uniquely suited to provide higher education opportunities for American Indians since approximately 100,000 American Indians live on reservations that surround Flagstaff and NAU. These nearby tribal nations include the Havasupai, Hualapai, Paiute, Apache, Navaho and Hopi. With almost 900 American Indian students, NAU has the second largest population of American Indians enrolled in any four-year college or university in the U.S. There is a special commitment to serve American Indians not only on campus, but also in outreach programs to reservation schools and in economic development programs in partnership with Indian Tribal Nations in the southwest.

NAU is located in northern Arizona on a 689-acre site at an elevation of 7,000 feet. The University serves 18,000 students, with 14,000 on the main campus. The remainder take courses on nine off-campus sites throughout the state, including a branch campus in Yuma. The University is also experiencing a continuous growth of Hispanic students. The student population is 7.3% Hispanic, 5% American Indian, 1% African American; 1% Asian American, 83% Anglo, and 2% international students.

Research Interests

Northern Arizona University actively collaborates with the National Park Service and the USDA Forest Service as well as the National Endowment for

Humanities, NASA, and DOE. A Forest Service Complex being constructed on campus will house the School of Forestry and a National Forest Service Regional Laboratory. The College of Engineering and Technology has developed programs with the Jet Propulsion Lab and NASA. Science and Engineering faculty have on-going activities with national laboratories such as Lawrence Livermore and Los Alamos.

The president, Dr. Eugene Hughes, received a Ph.D. in mathematics from Vanderbilt University. He has been instructor and administrator at several institutions. At NAU, Dr. Hughes has been a dean, provost and academic vice president. Under Dr. Hughes' leadership, Northern Arizona has grown into one of the finest state-supported universities in the nation, praised for its innovative undergraduate education.

CURRICULUM and FACULTY DEVELOPMENT

A Faculty Advisory Committee was established to manage the Environmental Science and Engineering Program at NAU. Its mission is to coordinate environmental science programs with the College of Arts and Sciences, Engineering and Technology, and Forestry. A new campus activity was the planning for an Environmental Science seminar with 10 speakers planned for the next academic year.

New courses for the 1992 schedule included:

- A bioremediation course
- An Environmental Science Problems Course focusing on engineering applications
- Global Change: Human Impact
- Environmental Restoration

Course revisions included:

- A new environmental engineering emphasis within Civil Engineering, with plans to implement expanded content over the next three years;

- Seven new environmental science experiments for the beginning course;

- A new laboratory manual for the beginning Environmental Science Laborotry with exercises on hazardous wastes and groundwater pollution in desert regions; and

- Two new field trips for introductory environmental science students to Palo Verde Nuclear Power Plant near Phoenix and to a recycling plant to study paper recycling and reuse of hazardous chemicals.

Equipment Upgrades

As part of the curriculum development, faculty surveyed equipment needs for the expanded environmental science focus. Elementary environmental laboratories were upgraded. One source for other environmental science equipment was DOE; another source for a GC Mass Spectrometer (associated with air sampling equipment) was private industry gifts combined with an NSF grant.

Faculty Activities

Northern Arizona had faculty representation at all consortium activities. In addition, staff development activities included attending a variety of workshops and conferences such as:

- The DOE Model Conference at Oak Ridge;

- The Air and Waste Management Association meeting of the American Academy of Environmental Engineers and Environmental Professionals;

- A bioremediation workshop for microbiology training and development of an NAU course on bioremediation;

- The Eighth National Meeting of the American Society of Surface Mining and Reclamation to obtain information for two environmental science courses; and

- A Hewlett-Packard seminar on the GC mass spectrometer and use of graphite furnace atomic spectrocopy.

RECRUITMENT and RETENTION

NAU is actively recruiting high school seniors into the Civil Engineering program with a new environmental emphasis. Total enrollment has increased by 25%, with a 50% increase in minority enrollment.

Other activities included:

- Promoting Environmental Science Student Club functions;

- Identifying summer jobs for three undergraduate and one graduate student in DOE laboratories; two students were American Indians;

- Creating an environmental science brochure to recruit new students; and

- Planning a Careers in Environmental Sciences Day program with representatives from industry, government, research facilities, and university graduate programs. The first career day will be in Fall 1992.

Science and Mathematics Learning Center

Northern Arizona advocates the integration of precollege programs with the revision of undergraduate and graduate programs. The Science and Mathematics Learning Center was formed as a supra-departmental entity to help coordinate program development and assemble a wide array of educational and research programs for teachers and students, from kindergarten through graduate levels. Currently, K-12 programs are underway and college-level programs will begin in Summer 1992.

At the K-12 level, 19 programs served nearly 400 inservice faculty. Three programs offered research experiences for 39 high school students. In addition to these programs, NAU offered 29 math and science summer school courses for teachers, some of which are interdisciplinary.

Three Teacher Enhancement Programs were partly supported by Consortium funds. These were:

- A.S.E.E.D. (Arizona Science and Environmental Education Development) trained three-member teams from 10 elementary and middle schools. Environmental science training included research experiences, as well as training in curriculum development.

- Critical M.A.S.S. (Mathematics and Science Specialists) served a three-member team from 7 middle and high schools. This project focused on advanced technologies, including graphing calculators and computer simulation with environmental science as an interdisciplinary problem solving theme.

- One institute was operated in cooperation with the American Indian Science and Engineering Society for 14 Hopi teachers. Topics included environmental education and engineering.

The Science and Math Learning Center also sponsored a student science training program.

SOS (Summer of Science)

SOS (Summer of Science) was a five-week residential Young Scholars Program that supported 30 high school students. Co-sponsored by NSF, the curriculum is based largely on environmental science with a research emphasis. Sophomores and juniors learned to do research in astronomy, biology, chemistry, forestry, or geology.

Supplementary research skills were part of the program, including statistics, experimental design, library research, reading scientific literature, scientific writing and understanding the social and historical contexts of science. Students presented their work at a scientific conference at the end of the five-week experience. Over 60% were underrepresented minority students; 60% were female.

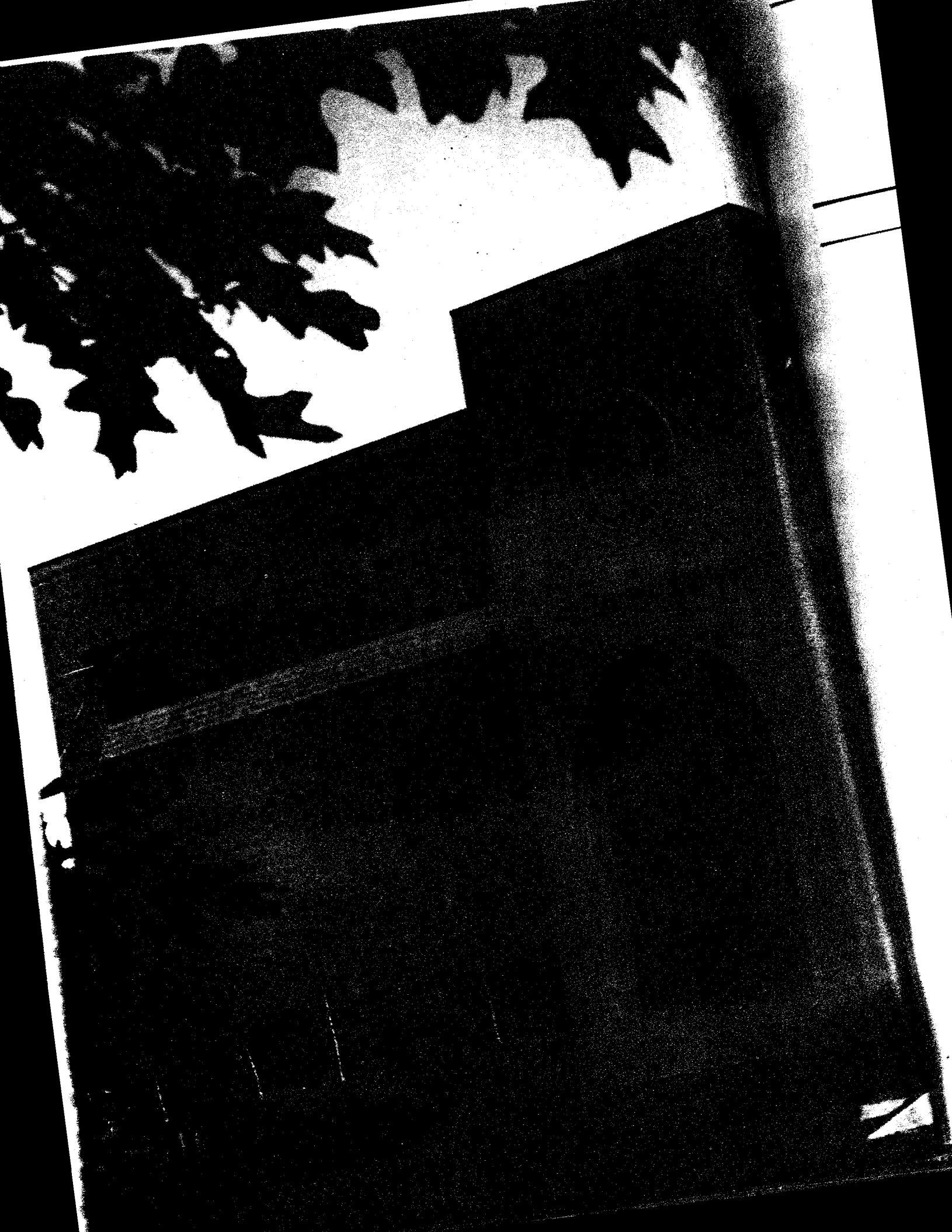
A quarterly newsletter from the Science and Mathematics Learning Center was mailed to educators around the state. This newsletter serves as a public relations and information tool, summarizing mathematics and science workshops, seminars, and projects that take place on campus.

In addition to the Science and Mathematics Learning Center activities, NAU offered four Summer Research Experiences for 40 high school teachers, undergraduate and high school students. These efforts focused on environmental science in chemistry and geology.

Community-Based Activities

NAU developed media support for its outreach goals, including one community pamphlet on waste water home septic systems. Another community- focused outreach program was a plan with the City of Flagstaff and the Environmental Science Students Organization for collection of household hazardous waste. Implementation should begin in 1991-92.

Steering Committee Member
Dr. Henry O. Hooper
Associate V. P., Academic Affairs
Research and Graduate Studies
Northern Arizona University
P.O. Box 4085
Flagstaff, AZ 86011
(602) 523-9011 Office
(602) 523-4230 Fax



NORTH CAROLINA A&T STATE UNIVERSITY

Dr. Edward Fort
Chancellor

North Carolina Agricultural and Technical State University was established in 1891. Today, it is one of sixteen public institutions of the University of North Carolina System and one of two land grant institutions in the state.

Today, NCA&T is a comprehensive university that offers degree programs at the baccalaureate level in the Schools of Education, Business and Economics, Technology, Agriculture, Engineering, Nursing, and the College of Arts & Sciences. Master's degrees are awarded in all areas except Business, Economics, and Nursing. A cooperative doctoral program with North Carolina State University is offered in the School of Engineering. Planning for NCA&T's own doctoral program in engineering has been authorized.

The student population is approximately 7100. Of this total, 89% are undergraduates, while 11% are graduate students. African Americans represent 86% of the student body. About 1% are international students. In 1988, NCA&T was the largest producer of African American engineers in the country and the fifth largest producer of minority engineers in the U.S.

Located in Greensboro, North Carolina, A&T is the largest of the eleven historically black colleges and universities in the state and the eighth largest HBCU in the nation. The campus covers approximately 187 acres, which include a working farm managed by the School of Agriculture.

Research Interests

North Carolina A&T has been the ranked in the top five HBCU/MI schools with regard to funds generated for R&D, developmental programs, institutes, and special projects. The NCA&T faculty is committed to a multidisciplinary approach to environmental research. The Schools of Engineering, Agriculture and Technology and the College of Arts and Sciences have an extensive research capability with ongoing research in environmental areas.

The School of Engineering is the first HBCU to design and produce

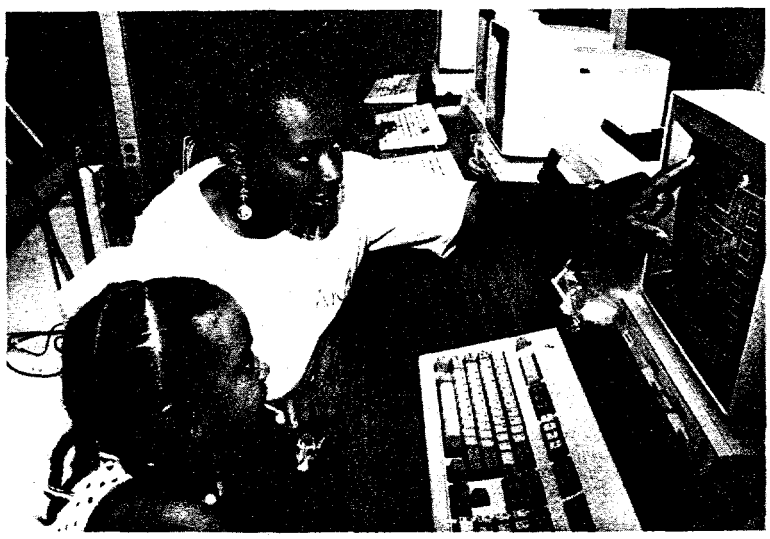
integrated circuit chips. In addition, the University serves as the lead research HBCU in a major research contract with NASA for a Mars Mission Research Project designed to put manned space vehicles on Mars. In joint research efforts with Oak Ridge National Laboratory, NASA and the National Science Foundation, the University has developed a world class Composite Materials Fabrication and Research Center and a world class Tensile Testing Ceramics Laboratory. A School of Technology project helped local and national industries to develop and implement Statistical Process Control Systems to improve quality control.

Agricultural research is conducted both in classroom labs and field labs on the University's 600-acre farm. Fully equipped with sophisticated scientific apparatus, the labs manage over 20 research projects in areas such as sow productivity, plant genetics, acid rain, and alternate energy sources. The University farm houses a poultry research lab and an environmental studies lab.

Other research interests include waste management systems analysis, strategies for assessing solid waste disposal alternatives, site restoration technologies, and productivity of restored ecological systems, subsoil properties controlling transport of waste contaminant, use of hollow fiber bioreactors for wastewater treatment, effects of ozone and acid rain on soil biology and chemistry, removal of SO_2 and NO_x from flue gases, fluidized bed and packed bed bioreactors, bioremediation and thermal characterization and fermentation of food and agriculture wastes.

The College of Arts and Sciences manages pure and applied research in areas such as cell biology and aquatic life, as well as applied research that leads to the improvement of teaching and learning (e.g., improving competencies of junior high mathematics teachers and computer competencies for natural science students).

The Chancellor, Dr. Edward Fort, who is also the first chair of the Consortium Council of Presidents, earned his Ph.D. from University of California-Berkeley and has served as superintendent of schools in two systems and as chancellor of the University of Wisconsin - Center System. Dr. Fort has authored a number of monographs and articles associated with educational delivery in today's international arena. Under Dr. Fort's leadership, NC A&T has moved into its current position as the top producer of master's level African American engineers.



CURRICULUM AND FACULTY DEVELOPMENT

NCA&T offers a strong environmental program. The earth and environmental science B.S. curriculum trains students in ecological and environmental restoration, land resource management and use, and water resource and pollution. The Department of Civil Engineering offers an option in environmental engineering. The programs are interdisciplinary, supported by Civil Engineering, Plant Science, Contruction Management and Safety, Chemistry and Chemical Engineering, with Biology joining the next phase of the project. Graduate programs in civil engineering and soil science also have an environmental focus.

Three departments evaluated their curricula with respect to environmental technology and waste management. The Civil Engineering Department did add eight new environmental engineering courses: Environmental Engineering, Environmental Engineering Laboratory, Water and Wastewater Engineering, Solid Waste Management, Waste and Wastewater Analysis, Environmental Engineering Design, Stream Water Quality Modeling and Air Pollution Control.

Faculty also expanded several courses to add risk assessment and environmental remediation. Two faculty worked on curriculum development and research activities, one in biochemical and environmental engineering and one in radioactive management and disposal. Other faculty planned a training course for employees who work with hazardous materials.

In addition to the Consortium sponsored activities, NCA&T faculty participated in other professional conferences and workshops, including:

- A workshop at the Occupational Safety and Health Center, UNC-Chapel Hill;
- An Indoor Air Pollution workshop;
- The Industrial Emergency Responder Course, Purdue University; and
- The Waste Management Conference, Puerto Rico.

RECRUITMENT and RETENTION

To enhance students' awareness of environmental science and engineering issues, 15 undergraduate scholarships were awarded to minority students from the Departments of Civil Engineering, Plant Science, Construction Management and Safety, Chemical Engineering, and Biology. One graduate scholarship was awarded to a student working on user-friendly computer programs used by students in the Water and Wastewater Engineering course. Also, three students attended the Waste Management Conference and presented poster papers on various hazardous waste topics.

OUTREACH ACTIVITIES

Precollege Environmental Technology and Waste Management Workshop

NCA&T presented its first "mini-conference" for high school students in July 1991. Seventy students attended lecture sections and a tour of the Osborne Waste Water Treatment Facility in Greensboro, NC. Topics were chosen to

heighten student awareness of specific studies and issues, such as: Agricultural Research and Waste Management, Waste Degradation, Chemistry and Waste Management, Waste Management and Food Safety.

Greensboro Area Mathematics and Science Education Center (GAMSEC)

The Greensboro Area Mathematics and Science Education Center (GAMSEC) is a science and mathematics resource for materials and inservice training center for teachers of grades 6-12. A range of graduate and undergraduate courses is offered in addition to institutes, conferences, field trips and forums. Some of the topics include how to integrate the computer into the teaching of mathematics and science and how to develop the lead teacher model for science teaching. Another is a series of biotechnology summer workshops and follow-up sessions. Kits of biotechnology equipment and materials are available for loan to teachers who successfully complete the summer workshops. Seraphim Program materials are also distributed by GAMSEC, including a set of software, modules and videodiscs.

Environmental Programs

The Foundational Approaches to Science Teaching (FAST) Institutes are a thematic, hands-on, minds-on cooperative learning environmental program for middle school teachers. Originally developed at the University of Hawaii, this 3-part series for junior high science teachers demonstrates how to present an integrated science program. FAST has trained over 200 teachers from 17 school systems in North Carolina, South Carolina, Vermont and California. A comparable program for the elementary schools is the DASH program, which integrates science, mathematics and health for K-2 teachers. At this point, 36 teachers have been trained to use DASH materials.

Student Workshops

NCA&T offers a series of activities for students, serving over 400 minority and female students from grades 4-12 in the 7-school system area. They receive academic enrichment and support services in mathematics, science, communication skills, computer science, career counseling and personal development. The programs include school year activities, summer internships and academic tutoring and enhancement at the school site on a daily basis. A group of 17 students were enrolled for six years in these programs. All 17 have been accepted by a four-year college or university. Most of them plan to major in science, mathematics or engineering. Also sponsored is a parenting program designed to assist parents of students who participate in the student programs to

become an integral part of the science and technology education and maturation processes of their children.

Science and Technology Saturday Academy

This program, which is for grades 4-8, meets twice monthly on Saturday mornings. Using hands-on, individualized computer-aided instruction and science and technology field trips, the program is designed to help students develop and enhance their skills in science, mathematics and language arts.

Summer Science and Mathematics Institute and Space Camp

The Summer Institute met four weeks during June and July. This intensive institute supported 30 of the top students from the Saturday Academy (grades 9-12). The curriculum was supplemented with biweekly science and technology field trips and special vocational counseling.

The Space Camp was designed for grades 4-8, and met for four weeks during the summer. Forty of the top students from the academic year program were invited to participate in hands-on instructional activities. Biweekly science field trips were used to enhance the classroom curriculum.

Science and Mathematics Competitions

Science and Mathematics Fairs were held in local schools. First and second place winners participated in a regional fair at North Carolina A&T. A Career Day was held in conjunction with this fair.

Community Workshops

The University sponsored "Amendments to Clean Air Act and Storage and Clean Up of Hazardous Wastes" for state and local government, industry, and universities. Thirty-six people attended. Topics covered changes in the Clean Air Act, EPA strategies, and hazardous waste issues.

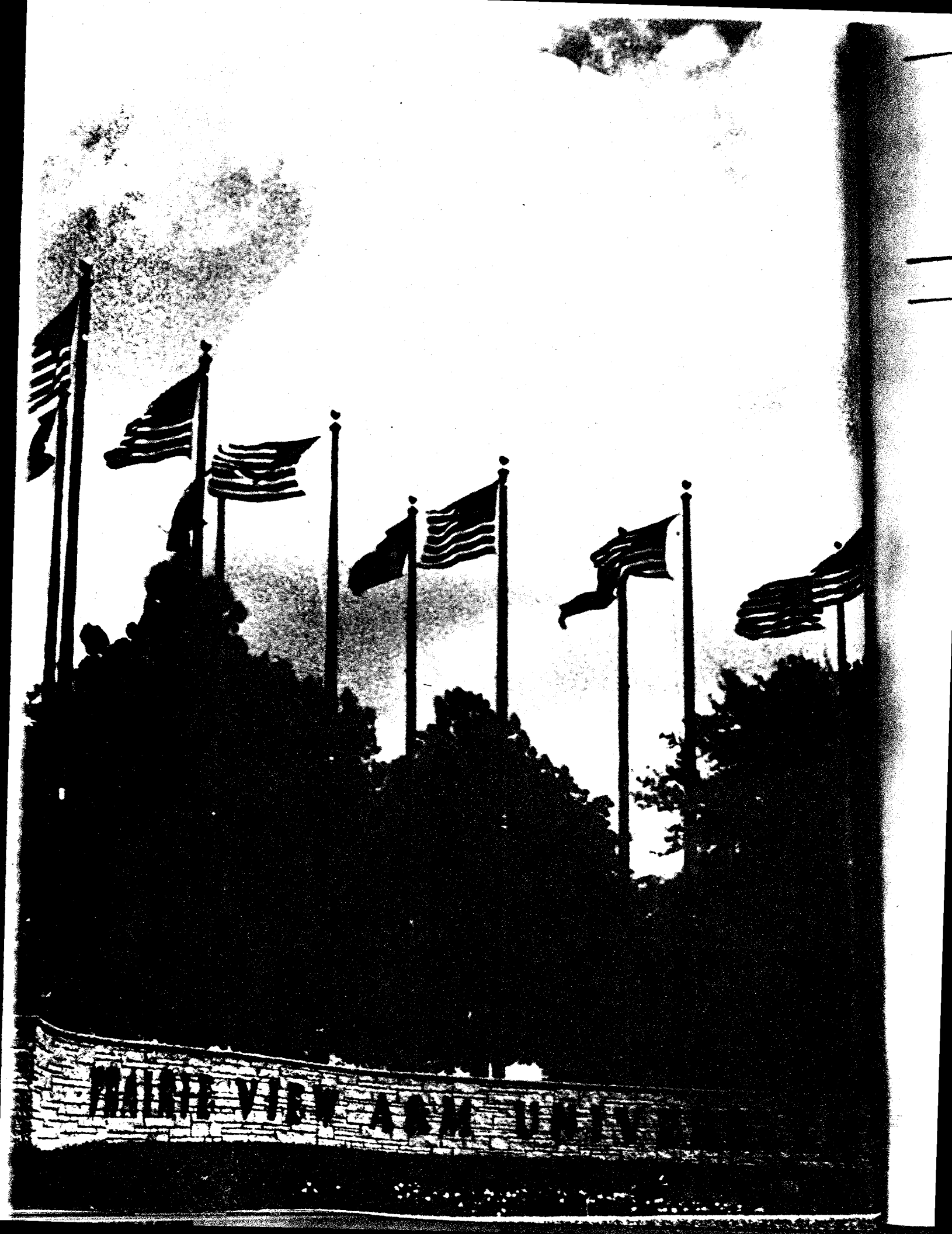
A 24-hour Haz-Mat training course was developed for the Hazardous Material Response Team. The course covered topics such as: Applicable Standards, Emergency Response Plan, Hazard Recognition, Safe Work Practices, Decontamination, Protective Equipment, Tank and Drum Repair, Spill Control and Containment.

Recycling

A recycling program was initiated on campus with office paper in four campus facilities. The program, complete with operations manual, was supported by school administration. The program has been integrated into regular University operations.

Steering Committee Member
Dr. Shoou-You Chang
North Carolina A&T State University
1601 East Market Street
Greensboro, NC 27411
(91[illegible]) ~~334-7500~~ Office
(91[illegible]) 334-7667 Fax

G. Uzochukwu
disconnected.
334-7500
area code = 910-
1910-555-12 not in service



PRAIRIE VIEW A & M UNIVERSITY

Lt. General Julius Becton, Jr.
President

Prairie View A&M University, a state supported coeducational land grant institution, will celebrate its 114th anniversary in 1992. The University continues its historical mission to provide access for students into the mainstream of the nation's social and economic system. In 1985, Prairie View became the third Texas university to earn the designation as "institution of the first class."

The University is committed to offering the highest quality programs and instruction through its eight colleges and schools: Arts and Sciences, Business, Engineering and Architecture, Applied Sciences and Engineering Technology, Nursing, Education, Graduate School and the Benjamin Banneker Honors College. Prairie View offers undergraduate and graduate programs at the master's level in these science and engineering areas: biology, chemistry, mathematics, sociology, and chemical, civil, electrical, and mechanical engineering. Undergraduate degrees are offered in physics, architecture, and computer science.

Located on a 1400-acre tract of land, Prairie View is 45 miles northwest of Houston. More than 5,600 students are enrolled, with 85% of the students from the east and southeastern regions of Texas; 4% are international students; 85% are African American.

Research Interests

Basic research in science and enginering is supported by agencies such as NSF, NIH, DOE, DOD and NASA. Other business and agency affiliations include companies such as AT&T Bell Labs, Honeywell, Sandia National Laboratories, Gulf Coast Hazardous Substance Research Center, Fermi National Laboratory, Battelle Pacific Northwest Laboratory, CIA, McDonald Douglas, Texas Instruments and General Dynamics.

The University is the site of an International Dairy Goat Research Center which focuses on problems of nutrition management and marketing of goat

products. Long standing rural-oriented public service programs build on Prairie View's many research findings to provide a Cooperative Extension Service, a Center for Community and Rural Development and a new International Affairs Program. Other major research projects in the physical sciences and engineering are insluded, such as those of the Particle Detector Research Center in support of the super conducting super collider project and the Thermal Sciences Research Center.

The president, Lt. General Julius Becton, Jr., is the first graduate of Prairie View to attain star rank in the military. Gen. Becton completed a 40-year military career which included two key federal positions as Director of U.S. Foreign Disaster Relief Agency and the Federal Emergency Management Agency. He has been listed in several Who's Who and named by *Ebony Magazine* as "one of the 100 most influential blacks in America."

CURRICULUM and FACULTY DEVELOPMENT

A primary concern of the University is the development of its faculty. Prairie View is pursuing a two-pronged approach to faculty development in teaching and research in environmental restoration and waste management. Two faculty members were recruited in chemistry and civil engineering.

The civil engineering faculty has a long history of involvement in environmental issues and presented papers at professional meetings during the year. The new analytical chemist has research interests which include solidification and stabilization of hazardous waste using portland cements. This new faculty member already has been successful in securing funded research projects through the Gulf Coast Hazardous Substance Research Center at Lamar University in Beaumont, Texas, and from the National Science Foundation.

The faculty in Chemical and Civil Engineering Departments developed class materials and case studies to be integrated into the existing undergraduate and graduate curriculum. They are also developing materials for a new environmentally focused course in chemical and civil engineering. The Departments of Biology and Chemistry have focused on reviewing existing traditional courses and the possibility of adding to the curriculum new courses relating to the environment and waste management. Both departments are investigating the re-establishment of Senior Thesis Projects that might have environmental foci.

A faculty task force for curriculum development in biology, chemistry, chemical engineering and civil engineering was established. This faculty committee reviewed the current Environmental Toxicology program in the Department of Biology to determine a more effective configuration for the program. The committee recommended including a new multidisciplinary program and establishing degree options within the traditional disciplines that allow students to register for electives in other departments. The committee will review other programs and recommendations of professional and accrediting bodies.

Additionally, the task force established an Environmental Seminar Program and links with industry. The Environmental Seminar Program brings speakers from industry and government to the campus. Speakers have included the Manager of the Waller County Superfund site (Sheridan Waste Facility), federal agencies, and the manager of the Campus Wastewater Treatment Facility.

Mini Grants Program

Faculty members have been encouraged to seek research funding in environmental areas. The University recently established an institutionally funded "Mini Grants Program." Through this program, the University provided seed funding for a project, "Ultrasonic Pulse Velocity and Ultrasonic Pulse Echo Attenuation Study for Evaluation of Hazardous Waste Solidification and Stabilization" conducted by a faculty member in the Department of Mechanical Engineering. University support also has been extended to a project, "Evaluation and Characterization of Effects of Underground Storage Tanks on the Environment," conducted by a faculty member in the Department of Chemical Engineering.

RECRUITMENT and RETENTION

Consortium funds partially supported the following:

Project Intercept

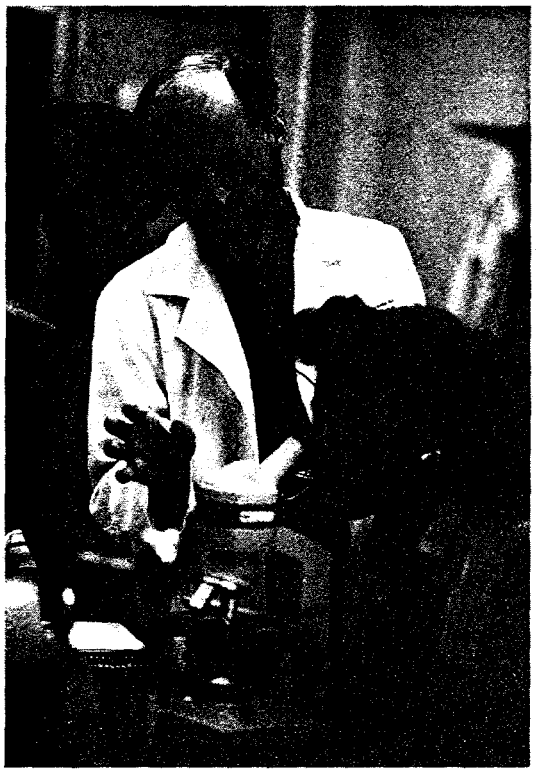
This project is an educational awareness and reinforcement program designed to improve academic performance of engineering students. It is supported by peer and faculty tutorial counseling.

Engineering Professional Concepts Courses

These courses are designed to expose undergraduate students to outstanding, nationally recognized lecturers and researchers in engineering. Seminars and daily lectures brought guest speakers to campus. These settings allow interaction among students, faculty and lecturers. Students report these seminars and lectures to be very exciting and rewarding.

OUTREACH ACTIVITIES

Prairie View will continue to develop Summer Enrichment Programs for precollege minority students and their teachers. These programs, focusing on basic science, mathematics, and engineering skills necessary for success in related environmental fields, are being conducted by the Department of Biology and the College of Engineering and Architecture. The programs include the Engineering Concepts Institute (ECI), Minority Introduction to Engineering (MITE) and Health Career Opportunities Program (HCOP). Activities include advanced tutorials, study skills and time management training, field trips,



seminar programs and special projects. A total of 39 students (30 in Engineering and 9 in Biology) were supported in the summer 1991 enrichment programs.

ECI

This is a summer awareness and enrichment program designed for high school seniors and those about to enter college. Selected students are brought to the campus for a 10-week residential program. Special mini-courses in mathematics, physics, English, and introductory engineering are provided for these students. Participants, although not active in research, interact with undergraduate and graduate students and with professors involved in research.

MITE

This two-week program is available to middle grades and high school students during the summer. Students are introduced to the basic academic disciplines needed for engineering. They learn about the profession and are provided ample opportunities to inxteract with faculty as role models.

HCOP

This special eight-week program attempts to identify high ability students for careers in the health sciences. The program includes a pre-matriculation summer academic enrichment program followed by an academic year tutorial component. Students are exposed to practicing professionals, including environmental toxicologists and health physicists.

SCOPE

This special two-week precollege program is designed to present careers in science and engineering to a selected group of highly motivated students. Activities include meeting practicing scientists, learning about career requirements, attending guest lectures and taking field trips.

Community Efforts

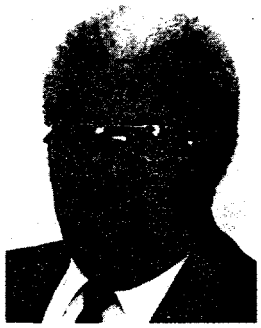
Prairie View has a long history of involvement with small farmers and small businesses in Texas. A significant need is for safety and health education in the small business workplace and on the farm. The University will initiate a program to provide occupational health and safety training and education to address the need for hazardous materials programs, including employee training and the safe handling and storage of materials on the farm and in the workplace.

Initial activities have focused on getting facilities upgrades and personnel sensitized to safety concerns—specifically, storage and handling of chemicals in the science instructional and research laboratories. Facility inspections have been conducted by University personnel and state agencies. A training program to include local volunteer fire fighters and emergency response personnel is being developed.

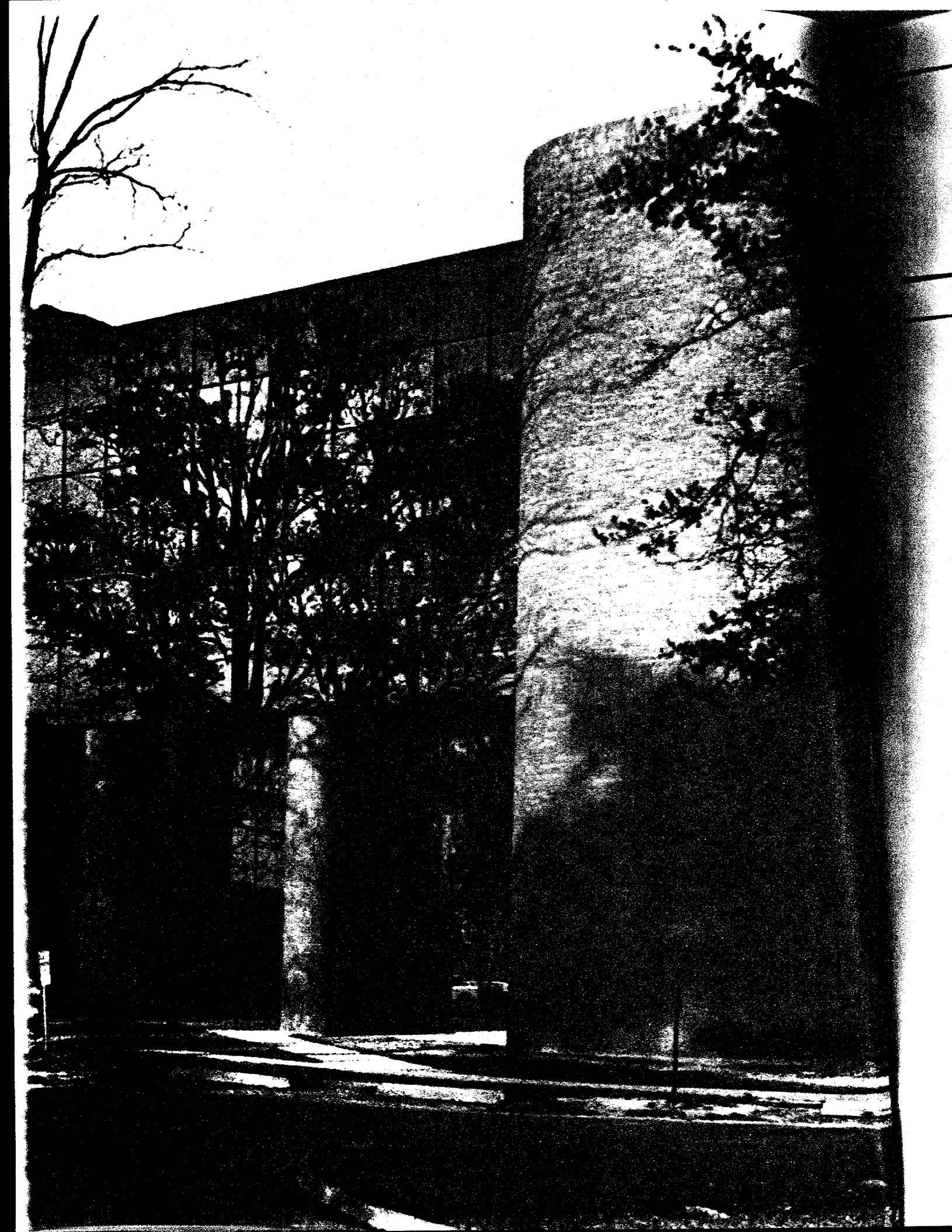
A complete inventory of all chemicals in the Harrington Science Building and the Agriculture Research Facility has been completed and Material Data Sheets for these chemicals currently are being produced using a commercial CD-ROM based Material Safety Data Sheet database.

Recycling Program

A pilot recycling project has been initiated in the College of Engineering and Architecture. This project will be expanded and implemented on a University-wide basis.



Steering Committee Member
Dr. John Williams
Chairperson, Department of Chemistry
Prairie View A&M University
College of Arts & Sciences
P.O. Box 2576
Prairie View, Texas 77446
(409) 857-3910 Office
(409) 857-2095 Fax



SOUTHERN UNIVERSITY

Dr. Dolores Spikes
President

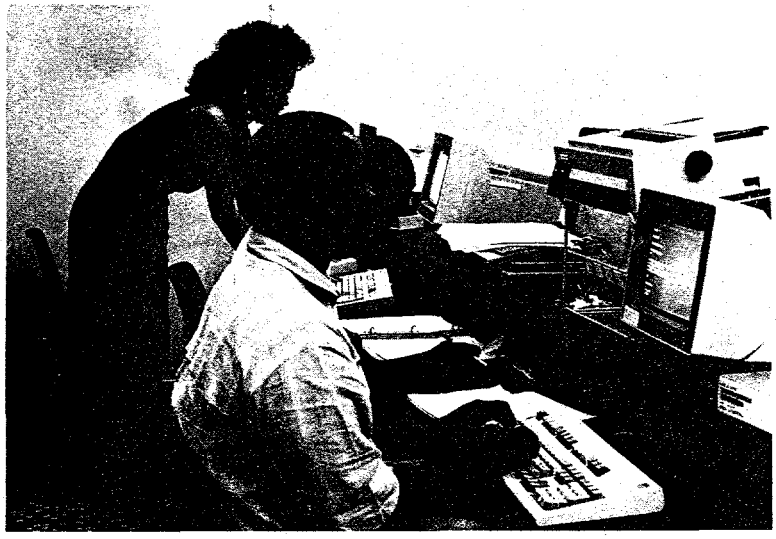
Southern University, Baton Rouge, the largest among the 117 HBCUs, is one of three state higher education institutions which comprise the Southern University System in the State of Louisiana. Established as a land grant institution under the federal Morrill Act of 1890, it is a state-assisted institution with the main campus located in the northern section of Baton Rouge.

The academic organization of Southern University consists of the Colleges of Agriculture and Home Economics, Arts and Humanities, Business, Education, Engineering, and Sciences; the Junior Division; Schools of Architecture, Public Policy and Urban Affairs; Nursing; and the Graduate School. Curricula offerings span the education spectrum from two-year associate degree programs through four-year baccalaureate programs to M.S., Ph.D. and professional degree programs.

The student body at Southern in Baton Rouge numbers approximately 9,100, with African Americans representing 91% and 2% international students. Approximately 88% are undergraduates and 72% are from Louisiana. The Southern University—Baton Rouge campus is one of the most beautiful campuses in the South, encompassing 512 acres of land with an additional 372-acre experimental farm located five miles north of the campus. Serving as an important educational, cultural, political and industrial center for south Louisiana, the University strives to exemplify the highest qualities expected of an institution of higher learning.

Research Interests

The University maintains an environment that enhances research and creative activities of faculty and students. Southern University manages two major NASA technology initiatives in industrial and space applications. The NASA Industrial Applications Center, one of only 10 in the country, assists agencies and businesses to conduct computerized searches of over 500 databases. Environmental research efforts have looked at impact assessment of solid waste application to agriculture land; feasible and cost effective methods of



regenerating two types of zeolite ion exchange materials used in waste water decontamination; strategies for decontaminating soils using an air stripping process; air toxics monitoring for volatile organic compounds; toxicity and environmental health impact studies, contaminant transport modeling; and the development of analytical methodology for water and waste water.

Other environmental research areas include environmental policy and management processes associated with solid and hazardous waste methodology; the development of innovative technology; and the mechanisms for more interaction among businesses, industry, governmental agencies, academia and the general population.

The president, Dr. Dolores Spikes, is the first woman to head a Louisiana public college or university. Dr. Spikes received her degrees in mathematics from Southern University and Louisiana State University. She taught and served in several chancellor positions before becoming president of the three campuses of the Southern University System. She has been voted one of the 20 most influential Black women in America by *Ebony Man* and received the Thurgood Marshall Educational Achievement Award.

CURRICULUM and FACULTY DEVELOPMENT

The new Center for Energy and Environmental Studies (CEES) has research and policy development capabilities in hazardous and solid waste materials management, toxicological evaluations and assessments, as well as air and water quality control and treatment methodology. CEES also directs the efforts of the ET/WM program in addition to the Minority Undergraduate Training in Energy-Related Careers (MUTEC) program, both DOE sponsored. This center is supported by a task force of business, industry, state and local government, media and educational institution representatives.

Several faculty members attended the six-week Hazardous Materials Training Institute at University of California-Davis to become certified as hazardous materials managers. These faculty members will provide training to faculty, students and other community or industry members who work with hazardous materials. The intent is to train community workers and other faculty members in pollution prevention and ways to reduce exposure to hazardous waste. Training programs will go beyond the Southern University community into other rural and urban areas.

Southern also sponsored a Faculty Research and Training Workshop describing information on various research and training grants in the environmental arena. Several proposals were developed for a summer science institute for middle school teachers, a science technology awareness retreat with business and industry, a middle school summer science camp and an environmental education training program.

Environmental Luncheon Series

CEES has initiated a series of bimonthly luncheons to foster an awareness of environmental issues and to enhance the environmental literacy of the faculty, staff, students, as well as the general public. Guest lecturers, experts in varied environmental arenas, present insights into global, national or local concerns. The luncheons also develop links between government, industry and businesses to cooperatively address environmental issues.

RECRUITMENT and RETENTION

The Consortium program has enhanced efforts in recruitment and retention of minority students in the sciences and engineering. Among these efforts was the sponsorship of a display booth and a student recruiter to accompany University representatives to the NAFEO Conference in Washington, D.C. Recruiters disseminated information on the new environmental initiative at Southern University. The admissions office has also appointed an activity coordinator to assist the Consortium's recruiting efforts. This coordinator also presents seminars to recruit participants for the Summer Science Institute and disseminates ET/WM promotional brochures to area high schools.

Tutoring Programs

The Consortium program initiated a collaborative tutorial effort with the student affiliates of two science-oriented organizations, the American Chemical Society and the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers. Members of these organizations tutor students of the School of Nursing and other students enrolled in lower level chemistry courses. They have also initiated a tutorial effort at one of the area elementary schools where they help teachers to perform science demonstrations and provide supplementary tutorials during classroom study hours.

OUTREACH ACTIVITIES

Two widely acclaimed environmental programs, Project Learning Tree (PLT) and Project Wild, were chosen because they offer effective mechanisms to expose teachers to interdisciplinary instructional activities, promote hands-on instruction of science as well as provide a mechanism to easily infuse environmental science into almost any subject area. Approximately 50 in-service teachers and 120 preservice teachers have participated in the PLT workshop. Twenty teachers took the facilitator's training, enabling them to conduct PLT educator workshops for teachers. Twenty teachers have also been trained on Project Wild.

Jefferson Project

The Jefferson Project is a summer enrichment program for middle school students, ages 12-14, grades 6-8. This program is multidisciplinary and provides enrichment experiences for students in mathematics, science, computer literacy and writing proficiency. The Consortium program sponsored several students for this program in summer 1991.

The impact of the summer experience on the student participants will be ascertained by following up their progress in mathematics and science during the following academic year.

Laboratory School Summer Enrichment Program

The Southern University Laboratory School has designed a K-8 program that provides enrichment experiences in mathematics, science, reading and computer literacy. The Southern HBCU/MI Consortium program also sponsored participants in this program and provided some of the science modules used in science instruction, including CHEM (Chemistry, Environment and Me) and CEPUP (Chemical Education for Public Understanding Program).

Summer Science Institute for Energy and Environmental Studies

The Consortium program cosponsored this six-week residential institute for 18 students. Curriculum included hands-on chemistry and environmental science, including laboratory experiences, mathematics and computer skills, writing, critical thinking, comprehension and test-taking skills. Field experiences provided firsthand knowledge of science careers and current technology. Students made weekly trips, including a visit to a nuclear plant, a refinery and a hazardous waste disposal plant. Because of the residential nature of the program, students from rural Louisiana and Mississippi were able to take advantage of this program. Surveys of participants indicated that some graduating seniors have chosen to go into environmental studies.

Science Teacher Awareness Retreat for Teachers (S.T.A.R.T)

This retreat was planned as a collaborative effort among the Southern University Consortium program, the Louisiana Department of Education and area industries to provide a meaningful training experience for teachers by helping them develop curricula and exposing them to instructional materials designed for today's changing technology. The purpose of the retreat was to encourage the participation of underrepresented populations in science and to

help teachers prepare students for science-oriented careers. The 3-day retreat impacted approximately 130 teachers from 31 parishes in southeast Louisiana.

Teacher Training Initiatives

A faculty initiative in conjunction with the Louisiana State University Center for Energy Studies and CEES is to develop an institute for middle school teachers and students to acquaint them with local, national and global environmental issues. The initiative will be geared toward teachers of "at risk" students who may not have had the in-depth exposure to science. The content will also expand student experiences with science activities and build confidence in the teachers' ability to offer hands-on science lessons.

The Southern University Consortium staff is also working with the College of Education to evaluate the possibilities of developing a teacher certification program in Environmental Science and a Science Certification for middle school teachers.

Eco-Net

The Alliance for Environmental Education sponsors an electronic environmental network for colleges and universities. The involvement of faculty, students and the interested public with this network has promoted more awareness of seminars, research, new developments in processes and technology for solving pollution prevention problems. An Eco-Net News Campus staff has actively been disseminating information to the community to help residents become more proactive in responding to the hazardous air and solid waste problems from the local petrochemical industry. An awareness of environmental equity issues, for example, is being raised since this region of the state,with the highest per capita cancer rate in the country, has come to be known as "Cancer Alley".

Recycling Program

The student group of the National Organization for the Advancement of Black Chemists and Chemical Engineers has developed a pilot recycling program on campus. Target for implementing a campus-wide program is Summer, 1992. Students are learning strategies to work with local community support groups for implementing recycling programs by surveying participants in the city recycling program while trying to determine reasons for non-participation. Students also visit recycling facilities to learn about the technology and processes involved in recycling.

Steering Committee Member
Dr. Robert Ford
Director, Center for Environmental Studies
Southern University at Baton Rouge
P. O. Box 9737, Building 8
Baton Rouge, LA 70813
(504) 771-3723 Office
(504) 771 4722 Fax

TEXAS A&I UNIVERSITY

TEXAS A&I UNIVERSITY

Dr. Manuel Ibanez
President

Texas A&I University is a part of the Texas A&M University System and is the only predominantly Hispanic university in the U.S. that offers both engineering and agricultural advanced degrees.

The Colleges of Education, Business Administration, Arts and Sciences and Graduate Studies make up the traditional areas of study. Each of these has faculty and programs that relate to environmental studies.

The College of Engineering has an interdisciplinary master's program in Environmental Engineering that emphasizes air, water, solid and hazardous waste, and product and worker safety. Texas A&I's major environmental engineering emphasis is the design of equipment, plants and procedures that protect human health and the environment from hazardous materials. The environmental faculty are drawn from a variety of areas within the University, thus providing a broad base of faculty expertise in air, water, soil contamination and remediation, and health and safety.

As the only comprehensive university in South Texas, Texas A&I University serves the needs of an area approximately the size of Pennsylvania. The University's enrollment is approximately 6,000, with 60% Hispanic and 3% African American. International students represent 5% of the total student population; 82% are undergraduates and 18% are graduate students.

The 257-acre main campus is dotted with red tile roofed buildings, tall palm trees and majestic live oaks. An additional 1,367 acres located in nearby counties are used by the College of Agriculture, The Caesar Kleberg Wildlife Research Institute (CKWRI), and the Texas A&I University Citrus Research Center.

Research Interests

Research interests are in diverse areas. Mesquite tree research is centered in the CKWRI and the Agriculture Department. Snake venom research,

including extraction, effects and applications, is centered in the Biology Department, as well as the Minority Biomedical Research Support (MBRS) program. Remote sensing of environmental effects projects are conducted by the CKWRI. Robotics research occurs in Mechanical Engineering. Micro-fabrication research, supported by NASA, is in the Mechanical and Electrical Engineering Departments. Water conservation and use in arid lands research is being conducted in the new Water Resources Research Center. Research in bioremediation is done by the Environmental Engineering Research Laboratory in conjunction with other physical sciences departments such as Geology and Soil Physics. Aerobic, anaerobic and nitrification studies of hazardous materials also are being conducted.

The president, Dr. Manuel Ibanez, has degrees in bacteriology and biochemistry from Penn State with post-doctoral work in nuclear medicine at UCLA. In addition to faculty positions, he has worked for the U.N. on agricultural projects in Central and South America. He held numerous academic positions as graduate dean, vice chancellor for academic affairs and provost at the University of New Orleans before moving to Texas A&I.

CURRICULUM and FACULTY DEVELOPMENT

In addition to developing the strategies, media and materials required to infuse environmental issues into existing courses, Texas A&I is developing a series of new courses. Electives were developed in summer 1991 to infuse environmental issues into existing science and engineering courses. Environmental media and laboratory equipment have been purchased. Some laboratory equipment was donated to the University.

Meteorology

An environmental engineering course was developed by the Department of Meteorology. This course was taught during the fall of 1990. Computer

programs for the USEPA short-term and long-term Air Dispersion Models are now available for faculty and student use. Several types of air sampling and analytical equipment acquired from U.S. agencies were used to supplement academic activities of this course. A complete meteorology station is being planned for the future.

Environmental Chemistry

Curriculum development for this course is still evolving. This environmental science course was taught for the first time in spring 1991.

Product Safety Design

Although the curriculum is still being developed, it was offered for the first time in summer 1991. Library materials have been ordered for three key aspects of this course: 1) Modeling and Statistics; 2) Product Safety Regulations; and 3) Radioactivity. Experts were recruited to present key lectures.

Solid and Hazardous Waste Design

This course has been taught several times although it is still evolving. Curriculum materials have been developed to aid in teaching it. To supplement this course and provide opportunities for research, the University has built an environmental laboratory. Some new state-of-the-art equipment is now available, including a gas chromatograph, an atomic absorption spectrophotometer, and a dual cell respirometer.

Faculty Development

In addition to Consortium-sponsored activities, one faculty member presented a paper on "Carbon Adsorption of Hazardous Metals" at the first Annual Waste Management Conference in San Juan, Puerto Rico. Others attended the Sixth Conference on Environmental Engineering Education. A toxicologist, who is also an industrial hygenist, was hired in September 1991.

RECRUITMENT and RETENTION

Through Consortium funding, 12 scholarships were awarded in the spring and summer semesters. The students participated in the Minority Outreach Programs on campus, which broadened their exposure and commitment to environmental sciences and issues. They participated in Texas A&I's outreach programs for K-12 students by doing demonstrations and environmental exhibits. All of these efforts have helped expand the environmental program.

OUTREACH ACTIVITIES

Junior College Bridge Program

This innovative 3-day program brings junior college students to the Texas A&I campus each summer to describe degree programs in Physical Sciences and Engineering. During their four days on campus, students visit laboritories, tour a local petrochemical plant and participate in activities designed to increase their awareness of their environment and encourage them to pursue a university degree in either environmental engineering or science.

A groundwork was laid for developing future relationships with 2- and 4-year programs at the Partners Program Regional Resource Sharing Conference, with joint sponsorship of the Hispanic Association of Colleges and Universities (HACU) and the Department of Interior (DOI). Many opportunities for student employment as well as for grants and contracts were reviewed at this conference.

Teleconference

Texas A&I faculty members hosted the Fourth Annual "Ask the Experts," an interactive teleconference on Hazardous Materials and Waste Management. Junior high and secondary school educators from the South Texas region were invited to participate. Topics included the Clean Air Act of 1990, the Clean Water Act and mixed radioactive and hazardous waste. Speakers were from industry, government and education.

Seminars

One-day seminars were conducted with earth science teachers at the K-6, junior high and secondary school levels to infuse environmental science and restoration issues into their classrooms. Training materials and kits were prepared for the teachers. The University is currently developing Project Wild and Project Learning Tree to help teachers understand ways to make science instruction more exciting for students.

Physics Is Fun

This program uses volunteer college science and engineering students to demonstrate physics experiments at area schools to K-12 students. At each school visited, Texas A&I students set up 25-30 booths of demonstrations and hands-on experiments. Students at the schools receive a kit so that they can perform experiments at home with their families. These weekly trips impacted a minimum of 400 students and teachers each week.

Two of the largest "Physics is Fun" Fairs were conducted during spring 1991. One fair was presented to approximately 4,000 students, parents and teachers in a predominantly Hispanic area in Weslaco, Texas. Another fair was held in Corpus Christi for approximately 7,400 participants.

The Physics is Fun Program has received praise from all the participants—approximately 21,500 students during the 1991 spring semester. The fall 1991 schedule is complete, with 18 schools on a waiting list for spring 1992.

Tex Prep Engineering Program

The three-week Texas A&I Tex Prep Program was conducted for high achieving 7th-11th graders with interest in engineering and science professions. The objectives are to develop student abstract reasoning and problem-solving skills. Courses and topics in the academic component include: Logic and its

Application to Mathematics, and Introduction to Engineering and Computer Science. Students also performed laboratory experiments in environmental science and engineering, hydraulics, soil mechanics and robotics. They also were given career opportunity presentations by faculty members and professional engineers from private industry.

Sixty of the sixty-one students enrolled successfully completed the program. Eighty percent of the program graduates were from minority groups traditionally underrepresented in the engineering and science professions.

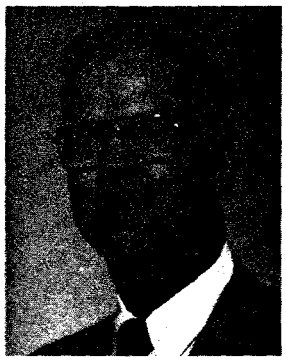
Geosciences Precollege Outreach In South Texas Program

Texas A&I is planning a progressive educational program in geosciences that will enable the University to maintain contact with interested students from elementary school through precollege training. The Geosciences Precollege Outreach In South Texas Program will use a successive levels approach beginning with Junior Rockhounds (grades 3-6), to Rockhounds (grades 7-9) and conclude with High School Geology/Environmental Science (grades 10-12).

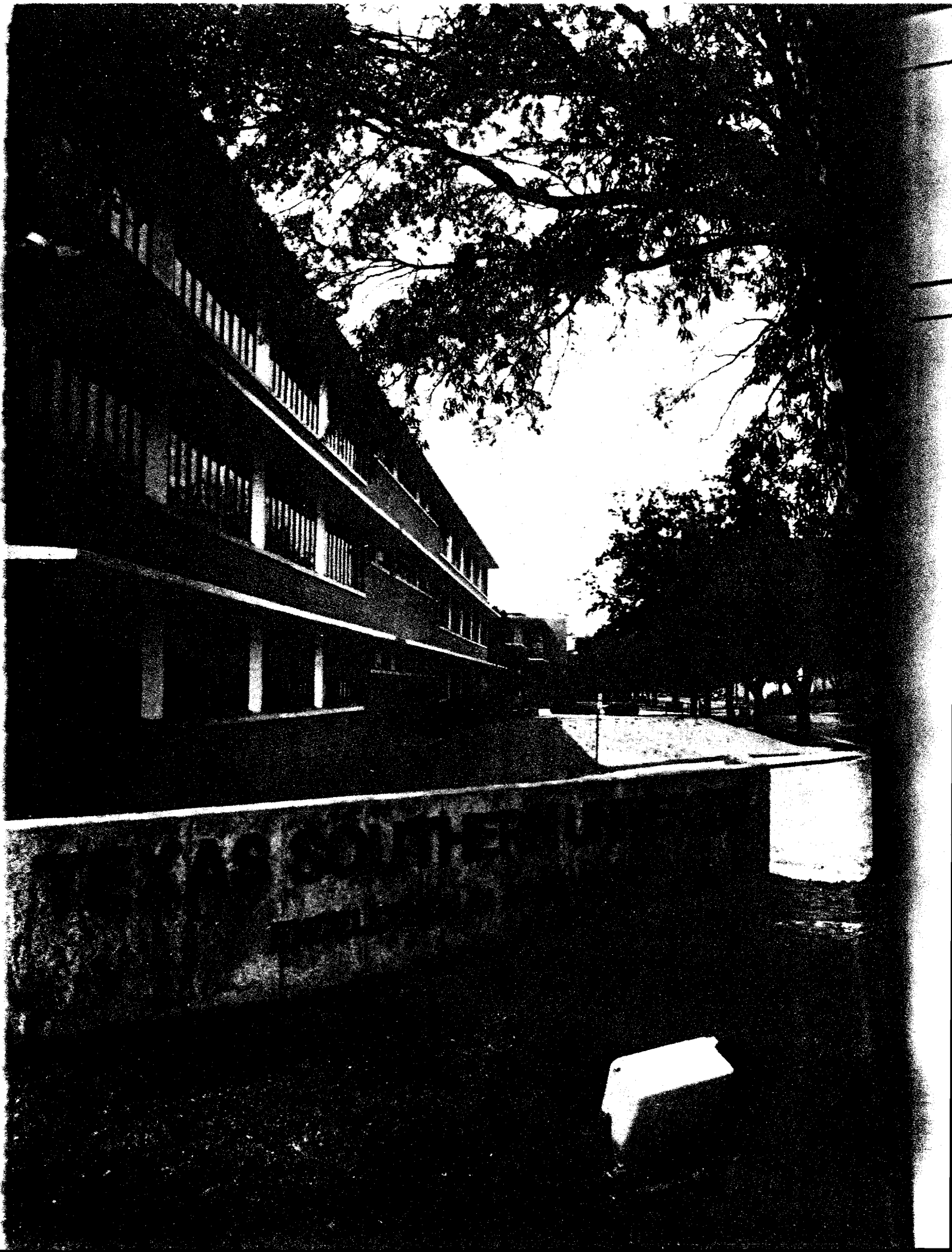
Junior Rockhounds will introduce elementary students to the world of collecting rocks, minerals, fossils and lapidary as a hobby. The Rockhounds program will increase the earth science class resource base with educational modules and quality in-service sessions. The high school Geology/Environmental Science Program will help students understand current and future earth and environmental issues facing South Texas and the nation.

Recycling

Phase I of the University's recycling program was implemented in spring 1991. This pilot program involves recycling white paper from three campus buildings. The recycled waste is sold to two companies in Corpus Christi, TX. Phase II will extend the recycling effort to all campus buildings in fall 1991.



Steering Committee Member
Dr. Ray Finch
Chair, CHE/GNE Department
Texas A&I University
Campus Box 193
Kingsville, TX 78363
(512) 595-3046 Office
(512) 595-2143 Fax



TEXAS SOUTHERN UNIVERSITY

Dr. William Harris
President

Texas Southern University (TSU) is the oldest state-supported institution of higher education in Houston, Texas. TSU is a comprehensive, urban university which was founded in 1927 and established as a state-supported university in 1947. The mission of the University includes teaching, research and public service. TSU offers courses through its four schools and three colleges leading to more than seventy undergraduate degree programs and more than thirty master's and doctoral degree programs.

Sixty percent of the faculty hold doctoral degrees. The fall 1991 enrollment was 10,300, of which 46% are male; 54% are females, and 80% are undergraduate students. Approximately 75% of the students are African Americans; 16% are international students; and 5% are Hispanics.

In the sciences and technology, degrees are offered in biology, chemistry, computer science, mathematics, physics, pharmacy, health science, environmental technology and industrial technology. The University has significant programs in environmental science and engineering research to train students in state-of-the-art research methods, who in turn can ultimately discover solutions to the complex problems resulting for the imprudent actions of humans on the natural environment.

Research Interests

TSU has a strong record of success in obtaining grants and contracts from government agencies such as NASA, DOD, NSF, HUD, NIH, and private foundations. Many efforts have been designed to support the University's goals of promoting environmental science research and education to reduce the harmful pollutants that threaten natural resources and the state's agricultural base. TSU envisions that these efforts will give impetus to clean up efforts and ultimately to the elimination of hazardous waste dumps and other polluting sites which infest urban neighborhoods.

Texas Southern currently is engaged in a significant number of environmental research and training studies. Some of these on-going studies include:

- Coal liquefaction and related environmental effects;
- Development and conservaztion of Wadi El Raiyan Western, Egypt Desert;
- Analysis of toxic elements and compounds in a closed environment;
- Waste water contaminant studies;
- Transport of heavy metals in the waste water process;
- Receptor-bound toxicants as biomakers for human exposure to environmental pollutants;
- Development of a radio receptor assay to measure environmental pollutants (insecticides) in the blood of exposed individuals;
- Environmental analysis; and
- Community planning and development.

The president, Dr. William Harris, has led the University during a 44% increase in student enrollment, substantially increased funded research projects, awards and grants, and increased community outreach programs. A noted historian with a Ph.D. from Indiana University, Dr. Harris has published numerous articles in scholarly journals. He came to this position from the presidency of his other alma mater, Paine College in Augusta, GA.

FACULTY and CURRICULUM DEVELOPMENT

Texas Southern proposes to offer a Ph.D. in environmental science that is unique in the State of Texas. The proposed program will be interdisciplinary and research oriented to prepare students to study the complex mechanisms by which pollutants act in the physical and living environments, the impact of pollutants on the environment, and the effectiveness of policy making, planning and the regulation of environmental resources by public and private agencies.

Program content will include environmental biology, environmental chemistry, environmental toxicology and environmental policy.

TSU plans to expand its environmental science program to encompass areas appropriate to the University's mission. These areas will include:

- Summer programs for high school students;
- Tutorials in biology and chemistry for college students;
- Saturday academies for grades 10-12;
- Motivational seminars by environmental scientists;
- Field trips to industrial sites and universities to meet environmental science professionals;
- Preceptorships in research laboratories for advanced students;
- Symposia for high school and college students; and
- Tracking students from grades K-12, college, and graduate school.

In addition to developing curriculum materials as enrichment for science majors, the institution plans to develop a clearinghouse on data and materials related to effective graduate and undergraduate environmental science instruction.

TSU's environmental health students participated in field trips that complemented course work in a broad range of environmental courses. Trips included a visit to a brewery to study fermentation; sanitary landfills, transfer stations, recycling centers; medical waste management facilities; a mosquito control laboratory; the biological/chemical and physical treatment processes used in municipal sewage; and a private environmental laboratory.

RECRUITMENT and RETENTION

During the academic year, tutorials were offered for the basic science courses to reinforce student academic preparation. An average of 50 to 60 students continue to be tutored weekly, many of whom seek tutorial assistance two or more times weekly. As a result of these and other efforts, students have increased understanding and interest in the science curricula and have demonstrated measurable improvement in their course work.

TSU ENVIRONMENTAL PROGRAMS

Environmental Health Club

The Environmental Health Club is a Texas Southern student organization that works for environmental change through education, awareness and concrete action. Last year, Club members planned a tree planting and recycling effort to celebrate the twentieth anniversary of Earth Day. As a result of these efforts, this organization was presented with a monetary award from the National Wildlife Federation. The Club continues to work on projects benefiting the campus and the surrounding community.

College-wide Recycling Program

Community outreach and education were the two main thrusts of the 1991 recycling project initiated by the Environmental Health Club. While expanding on the existing campus-based recycling program which won them one of the *"Cool It!"* merit awards in 1990, the students wanted to increase the community awareness around recycling while bridging gaps between the campus and

its neighboring community. As a result of the Club's recycling initiatives, the students serve as representatives of their district at the City of Houston's recycling committee hearings. Students monitor the progress of the program and participation levels in their community.

OUTREACH

SEC2-AP2

The Science and Engineering Career Awareness and College Preparatory Program (SEC2-AP2) has been operating for over a decade. The program was designed to prepare talented minority students for majoring in one of the physical sciences, computer science or engineering at the university level. There are four levels of academic preparation during a six-week summer workshop, including personal and career development sessions:

Level 1: Chemistry, Drafting, Computer Science (MS-DOS and software), Introductory Algebra, Reading and Study Skills and Physics.

Level 2: Computer Science (UNIX), Drafting, Electronics, Intermediate Algebra and Geometry, Personal Growth and Development and English Composition.

Level 3: Chemistry (college level), Computer Science (PASCAL), Trigonometry, English Composition/Speech, SAT Review and Physics (college level).

Level 4: Chemistry (college level), Computer Science (PASCAL), Introductory Calculus, Space Science and Physics (college level).

By the completion of Level 4, students have computer programming skills in two computer languages (PASCAL and C) and are familiar with both the MS-

DOS and UNIX operating systems. Additionally, they are familiar with some of the software packages commonly utilized in business, industry, and science.

School Partnerships

Texas Southern has formed articulation agreements with Houston Community College and twelve other community colleges in Texas. Through these agreements, students are encouraged to transfer and pursue majors in environmental science and other related fields. Plans were made to design a collaborative partnership with one Houston Independent School District (HISD) elementary school. Students will benefit from the expertise of professional faculty from liberal arts, sciences and professional colleges; the physical resources of a college campus; the support of college student mentors; and role models and the leadership of the two institutions in creating a network of social services for the students, families, and the community.

Careers in Science

The Careers in Science project is another partnership between Texas Southern and four elementary schools of the HISD. The long term goal is to increase the number of ethnic minority students and women who choose careers in science (including environmental science) during the early school years. This effort is based on four premises:

- There is a direct positive correlation between pupil achievement in science and teacher commitment and content competence in science.
- Staff development is a viable tool for increasing the science competence of teachers who serve students in K-3.
- Maintaining high interest and raising performance levels in science during the early years alters the trend of lowered performance, generally evident by grade 3.
- Sustaining pupil achievement in elementary science is a foundation for increasing the pool of students who ultimately choose science and engineering careers.

Steering Committee Member
Dr. Bobby Wilson
Vice-President for Academic Affairs
Texas Southern University
3100 Cleburne Avenue
Houston, TX 77004
(713) 527-7134 Office
(713) 639-1999 Fax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TUSKEGEE UNIVERSITY

Dr. Benjamin F. Payton
President

Tuskegee University is a coeducational, privately controlled though state-related professional, scientific and technical university. Since its founding in 1881 by Booker T. Washington, Tuskegee has addressed critical issues confronting the "Black Belt" area of Alabama and, in so doing, developed the "School on Wheels," which evolved in 1906 to become the first Cooperative Extension Program in the United States.

Tuskegee University is a comprehensive university with strong research and teaching programs in scientific and technical areas. Tuskegee is organized under seven major schools: Arts and Sciences, Agriculture and Home Economics, Business, Education, Engineering and Architecture, Nursing and Allied Health and Veterinary Medicine. The schools offer 45 bachelor's degrees, 21 master's degrees and a Doctor of Veterinary Medicine.

Tuskegee has enrolled more than 63,000 students during its 110 years. Currently, it enrolls 3700, 95% of which are African American, with 95% in undergraduate programs and 5% in graduate programs. Tuskegee has approximately 250 faculty involved in teaching and research.

Located in central Alabama, the University's sprawling facilities cover more than 4,500 acres of land and more than 155 buildings and structures. Tuskegee was the first black college to be designated as a Registered National Historic Landmark in 1966 and the first HBCU to be designated a National Historic Site in 1974.

Research Interests

Tuskegee has strong research and teaching programs in scientific and technical areas. One of the University's strongest assets is the interdisciplinary team approach to research. On-going examples of this include developing and patenting new technology for growing food without soil for long-term space missions (engineers, plant, soil and food scientists); production of light weight materials for space missions (chemists and engineers); delivery of animal health

care practices to rural farmers (veterinary medicine, cooperative extension and animal science) and monitoring the effects of acid rain and ozone on pine trees (soil science, forestry). Tuskegee serves as a strong regional and national resource for hazardous waste research, management and education programs due to its strategic location.

The president, Dr. Benjamin F. Payton, is the fifth president of Tuskegee University. He holds the doctorate from Yale and graduate degrees from Harvard and Columbia. In addition to having held several positions in higher education and nonprofit agencies, he has had the unique experience of being part of two Presidential task forces to evaluate institutions of higher learning in seven African countries. He is a member of numerous boards and organizations and director of several corporations.

CURRICULUM and FACULTY DEVELOPMENT

The Tuskegee Environmental Technology and Waste Management Team (TEWT) launched a university-wide program to infuse environmental science curriculum in all seven academic areas. With local EPA support, the committee assessed the quality and number of environmental science courses available in Alabama higher education institutions.

Several other enhancements included the purchase of interactive video programs for the general and organic chemistry courses to facilitate student learning. The organic chemistry program was implemented in fall 1991, and the general chemistry program will be in place by the end of the spring 1992 semester. A two-day Speaker's Forum focusing on environmental technology involved faculty and students from six departments.

One faculty member completed the Hazardous Waste Training and Certification Program at the University of California, Davis. Three others attended a week-long workshop at Jackson State University on ET/WM. Other faculty have been developing seminars on environmental technology and a forum on "Chemical Storage and Disposal."

RECRUITMENT and RETENTION

Scholarships

Twelve students received scholarships during the 1990-1991 academic year. These students were selected from several academic areas because of their expressed interest in the environmental sciences and potential for graduate study. One student from the School of Engineering has been accepted in the doctoral program at Purdue; a second student, from chemistry, entered the graduate program at the University of Tennessee, Knoxville.

Career Explorations

Two chemistry professors and one economics professor took their classes on several field trips to Chemical Waste, Inc. These field trips were designed to expose students to private sector involvement in hazardous waste management.

Health Careers Opportunity Program

This program is designed to recruit, facilitate admission, provide academic reinforcement for financially or academically disadvantaged students to enter and complete careers in the health sciences. This eight-week pre-admission summer enrichment program helps students diagnose their learning deficiencies, gives survival study skills, strengthens their comprehension of scientific information and improves their ability to apply their knowledge. Additionally, the program provides tutorial services from peers and faculty and comprehensive counseling.

Twenty-five trainees are selected each year. From this group eight to ten are admitted to the School of Veterinary Medicine. Almost one-third of the enrollment and one-third of the doctorates have been summer trainees. Fourteen years of continuous Public Health Service funding has supported this project.

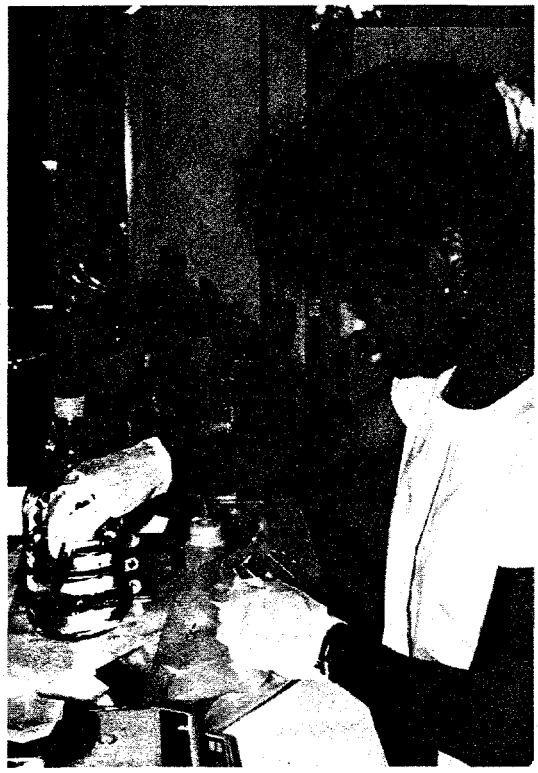
OUTREACH

Tuskegee offers the largest number of precollege programs found at any school of its size as part of a comprehensive effort to identify, motivate and prepare high school students to consider engineering and science careers. Some of the outreach programs described below have been operating 10-15 years. The combined programs served approximately 350 students during the 1990-91 school year.

These programs have become a powerful recruiting tool for the School of Engineering particularly. Of the 200 engineering freshmen, approximately half participated in one or more of these precollege programs. Faculty members believe these programs to be responsible for the skill building and motivational experiences that enable students to complete their course work in 8 semesters and increase the likelihood of their matriculating in graduate school. The School of Engineering increased enrollment in its M. S. program from 29 to 51 between 1990-91 and 1991-92. African American student enrollment increased from 8 to 36.

Saturday Science Academy

This program has been operating for nearly 5 years and has been used by Tuskegee to actively recruit high school students into pre-engineering and other science programs. In 1991, the program served over 100 students. The students met weekly from September to May. Tutorials were taught one hour by advanced engineering students and faculty.



This program strengthens student performance in chemistry, physics and mathematics. Additional evening tutorial sessions are available. Outstanding students are selected to participate in one of the following Summer Enrichment Programs.

PREP I and II

The Pre-freshman Enrichment Programs I and II are four-day summer programs offered to sophomores and juniors from the local school systems. As with other programs, almost half of the students in these courses were recruited from the Saturday Science Academy sessions.

PREP I and II offer instruction in mathematics, chemistry, physics and engineering graphics. Laboratory sessions with tutorials provide students with experience in experimentation, report writing and problem solving. Student-faculty interaction provides opportunities for guidance in career selection. Guest lectures from alumni expand student perceptions of career opportunities, especially regarding potential for women and opportunities to integrate multiple careers such as law and public administration with an engineering base.

Minority Introduction To Engineering (MITE) and Research Apprenticeship for Disadvantaged High Schoolers (RADHS)

MITE and RADS are programs available to students who have completed their high school junior year. Two one-week MITE sessions were designed to expose students to various aspects of engineering and college life. The main features of the program are lectures and laboratory demonstrations by engineering faculty and alumni.

RADHS is a residential, eight-week program designed to provide participants the opportunity for hands-on laboratory experience under the supervision of research faculty along with instruction in computer programming and computer-aided design. Seminars, guest lectures, field trips and career counseling are additional features of RADHS. Each participant receives a $1000

stipend. Most students are from rural school systems and may not have had the opportunity to participate in this type of science enrichment.

Freshman Accelerated Start-Up Training for Retention in Engineering Curricula (FASTREC)

FASTREC is an eight-week summer program offered to high school graduates. This program has been marketed to the 20,000 prospective graduates on the College Board mailing list. Participants come from all over the country. In FASTREC, students pursue an intensive program of study in mathematics, freshman orientation, engineering graphics or computer programming with guest lectures, field trips and seminars. Students earn seven semester hours toward a B.S. in Engineering. A majority of the FASTREC students enrolled in Tuskegee's engineering program.

Space Grants and Sweet Potatoes

Space grant funds are shared by the Schools of Agriculture and Home Economics, and Engineering and Architecture. Space grant activities include visits by over 650 high school students to the Tuskegee/NASA Sweet Potato Project and provide lecture expenses, student stipends and overnight inspirational trips to the NASA/Marshall Space Flight Center in Huntsville, AL.

Teacher In-service Programs and Integrated Science 7 Program: Solid Waste Curriculum Supplement

This collaborative effort combined talents of university professors, public school faculty and administrators to produce a solid waste management curriculum for Macon County. Four middle school teachers were partially funded with Consotrium funds to attend a curriculum development workshop at the University of Alabama and later complete the seventh grade curriculum.

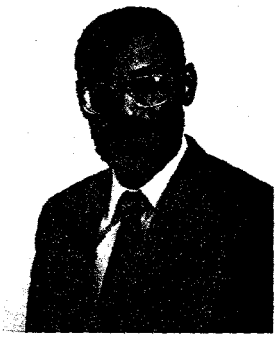
An integrated science curriculum program for grades 8-12 will be implemented on a year-by-year basis. This program will be replicated in adjoining counties.

Community Programs

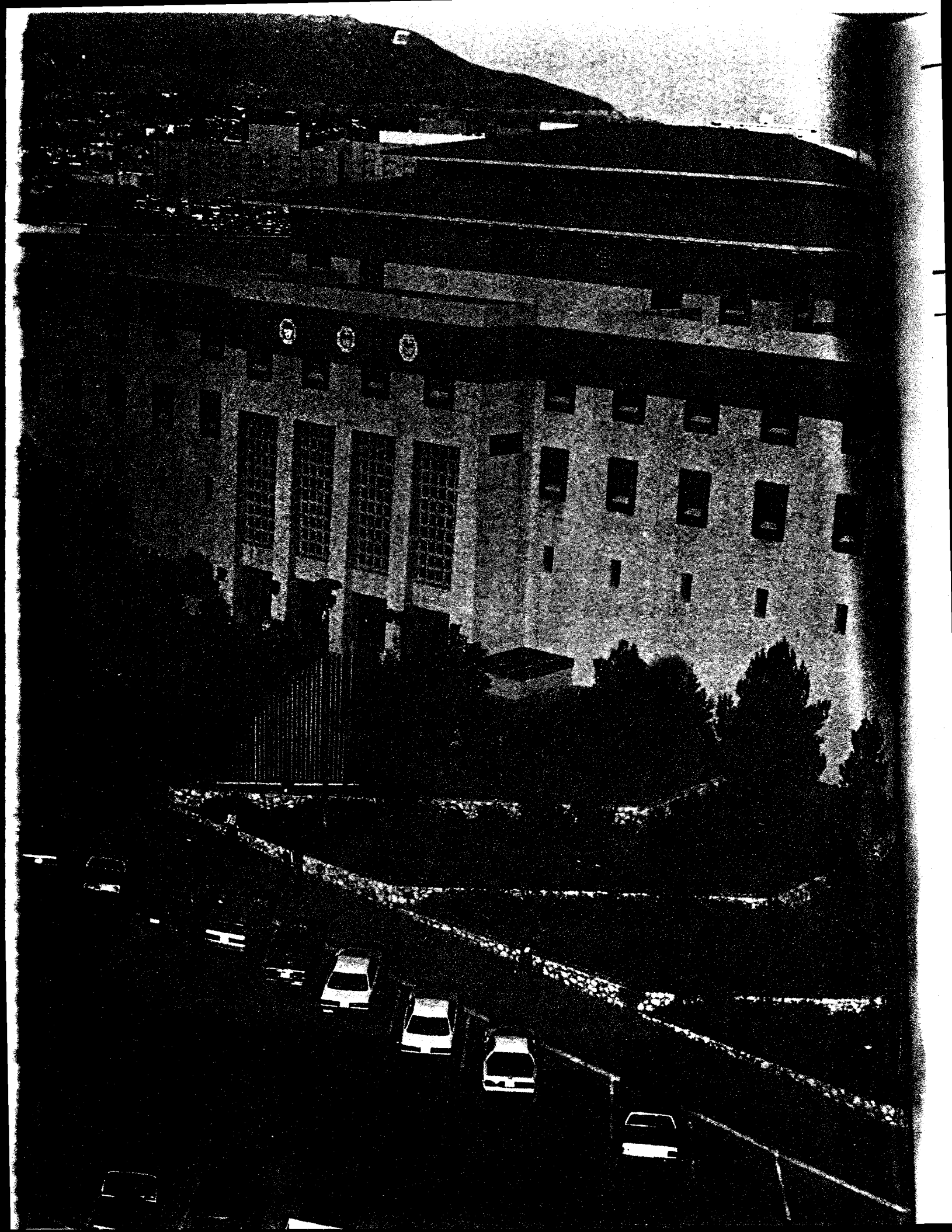
The Water Quality Testing Program implemented by the School of Agriculture and Home Economics, partly funded by the Consortium, conducts a water testing program for nitrates, lead and iron for private wells and community water systems. In FY 91, approximately 200 samples were collected and examined. Graduate and undergraduate students in agriculture participated in the collection and testing of these water samples.

Recycling

A pilot paper recycling program was completed for a major building on campus and has been expanded to three other campus facilities.



Steering CommitteeMember
Dr. Walter Hill, Dean
School of Agriculture and Home Economics
Tuskegee University
Tuskegee, Alabama 36088
(205) 727-5241 Office
(205) 727-8493 Fax



UNIVERSITY OF TEXAS - EL PASO

Dr. Diana Natalicio
President

The University of Texas at El Paso (UTEP) was founded in 1913 as the Texas State School of Mines and Metallurgy and is the second oldest academic component of The University of Texas System.

UTEP's six undergraduate Colleges- -Business Administration, Education, Engineering, Liberal Arts, Nursing and Allied Health, and Science- - offer over sixty-five bachelor's degree options. Master's degree programs are offered in all six colleges. Doctoral programs in geological sciences and electrical engineering are also offered. Graduate work is coordinated through the Graduate School.

The campus is over 300 acres and is a few hundred yards from the United States - Mexico border. The University, which features Bhutanese architecture, currently enrolls 16,800 students. More than 59% of the student body is Hispanic, 8% are international students (mostly Mexican), with undergraduate students representing 83% of the University population.

Research Interests

UTEP conducts research on hazardous waste management and soil, air and water pollution issues that impact this binational region. For example, engineering faculty members are studying hazardous and radioactive waste management by-products and pollutants, the contamination and reclamation of subsurface environments, treatment technologies for water, waste water and hazardous wastes, methods for recycling and reuse, and recovery of water and materials.

Under the auspices of UTEP's Center for Environmental Resource Management, researchers have developed an internationally recognized program in solar pond technology. This program offers future solutions for recycling power plant waste water effluents and irrigation return water flows. UTEP is a leader in solar pond technology and operates the largest solar pond in the United States. UTEP's solar pond was the first to supply heat for industrial use,

to treat brackish water using thermal and electric energy generated from the pond and the first in the US to generate grid-connected electricity.

UTEP's research effort is supported by state-of-the-art technology with funding from federal agencies such as EPA, NSF, NIH, DOE, NASA, the Army, and the Air Force Office of Scientific Research. The University's Materials Research Center of Excellence is one of eight Minority Research Centers of Excellence funded by NSF.

The president, Dr. Diana Natalicio, has held numerous positions including chairperson, dean and vice president for academic affairs at UTEP. Dr. Natalicio's degrees from St. Louis University and the University of Texas-Austin are in Spanish, Portuguese and linguistics. Dr. Natalicio is involved in many state and national initiatives to increase opportunities for women and minorities to participate in education and a variety of professional fields. She currently serves on the President's Advisory Commission on Educational Excellence for Hispanic Americans.

FACULTY and CURRICULUM DEVELOPMENT

A mechanical and industrial engineering faculty member was given support to develop an interdisciplinary environmental course to address environmental restoration and waste management issues. The new course will look at issues such as environmental policy analysis and risk assessment, toxicology, allied health and industrial hygiene, environmental remediation, and hazardous materials management from technical, social and ethical perspectives. The plan is to team teach and involve faculty members from all the University's colleges.

New courses in the environmental area are under development in the Departments of Civil Engineering and Geological Science. In addition there is a University-wide review of the curricula to determine the amount and quality of attention given to environmental issues. These data will be the basis for ways to infuse the existing curriculum with environmental restoration and waste management topics.

In addition to participating in Consortium-sponsored programs, UTEP initiated speaker programs. Featured speakers covered either new technology or policy issues related to developing environmental science programs.

RECRUITMENT and RETENTION

The SUCCESS Program

UTEP has designed an integrated academic and professional support initiative program to help incoming freshmen move into technical studies. Highlights of this program include:

- The Summer Engineering Orientation Program. This begins with a two-day counseling and orientation session. An intensive six-week academic enrichment program follows. It concentrates on mathematics, engineering, problem-solving and academic gamesmanship.

- A special multidisciplinary engineering course for SUCCESS students teaches engineering fundamentals, study, personal presentations, and technical writing skills. During the course, students meet with corporate representatives. They then develop class projects and

conduct professional activities to help them focus for success during their first year in college.

- The Academic Workshops and Tutoring Program offers weekly mathematics workshops aimed at helping students master course content. Supplementary tutoring by upper level engineering students is also offered.

- The Academic and Personal Advising Program clusters freshmen into common sections or core classes in order to foster team building. Incoming students develop a personal action plan with the help of faculty and upper-division peer counselors.

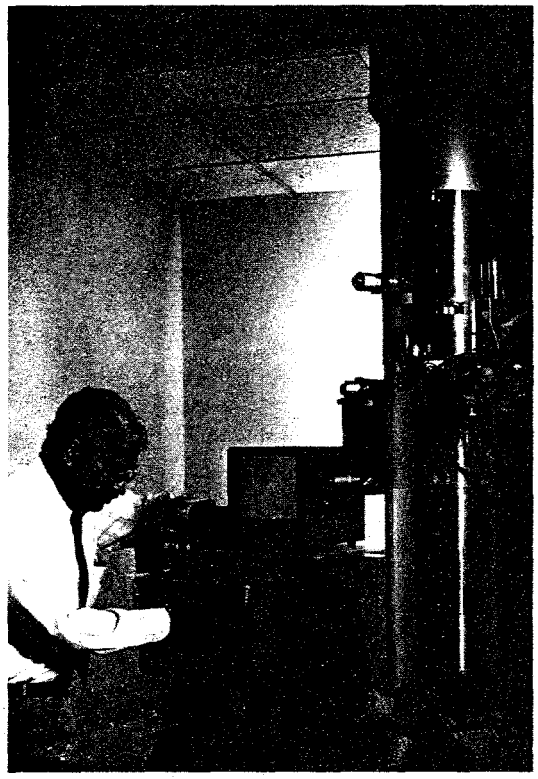
The Consortium program provided support for two half-time student mentors to work with freshmen. The mentoring and tutoring activities are designed to keep science and engineering undergraduates in school and to successfully pursue their courses of study. An initial evaluation of the program indicates that the average GPA of participating students is significantly higher than for the College as a whole.

Research Assistantships

Consortium program provided stipends for students to serve as research assistants on environmentally related research projects. Six undergraduates and two graduate students were supported this year. Some of the research topics addressed include:

- Testing of an experimental design to compare strontium and cobalt ions;

- Research on the technology of soil venting;



- Microbial rock plant filters for treating and reusing waste water in arid environments;
- Solar pond data analysis;
- Weather data analysis;
- Aerosols and visibility effects in the atmosphere; and
- Removing heavy metals from contaminated soils.

OUTREACH

Summer Science and Engineering Institute

UTEP sponsors three two-week summer sessions for students in grades 8-10. Sessions, run by engineering faculty and students, have varied activities including laboratory experiments, competitions and field trips. The intention is to introduce students to energy and engineering careers. The 1991 program added several sections with an environmental focus, including one on urban planning that dealt with environmental issues. This year 330 students participated.

Bridge Program

Using Consortium funds, UTEP has enhanced the existing "bridge" program with El Paso Community College. Its purpose is to encourage capable community college students in science and engineering to continue their university education at UTEP and ease their transition from a two- to a four-year institution. In summer 1991, thirty eight (38) students participated in activities on UTEP's campus. They were involved in "support" classes and worked as research assistants on energy and environmentally related projects.

Living in the Desert

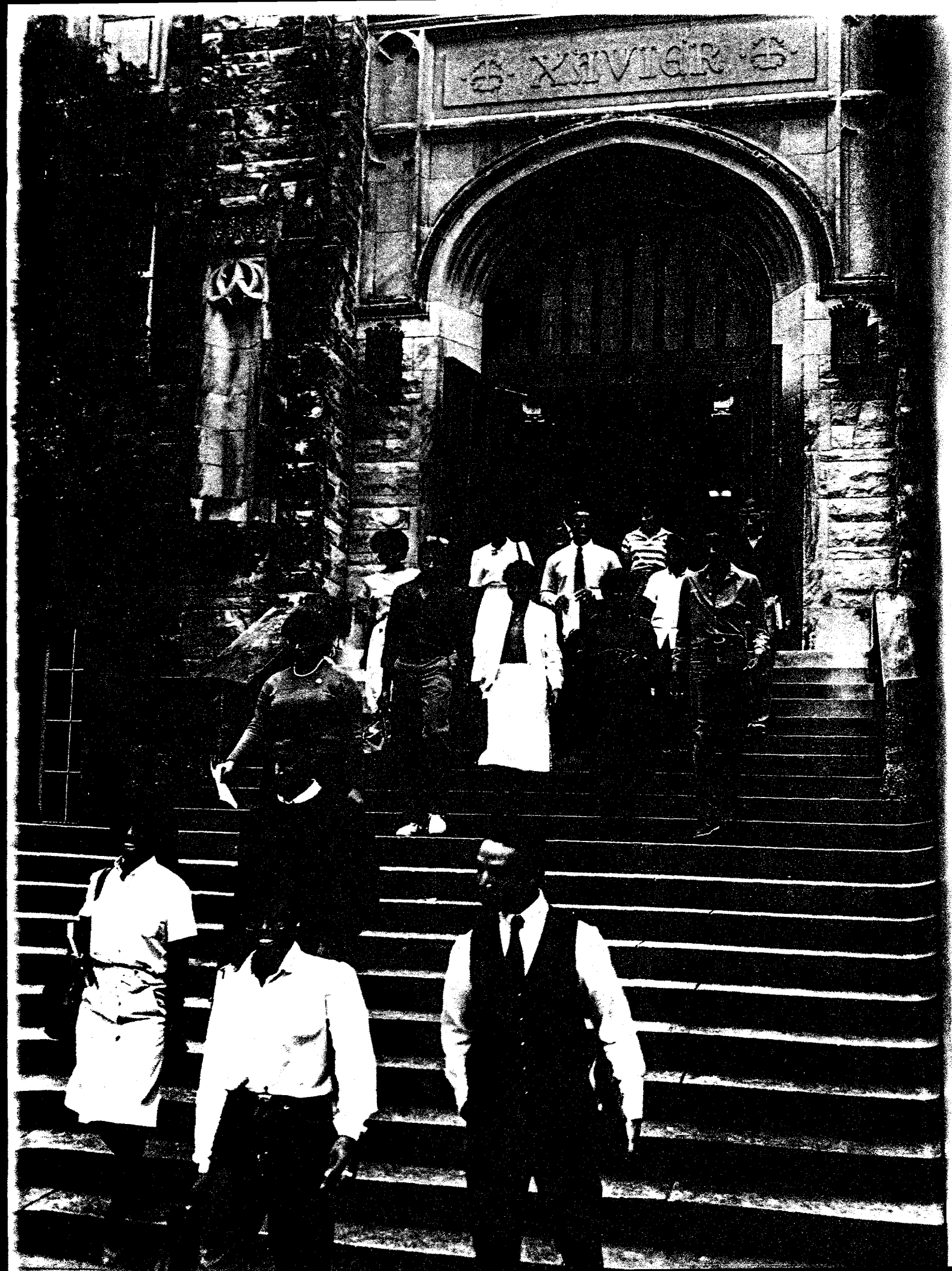
This video-based educational resource was selected as the most appropriate vehicle for in-service training and curriculum for public school teachers in the El Paso region. This program, originally developed in conjunction with area teachers, focuses on conserving resources in a desert environment. Training is being planned for all El Paso science teachers.

Recycling

Students supported by the program are developing and implementing a University-wide program. Current efforts focus on cardboard, white paper, computer paper and aluminum cans.

Steering Committee member

Dr. Charles Turner
Chairperson
Civil Engineering Department
University of Texas at El Paso
500 West University Avenue
El Paso, TX 79968-0587
(915) 747-5000 Office
(915) 747-5616 Fax


S. XAVIER'S

XAVIER UNIVERSITY

Dr. Norman Francis
President

Xavier University, a Catholic high school turned into a college in 1925, traditionally has served the African American community of Louisiana. Xavier has extended its traditional focus so that currently 53% of its 3000 students are non-Catholic, over 30% are from outside the state, and 10% are from other ethnic or racial groups.

Xavier is a liberal arts institution composed of a College of Arts and Sciences, a Graduate School and a College of Pharmacy. It offers professional and doctoral degrees in pharmacy and master's degrees in five areas. In the last 10 years, Xavier has had a dramatic increase in students interested in science and engineering, with over 250 chemistry and 600 biology majors.

The growth of the University also has been in the quality of science graduates: for the past five years, Xavier has been ranked first in the nation in placing African Americans into graduate pharmacy programs (one fourth of all African American pharmacists are educated at Xavier) and second nationally in placing African Americans into medical and dental schools. Eighty percent of the Xavier applicants to medical school are accepted, compared to a national average of 45% for all students.

Research Interests

The Center for Environmental Programs is conducting research in oceanography, limnology and aquatic ecology in environments such as the estuarine/coastal Gulf of Mexico and the Great Lakes. These programs include developing lake-wide management strategies and remedial action plans for degraded aquatic ecosystems. The Center also has developed interdisciplinary fact-finding programs to assess risks to human health from environmental exposure to toxic chemicals.

Biology faculty members are involved in degradation projects focused on munitions pollution at DOD facilities. These studies include botany, microbiol-

ogy and applied ecology investigations. Pharmacy faculty research concentrates on investigating the risks from heavy metal pollution and organic contaminants to aquatic fauna and humans. Chemistry faculty are developing monitoring tools and methods for removing organic and inorganic pollutants from waste streams and drinking water. Social Science faculty are researching environmental policy and decision-making, especially, strategies for investigating environmental equity.

The president, Dr. Norman Francis, has a law degree from Loyola University. He held various top administrative positions at the University before becoming president. He has enjoyed a national prominence by chairing prestigious boards such as Educational Testing Service and the Southern Education Foundation. Dr. Francis has been named among the 100 most effective college and university leaders.

FACULTY and CURRICULUM DEVELOPMENT

The Center for Environmental Programs

A Center for Environmental Programs has been established to further design and implement programs in precollege, undergraduate, graduate and community outreach areas. The Center's mission in guiding new curriculum is to promote activities that help students develop:

- Effective creative and critical thinking skills;
- A system of values to guide their ethical and moral decisions;
- An understanding of the psychological, social, economic and political forces that shape their world; and
- Group and organizational skills that take an interdisciplinary approach to rectifying social and economic inequity while promoting environmentally sound global development.

Students will receive technical knowledge about the structure and function of the natural world and a broad-based, value-oriented appreciation of the environment and humanity's relationship to it. Xavier's philosophy stresses interdisciplinary, holistic perspectives and a comprehensive education.

The Center will be responsible for the development of curriculum modification strategies for infusion of environmental restoration and waste management topics and courses. The Center's approach is to weave this common thread throughout a majority of existing programs to bring environmental literacy to all students. The goal is to have 50% of all courses contain environmental examples and perspectives within five years, clearly promoting a multidisciplinary spirit in its approach. Currently, the Center is developing several course syllabi that would provide direct instruction in environmental topics to Xavier students, including an Environmental Studies course for juniors and a special topics course on Environmental Problem Solving for seniors.

An Environmental Studies minor is being considered, using existing courses as part of the offering: Introduction to Environmental Toxicology, Ecology Environmental Biology, and Environmental Philosophy. Other courses which cover environmental topics will also be included.

Faculty Development Program

Through CEP, a Faculty Development Grants Program offers competitive faculty grants for faculty retraining, course refinement and related activities. Examples of these include:

- Environmental and Social Issues in Christian Perspectives (Theology Department);
- The Interrelationship of Art and Environmental Science (Art Department);
- Images of Technologically-Induced Environmental Disasters in Contemporary World Literature (English Department);
- Music Video for Public Education on Environmental Concerns (Music Department);
- Development of an Energy Saving Kiln (Art Department); and
- A Public Information Program called "Lead Free Kids" (College of Pharmacy).

OUTREACH ACTIVITIES

Xavier has a long and successful link to minority high school students through its summer programs which attempt to motivate and increase the number of minorities who pursue careers in engineering and science-related fields. Plans are underway to infuse environmental components into existing programs and to set goals for recruiting students into ET/WM careers.

- This past year, the University's Louisiana Engineering & Applied Physics (LEAP) Program reached over 1,300 middle and high school students. Its main goal is to motivate students to pursue careers in science and engineering.
- The Summer Science Academy programs in biology, chemistry, computers, and mathematics helped high students prepare for their first science courses. Over 500 students were involved.
- The Stress On Analytical Reasoning (SOAR) program is designed for

students interested in everything from humanities to science and computers. It reached approximately 120 precollege students.

- Xavier awarded $200 Science Fair scholarships.

The CEP is working already with summer program faculty to investigate an acceptable mechanism for establishing an environmental studies emphasis in those summer programs that already exist at Xavier. Although present summer program syllabi include a small amount of exposure to environmental issues, discussions are now focused upon investigating how more environmental emphasis might be included. For example, in the 1992 EXCEL Program, several environmental field trips have been scheduled for the student participants, and there has been an effort by EXCEL faculty to infuse environmental content (e.g., point-counterpoint exercises and critical thinking activities) into the existing syllabus.

Targeting the existing summer programs affords Xavier immediate and direct access to high school students, providing environmental education prior to their enrollment at an undergraduate institution. This effort will help direct those interested into an educational program for an environmental science career.

Environmental Studies Seminars

Xavier has instituted a monthly University-wide Environmental Studies Seminar Series. The Center also is designing an Industry/Agency/University Mentor Program for regional high schools that will focus on environmental restoration issues. This program will complement the summer program efforts by working with students during the school year. Monthly visits to participating regional high schools in southern Louisiana will increase information and interest.

Environmental Equity Issues

There exists evidence and concern that environmental problems affect poor and minority groups disproportionately in relation to other sectors of society. Since the majority of people have not directly felt the burden of toxic exposure, the negative effects of modern industrial living on the ecosystem have not been a high priority; hence the basis for the complex issue of environmental equity.

Educators and researchers at Xavier have begun to take an interest in teaching and investigating environmental impact questions to address equity issues. Xavier is designing projects to allow community participation, expand educational programs to include environmental equity concerns, and provide a regional networking tool to promote communications between policy-makers, the University, and the impacted communities.

Specific goals of this outreach effort include:

- Bringing ongoing national dialogue about environmental justice to the regional level;
- Strengthening educational programs and encouraging research;
- Initial discussions between impacted populations and University educators and researchers;
- Identifying key local environmental policy questions; and
- Impacting decision-making in public policy.

Steering Committee Member
Dr. R. Warren Flint
Director, Center for Environmental Programs
Xavier University of Louisiana
7325 Palmetto Street
New Orleans, LA 70125
(504) 483-7508 Office
(504) 488-7977 Fax

Acknowledgments

Support Service Contractors

Associated Western Universities, Inc.

The Associated Western Universities, Inc. (AWU), a consortium of forty-two universities, directly supports the U.S. Department of Energy's (DOE) mission to develop and maintain educational and training activities which ensure that the scientific and technical needs of the energy research and development community are met. AWU was established because the academic community and the federal energy agency recognized the need for a more effective and economical mechanism to plan, coordinate, and administer their educational and training activities than could be implemented by each entity acting alone. AWU provides such an Interface among the academic community, DOE, and its laboratories.

As a contractor to the federal energy agency since 1963, AWU is an active partner in the DOE science education enterprise, administering programs for students, faculty, and recent graduates from middle school through the university. In many of these programs AWU plays the role of broker, matching and evaluating the research interests and capabilities of academic scientists with research opportunities in the laboratories. Talented students, faculty, and recent advanced-degree graduates are awarded scholarships or fellowships as visiting guest scientist at host laboratories, thus gaining access to the vast and often unique personnel and material resources available in these national facilities. Since its inception, AWU has provided awards to more than 7,000 individuals from over 950 high schools and colleges in all 50 states to participate in research at 47 DOE-funded facilities.

Basic Technologies International

Basic Technologies International (BTI) is a metropolitan Washington, D.C. company providing support services in science and engineering based technologies. Founded in 1988 as a minority female-owned firm, BTI works with federal, state and local governments; colleges and universities; corporations and small businesses; civic organizations; and technical societies.

The corporation specifically targets training and technical concerns which support the nation's energy, environmental technology, transportation, worker health and safety, defense construction, aerospace, waste management and communications industries.

By effectively and efficiently disseminating information on advanced and emerging technologies, BTI's three business units provide the following quality service in the following areas:

Strategic Planning and Management

- Policy Analysis
- Program Development and Evaluation
- Targeted Research and Analysis
- Human Resource Diversity Studies in Scientific and Technical Disciplines and Occupations
- Data Management

- Public Relations and Media Coordination
- Convention/Workshop Planning and Management
- Contracted Support Services

Environmental Information Systems
- Hardware/Software Design
- Training Management & Marketing

Hydrogeological Research and Development, Testing & Service

United States Department of Energy

Texas Chee
Susan Prestwich

Environmental Protection Agency

August Curley
On IPA Assignment as Program Manager
The HBCU/MI Consortium

Richard Bright
On IPA Assignment as Education and Training Director
The HBCU/MI Consortium

Sandia National Laboratories

Doug Denham
Eunice Young

Clark Atlanta University

Carol Johnson, Project Assistant
Bernice M. Jones, Financial Assistant
Faye Lyons-Gary, Industry Coordinator
Marilyn Maynard, Project Assistant
Clarissa Perryman, Administrative Assistant
Stevie Thomas, Information Systems Specialist
Roxane Viard, Assistant to the Director
Jacqueline Williams, Project Assistant

Research Center
Leon Henry, Director
Technical Services

Art Department
Christopher Hickey, Art Direction
Belinda Peters, Art Direction

Communications Consultant

Dr. Donata Renfrow