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THE HBCU/MI CONSORTIUM

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

ANNUAL REPORT 1992-93

MASTER *jm*

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**CONSORTIUM MEMBER
INSTITUTIONS**

Alabama A&M University • Clark Atlanta
University • Florida A&M University •
Florida International University •
Hampton University • Howard University
• Jackson State University • New Mexico
Highlands University • North Carolina
A&T State University • Northern Arizona
University • Prairie View A&M
University • Southern University-Baton
Rouge • Texas A&M University-
Kingsville • Texas Southern University •
Tuskegee University • University of
Texas - El Paso • Xavier University-
New Orleans

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MISSION

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY CONSORTIUM MISSION STATEMENT

The HBCU/MI Consortium was formed (1) to respond to national R&D, policy formulation and minority manpower needs in environmental technology, hazardous, solid and mixed waste materials management, environmental restoration, and environmental health; and (2) to address limited minority participation in the public, private and non-profit environmental industries; limited environmental awareness among minorities; minimal interaction between HBCUs/MIs and majority universities, industry and interest groups; limited institutional development in environmental education and research; and lack of minority technical businesses in the environmental industry.

"...one of our most urgent tasks is to strengthen our science and engineering workforce. The education pipeline -- from kindergarten through the Ph.D. -- is failing to produce workers needed to meet future demand. . . .

Indeed, unless parents, schools, colleges, industry, professional societies, state legislatures, federal agencies, the President, and the Congress act in concert, our national science and engineering workforce will continue to erode and the prospects for maintaining an advanced industrial society will diminish."

*From the report Changing America:
The New Face of Science and Engineering*

INTRODUCTION

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 that of confronting past decisions that have created pollution because of our energy, defense and commercial activities. Several laws, principal among them the Solid Waste Disposal Act (SWDA), as amended by the Resource Conservation and Recovery Act (RCRA), 1976 and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), 1986, 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, as well as 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 needed to solve these environmental 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 by the year 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 demands. 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 our taking corrective action to reverse existing downward trends in the number and availability of skilled technical manpower. The United States has to improve its approximately seven-year lag between formulating new ideas and commercial concepts and bringing them to market. We can no longer continue to segregate academia and industry in our research and development (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 too will the advent of new courses and curricula. Ultimately, graduates come into an industrial culture that may be five to seven years ahead of them. Industry cannot expect this novice staff to immediately begin solving technological problems.

To address this lack of effective technology development and transfer mechanisms, government, academia and industry must foster alliances by building collaborative research efforts and teaching students research skills and the ways of their future profession before they leave the academe. Besides bolstering science and mathematics instruction for students and teachers in

the pre-college 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 quickly becomes obsolete. Adults will have multiple careers in the coming decades, and the requirements for change require continuing education for the workforce.

In August 1989, the Department of Energy (DOE) released its Environmental Technology Five-Year Plan, which included support of strong educational programs at all levels. A few 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, furthermore, 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, although they have low enrollments in our colleges and universities. 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 will be women and minorities by the first decade of the 21st century. In spite of this fact, minorities currently represent only four percent of the natural scientists and engineers. A greater scientific literacy must be promoted nationally and particularly among minority populations since therein lies the greatest potential of untapped human resources.

In January 1990, a group of African American, Hispanic and Native American Indian serving institutions formed the Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) Environmental Technology Consortium (Consortium). The seventeen institutions of the Consortium are well-known for their significant role in training the nation’s minority technical workforce. Twelve of the institutions are Historically Black Colleges and Universities, four are predominantly Hispanic and two have a sizable population of Native 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 producers of minority Ph.Ds in pharmacy. Two member institutions produce 16 percent of the B.S. Engineering Technology degrees awarded to African Americans, while two institutions produce 7 percent 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, the Consortium is uniquely qualified to develop environmental technology programs to fill the workforce gap for the next several years. 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 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 partnerships for environmental education and technology development. The program's focus was environmental technology development with the concomitant 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 the competition by the DOE. In September 1990, the Secretary of Energy announced that the HBCU/MI Environmental Technology Consortium won the competition. A five-year agreement between DOE and the Consortium was signed in October 1990.

FIGURE 1. MEMBER INSTITUTION SITES

LOCATION	UNIVERSITY	MINORITY POPULATION SERVED
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, Native American Indian
9	North Carolina A&T State University	African American
10	Northern Arizona University	Hispanic, Native American Indian
11	Prairie View A&M University	African American
12	Southern University at Baton Rouge	African American
13	Texas A&M University-Kingsville	Hispanic
14	Texas Southern University	African American, Hispanic
15	Tuskegee University	African American
16	University of Texas at El Paso	Hispanic
17	Xavier University	African American

MANAGEMENT

CONSORTIUM MANAGEMENT

The policy-making body of the Consortium is the Council of Presidents. The Consortium Director reports directly to the Council and serves as its secretary. A Steering Committee under the leadership of a chair, implements the Council's general policies. The chair of the Steering Committee also serves as a non-voting member of the Council.

THE CONSORTIUM ORGANIZATIONAL/ MANAGEMENT FLOWCHART

MANAGEMENT RESPONSIBILITIES

Overall policy direction for the Consortium is provided by the Chair of the Council of Presidents. Dr. Edward B. Fort, the Chancellor of North Carolina A&T State University, served as the first Chair, 1989-1991. Dr. Diana Natalicio, the President of the University of Texas at El Paso, served as the Chair of the Council from 1991-1993. The current Chair for the period 1993-1995 is Dr. Frederick Humphries, President of Florida A&M University.

The Consortium operates under the auspices of Clark Atlanta University in Atlanta, Georgia. The Consortium headquarters provides day-to-day management and operates independently of the member institutions. It is managed by the Consortium Director, Dr. Kofi B. Bota, and staff. The director is assisted by the associate director, and program manager, August O. Curley, and other support personnel.

STEERING COMMITTEE

The responsibilities of the Steering Committee are to implement the general policies of the Council of Presidents, recommend new directions for Council consideration and action, plan and evaluate the long- and short-term goals and programs of the Consortium, and carry out assignments or functions under the leadership of its chair. Committee members also act as the Consortium point of contact for the member institutions and provide general coordination for Consortium activities at their respective institutions. They assume local program management responsibility for institutional projects and the fiscal implementation of subcontracts issued by the Consortium to their institutions, subject to federal or other procurement and management regulations.

STEERING COMMITTEE CHAIRPERSON

The chair of the Steering Committee is responsible for general oversight of the affairs of the Consortium and the implementation of Council policy. In addition, the chair is responsible for the formulation, program direction and operation of the Consortium Standing and Ad-Hoc Committees.

STANDING AND AD-HOC COMMITTEES

These committees guide the Consortium's business in research, development, education, technology transfer and training. There are four Standing Committees and two Ad-Hoc Committees:

STANDING COMMITTEES

Committee on Outreach and Pre-College Programs

Committee on Undergraduate Education and Postsecondary Training

Committee on Graduate and Post-Graduate Education and Research

Committee on Technology Transfer

AD-HOC COMMITTEES

Committee on Communications

Committee on Quality Assurance/Quality Control

THE STEERING COMMITTEE

Dr. Jeanette Jones
Vice President for Research
Alabama A&M University
Office of Research
P.O. Box 207
Normal, Alabama 35762
(205) 851-5675 Phone
(205) 851-5030 Fax

Dr. Kofi Bota
Vice President for Research
and Sponsored Programs
Clark Atlanta University
223 J.P. Brawley Drive
Atlanta, Georgia 30314
(404) 880-6996 Phone
(404) 880-6880 Fax

Dr. Charles Kidd
Associate Vice President for
Environmental Programs
Florida A&M University
P.O. Box 338
Tallahassee, Florida 32307
(904) 599-3550 Phone
(904) 561-2248 Fax

Dr. M.A. Ebadian
Chairman, Mechanical Engineering
Florida International University
University Park
Miami, Florida 33199
(305) 348-2569 Phone
(305) 348-4176 Fax

Dr. Isai Urasa
Chairman, Department of
Chemistry
Hampton University
Hampton, Virginia 23668
(804) 727-5396 Phone
(804) 727-5084 Fax

Dr. James Johnson
Chairman, Civil Engineering
Howard University
2300 Sixth Street, NW
Washington, DC 20059
(202) 806-6570 Phone
(202) 806-5271 Fax

Dr. Abdul Mohamed
Dean, School of Science
and Technology
Jackson State University
P.O. Box 18609
Jackson, Mississippi 39217
(601) 968-2153 Phone
(601) 968-2058 Fax

Dr. Robert Lessard
Professor of Geology
New Mexico Highlands University
Las Vegas, New Mexico 87701
(505) 454-3564 Phone
(505) 454-3103 Fax

Dr. Ernestine Psalmonds
Vice Chancellor for Research
North Carolina A&T State
University
1601 East Market Street
Greensboro, North Carolina
27411
(910) 334-7995 Phone
(910) 334-7086 Fax

Dr. Henry Hooper
Vice President for Academic
Affairs
Northern Arizona University
P.O. Box 4085
Flagstaff, Arizona 86001
(602) 523-4340 Phone
(602) 523-4230 Fax

Dr. John Williams
Professor of Chemistry
Prairie View A&M University
Prairie View, Texas 77446
(409) 857-3910 Phone
(409) 857-2095 Fax

Dr. Robert Ford
Director, CEES
Southern University at
Baton Rouge
P.O. Box 9737, Building 8
Baton Rouge, Louisiana 70813
(504) 771-3723 Phone
(504) 771-4722 Fax

Dr. Ray Finch
Chair, Environmental Engineering
Department
Texas A&M University-Kingsville
Campus Box 193
Kingsville, Texas 78363
(512) 595-3046 Phone
(512) 595-2069 Fax

Dr. Bobby Wilson
Professor of Chemistry
Texas Southern University
Department of Chemistry
3100 Cleburne Avenue
Houston, Texas 77004
(713) 527-7135 Phone
(713) 527-4217 Fax

Dr. Walter Hill
Dean, School of Agriculture
Tuskegee University
Tuskegee, Alabama 36088
(205) 727-8157 Phone
(205) 724-4451 Fax

Dr. Charles Turner
Chairperson,
Department of Civil Engineering
University of Texas
at El Paso
El Paso, Texas 79968
(915) 747-5460 Phone
(915) 747-5616 Fax

Dr. Sally O'Connor
Xavier University of Louisiana
Office of Environmental Programs
7523 Palmetto Street
New Orleans, Louisiana 70125
(504) 483-7508 Phone
(504) 488-7977 Fax

CONSORTIUM INSTITUTION DEMOGRAPHICS

Student Populations in Table 1 list the demographic data on students at the 17 HBCU/MI Universities. Twelve have between 75% 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 over 50% representation of Hispanic students (Florida International, New Mexico Highlands, Texas A&M University-Kingsville, and the University of Texas-El Paso). A third minority group, American Indians, have a 4% representation at New Mexico Highlands and a 6% representation at Northern Arizona University.

TABLE 1 THE 1992-1993 HBCU/MI CONSORTIUM INSTITUTION DEMOGRAPHICS

	AAMU	CAU	FAMU	FIU	HaU	HoU
Type	public	private	public	public	private	private
Faculty	299	251	425	896	394	2021
Students	5593	4480	9493	22,387	5582	11,919
% Male	46	32	42	42	41	41
% Female	54	68	58	58	59	59
% African Amer.	78	86	88	10	88	85
% Hispanic	<1	<1	1	52	<1	<1
% Native Amer.						
Indian	<1	0	<1	<1	<1	<1
% Asian	<1	<1	<1	3	<1	1
% Anglo	12	<1	8	35	9	1
% International	8	27	1	5	2	1

	JSU	NMHU	NCAT	NAU	PVAM	SU
Type	public	public	public	public	public	public
Faculty	315	121	529	566	305	530
Students	6346	2768	7580	18,817	5660	9502
% Male	42	42	50	42	52	43
% Female	58	58	50	58	48	57
% African Amer.	96	3	86	1	89	92
% Hispanic	<1	65	<1	8	1	<1
% Native Amer.						
Indian	<1	4	<1	6	<1	<1
% Asian	<1	<1	1	<1	1	<1
% Anglo	3	27	12	80	8	5
% International	0	1	1	2	<1	2

THE 1992-1993 HBCU/MI CONSORTIUM INSTITUTION DEMOGRAPHICS

	TAMU-K	TSU	TU	UTEP	XU
Type	public	public	private	public	private
Faculty	240	510	254	748	260
Students	5900	10,860	3371	17,001	3100
% Male	51	39	49	48	32
% Female	49	61	51	52	68
% African Amer.	4	84	95	3	90
% Hispanic	55	3	1	62	<1
% Native Amer.					
Indian	<1	0	<1	<1	0
% Asian	<1	2	0	1	2
% Anglo	36	2	3	25	6
% International	1	.9	<1	9	2

Total Enrollment: 145,500

Total Faculty: 8,559

% Male: 45

% Female: 55

CONSORTIUM PURPOSES AND STRATEGIES

The HBCU/MI Environmental Technology Consortium's response to the national environmental crisis is to increase minority participation in environmental professions by improving outreach and pre-college education; undergraduate education and postsecondary training; graduate and postgraduate education and research; and technology transfer. The Consortium's Research, Education and Technology Transfer (RETT) Plan is described in Tables 2 - 5.

TABLE 2 MINORITY OUTREACH AND PRE-COLLEGE EDUCATION

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

Objectives

Develop and Implement Mathematics and Science Programs for Minority Parents and Children (Pre-K-12) and pre-college Teachers

Promote Public and Private Industry Linkages with Minority Elementary and Secondary Schools

Develop Core Elements of Pre-college Programs in the Energy and Environmental Sciences

Accelerate Certification and Professional Training of Science and Mathematics Teachers

Actions

- Literacy Programs
- Formal/Informal; School-Based/Home-Based Activities
- Student Recognition Programs
- Work/Study Programs
- Mathematics & Science Enrichment Programs (Saturday, Summer, and After-School)
- Career Awareness and Orientation Activities
- Parenting Skills
- 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 Mathematics Fairs
- State/Local Education Department Joint Curriculum Planning and Design with Energy and Environmental Industry and National Laboratories
- Instructional Materials Development
- Video Development and Presentation on 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.
- Scholarships
- Specialized Institutes and Workshops
- Participation in Federal, State and Private Industry Research and Development Projects
- Teacher Retraining and Continuing Education in the Energy and Environmental Sciences

TABLE 3

UNDERGRADUATE EDUCATION AND POST-SECONDARY 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

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 and Engineering

Develop Programs to Retain Minority Faculty and Trainers as Mentors and Role Models

Identify Elements and Recommend Implementation of Strong Undergraduate Programs in the Sciences, Mathematics and Engineering Disciplines with Minor Programs in the Energy, Materials and Environmental Sciences

Actions

- Scholarships
- Career Counseling Resource Materials
- Undergraduate Research Participation
- Summer Internships and Co-ops
- Role Model Training Programs for Minority Science Student Mentors
- Undergraduate Research Programs
- Faculty Exchanges
- Institutional Rewards for Faculty
- Faculty Retention Incentive Programs
- Summer Industry Enrichment Programs
- 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

Develop a Clear Statement of the HBCU/MI Consortium's Capabilities Consistent with Federal, State and Industry Priorities and Needs

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

Provide Competitive Fellowship Support and Industry Access to Minority Graduate Students Pursuing Master's and Ph.D. Studies at the Consortium Institutions in Energy and Environmental Sciences and Engineering

Actions

- The HBCU/MI Consortium Capability Statement
- The HBCU/MI Consortium 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
- The HBCU/MI Consortium Fellowship Program
- Summer and co-op Placement in the Public and Private Sectors

TABLE 5 TECHNOLOGY TRANSFER

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

Objectives

Create Consortium Technology Development Centers that Establish Linkages with the Environmental Industry and National and Federal Laboratories and Technology Centers for the Development and Application of Priority Technologies

Promote the Development of Competitive Minority Technical Entrepreneurial Talent and Businesses in the Environmental Technology Areas

Establish the Environmental Technology Minority Manpower Training Centers and Programs

Actions

- 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

- 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.

- Credit and Non-Credit Short Courses
- Environmental Technology Management Training Institutes
- Joint Development and Sponsorship of Certified Training Programs for Industry and Government Personnel

The Consortium's program has six prongs: program development; faculty development; curriculum development; recruitment and retention; outreach (pre-college education; community; business); and technology transfer

The Consortium member institutions have continued to strengthen their individual infrastructures in order to implement the Consortium objectives. Some institutions have created centers that serve as the focal point for environmental activities. These centers have spearheaded efforts to expand environmental curricula by modifying courses to add or upgrade environmental science content or reexamined degree programs and course offerings, sponsored pre-college student and teacher training programs and fostered research and technology development and transfer programs.

CURRICULUM

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. The Consortium members have continued to expand courses, update the content of existing courses and create multidisciplinary environmental courses.

Improving the quality of scientific instruction often necessitates faculty retraining to acquaint faculty with new technologies, research processes and problems being addressed by the national laboratories and the private and public sector research communities. Faculty internships or research partnerships were undertaken by the member institutions to achieve this objective.

Since Curriculum Development Workshop I, held in June 1991 at Jackson State University, member institutions have established new courses, degree programs and curricula. Some universities have infused hazardous waste management, environmental restoration and technology development information into traditional courses.

The Consortium conducted Curriculum Development Workshop II in June 1993, in Atlanta, Georgia. The objectives of the workshop were to continue:

- developing and implementing environmental courses within the traditional disciplines in the sciences and engineering;
- developing and implementing minor concentrations in the environmental sciences and engineering as a complement to the classical "majors" in the sciences and engineering;
- developing action plans for follow-up and tracking and
- extending the network for curriculum development.

Evaluations of the workshop revealed that the workshop objectives were accomplished with the number of courses, curricula and degree programs developed and implemented.

The Curriculum Development Workshop II showed the significance of the HBCU/MI Consortium as a valuable resource that addresses national and international environmentally trained human resources, hazardous waste management, environmental technology and environmental restoration needs.

Table 7 lists many of the courses and environmental degree programs that have been developed or implemented by member institutions during the past three years.

TABLE 6 THE HBCU/MI CONSORTIUM MEMBER INSTITUTIONS DEGREE OFFERINGS

ACADEMIC DEGREE	AAMU	CAU	FAMU	FIU	H&U	HoU	JSU	NMHU	NCAT	NAU	PVAM	SU	TAMU	TSU	TU	UTEP	XU
Allied Health																	
BS		x		x		x				x		x		x	x	x	
MS				x		x				x							
PhD				x		x											
Agribusiness																	
BS	x		x						x		x	x	x		x		
MS	x								x				x				
PhD																	
Biochemistry																	
BS										x		x				x	x
MS		x				x				x							
PhD		x				x											
Biology																	
BS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
PhD		x		x		x				x							
Chemical Engineering																	
BS		x ^o	x		x	x			x		x	x	x	x	x	x	
MS			x		x	x			x			x	x				
PhD			x			x											
Chemistry																	
BS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
PhD		x				x											
Civil Engineering																	
BS	x	x ^o	x	x		x		x	x	x	x	x	x	x	x	x	
MS	x		x	x		x			x			x	x		x	x	
PhD																	
Civil Engineering Tech																	
BS	x		x							x		x		x			
MS	x																
PhD																	
Computer Info Systems																	
BS	x	x	x		x	x		x		x						x	x
MS	x	x			x		x										
PhD																	
Computer Science																	
BS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MS	x	x	x	x	x	x	x					x	x			x	
PhD				x		x											
Dietetics and Nutrition																	
BS	x			x	x	x			x					x	x		
MS	x			x		x			x					x	x		
PhD				x		x			x								

TABLE 6 THE HBCU/MI CONSORTIUM MEMBER INSTITUTIONS DEGREE OFFERINGS

ACADEMIC DEGREE	AAMU	CAU	FAMU	FIU	HAU	HoU	JSU	NMHU	NCAT	NAU	PVAM	SU	TAMU	TSU	TU	UTEP	XU
Economics																	
BS	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
MS	x	x		x		x								x	x	x	
PhD				x		x											
Electrical Engineering																	
BS	x	x*	x	x	x	x		x	x	x	x	x	x	x	x	x	x
MS			x	x		x			x				x		x	x	
PhD			x	x		x			x							x	
Electrical Engineering Tech																	
BS	x		x					x		x	x	x		x			
MS																	
PhD																	
Environmental Chemistry																	
BS										x							
MS										x							
PhD																	
Environmental Engineering																	
BS				x		x				x							
MS				x									x				
PhD																	
Environmental Science																	
BS	x		x	x	x	x	x	x		x					x		
MS	x			x	x		x	x		x		x*		x	x		
PhD	x						x							x			
Geochemistry																	
BS				x						x							
MS				x						x							
PhD																	
Geology																	
BS				x		x		x		x			x			x	
MS				x						x			x			x	
PhD										x						x	
Geophysics																	
BS										x						x	
MS																x	
PhD																	
Industrial Engineering																	
BS	x	x*	x	x					x				x			x	
MS	x		x	x					x				x			x	
PhD																	
Industrial Engineering Tech																	
BS	x	x					x		x			x	x	x			
MS	x																
PhD		x															

* Dual Degree Program

TABLE 6 THE HBCU/MI CONSORTIUM MEMBER INSTITUTIONS DEGREE OFFERINGS

ACADEMIC DEGREE	AAMU	CAU	FAMU	FIU	H&U	HoU	JSU	NMHU	NCAT	NAU	PVAM	SU	TAMU	TSU	TU	UTEP	XU
Marine Science																	
BS					x											x	
MS					x		x										
PhD						x											
Mathematics																	
BS	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x
MS		x		x	x	x	x			x	x		x	x		x	
PhD						x											
Mechanical Engineering																	
BS	x	x*	x	x		x			x	x	x	x	x	x	x	x	
MS			x	x		x			x				x	x	x	x	
PhD				x		x											
Mechanical Engineering Tech																	
BS	x		x					x	x	x	x	x					
MS			x														
PhD																	
Microbiology																	
BS						x				x		x				x	x
MS						x				x						x	
PhD						x				x							
Natural Gas Engineering																	
BS													x				
MS													x				
PhD																	
Occupational Therapy																	
BS				x								x		x	x	x	
MS				x													
PhD																	
Pharmacology																	
BS																	
MS						x											
PhD			x			x											
Pharmacy																	
BS			x			x				x				x			x
MS			x														
PhD			x														x
Physics																	
BS	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
MS	x	x	x	x	x	x				x				x		x	
PhD	x				x	x											

* Dual Degree Program

TABLE 6 THE HBCU/MI CONSORTIUM MEMBER INSTITUTIONS DEGREE OFFERINGS

ACADEMIC DEGREE	TAMU	CAU	FAMU	FIU	H&U	HoU	JSU	NMHU	NCAT	NAU	PVAM	SU	TAMU	TSU	TU	UTEP	XU
Plant Soil Science																	
BS	x								x			x	x	x	x		
MS	x								x				x	x	x		
PhD	x																
Political Science																	
BS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MS		x		x		x	x	x		x		x	x			x	
PhD		x				x				x							
Public Health																	
BS											x						
MS				x													
PhD																	
Urban Planning																	
BS	x			x	x	x	x			x							
MS	x			x	x	x				x		x					
PhD																	

* Dual Degree Program

TABLE 7 CURRICULUM DEVELOPMENT

UNIVERSITY	NEW COURSES	DEGREE PROGRAMS DEVELOPED AND/OR IMPLEMENTED
AAMU	<ul style="list-style-type: none"> •Course in Economics/Finance •Courses in Plant/Soil Science •Course in Biology •Course in Community Planning/Urban Studies •Courses in Civil Engineering •Course in Chemistry 	<ul style="list-style-type: none"> •B.S. in Environmental Science •M.S. in Environmental Science •Ph.D. in Environmental Science
CAU	<ul style="list-style-type: none"> •Courses in Environmental Chemistry •Course in Environmental Law •Seminar in Environmental Science •Course in Ecology 	<ul style="list-style-type: none"> •M.S. and Ph.D. Programs in Environmental Health Sciences and Toxicology
FAMU	<ul style="list-style-type: none"> •Courses in Environmental Remediation •Courses in Construction Engineering Technology •Courses in Environmental Science (Option) •Courses in Environmental Toxicology 	<ul style="list-style-type: none"> •B.S. in Environmental Toxicology •M.S. in Environmental Science •M.S. in Agricultural Science •M.S. and Ph.D. in Environmental Toxicology •Ph.D. in Entomology
FIU	<ul style="list-style-type: none"> •Courses in Environmental Engineering 	<ul style="list-style-type: none"> •B.S. in Environmental Engineering •M.S. in Environmental Engineering
HaU	<ul style="list-style-type: none"> •Courses in Environmental Chemistry •Seminar in Environmental Science •Courses in Chemical Analysis Methods •Courses in Techniques in Environmental Analysis •Courses in Environmental Management and Policy Analysis 	
HoU	<ul style="list-style-type: none"> •Courses in Environmental Microbiology •Courses in Environmental Chemistry •Courses in Environmental Engineering •Courses in Environmental Impact Analysis •Courses in Occupational Environment •Courses in Solid Waste Management •Courses in Environmental Management Policy •Courses in Environmental Health •Courses in Water Quality and Health 	<ul style="list-style-type: none"> •B.S. in Environmental Science

TABLE 7 CURRICULUM DEVELOPMENT

UNIVERSITY	NEW COURSES	DEGREE PROGRAMS DEVELOPED AND/OR IMPLEMENTED
JSU	<ul style="list-style-type: none"> •Courses in Occupational Safety •Courses in Environmental Economics •Courses in Environmental Planning and Administration •Seminars in Community and Economic Development •Seminars in Leadership Development in fusion 	<ul style="list-style-type: none"> •Ph.D. in Environmental Science •Ph.D. in Public Policy and Administration
NMHU	<ul style="list-style-type: none"> •Courses in Water Resources and Biological Monitoring •Courses in Water Supply and Pollution Control •Courses in Environmental Law, Ethics and Policy •Courses in Toxicology and Risk Assessment I •Courses in Atmospheric Science and Pollution •Courses in Waste Management, Minimization and Handling 	<ul style="list-style-type: none"> •B.S. in Environmental Science •M.S. in Environmental Science •M.S. in Life Sciences with concentration in Environmental Health Science
NCAT	<ul style="list-style-type: none"> •Courses in Environmental Sciences 	<ul style="list-style-type: none"> •B.S. in Environmental Science
NAU	<ul style="list-style-type: none"> •Courses in Environmental Engineering •Courses for Pre-Service Teachers •Course in Environmental Technology 	<ul style="list-style-type: none"> •M.S. in Environmental Chemistry
PVAM	<ul style="list-style-type: none"> •Courses in Environmental Engineering •Courses in Biology Waste Water Treatment 	<ul style="list-style-type: none"> •M.S. in Environmental Toxicology
SU	<ul style="list-style-type: none"> •Courses in Water Resources Management •Courses in Environmental Engineering •Courses in Environmental Sociology •Courses in Environmental Reporting •Courses in Hazardous Waste Management 	<ul style="list-style-type: none"> •M.S. in Environmental Science
TAMU	<ul style="list-style-type: none"> •Courses in Environmental Engineering •Courses in Environmental Science •Courses in Environmental Chemistry •Courses in Environmental Toxicology •Courses in Environmental Geology 	<ul style="list-style-type: none"> •M.S. in Environmental Engineering
TSU	<ul style="list-style-type: none"> •Courses in Environmental Engineering Technology •Courses in Environmental Health •Major Courses in the Environmental Sciences 	<ul style="list-style-type: none"> •M.S. in Environmental Science •Ph.D. in Environmental Toxicology

TABLE 7 CURRICULUM DEVELOPMENT

UNIVERSITY	NEW COURSES	DEGREE PROGRAMS DEVELOPED AND/OR IMPLEMENTED
TU	<ul style="list-style-type: none"> •Courses in Plant and Soil Science •Courses in Hazardous Waste Management 	<ul style="list-style-type: none"> •B. S. in Environmental Science •M.S. in Environmental Science
UTEP	<ul style="list-style-type: none"> •Courses in Chemistry Lab emphasizing Environmental experiments •Courses in Biological Sciences with an emphasis on Environmental Science •Courses in Toxicology 	
XU	<ul style="list-style-type: none"> •Courses in Ecology •Courses in Environmental Biology •Courses in Environmental Philosophy 	

RECRUITMENT

RECRUITMENT AND RETENTION

The institutions are actively recruiting students for mathematics and science programs, emphasizing opportunities in environmental science careers. Activity in this area was marked by three distinctive strategies. First, financial support for students came through either the institution or the Environmental Management Career Opportunities for Minorities (EMCOM) program. Whenever possible, students were involved in research opportunities to build laboratory skills and introduce them to the real world of scientific research careers. The EMCOM program is more fully described starting on page 35 of this report.

Second, many institutions funded tutoring/mentoring programs to support students in their academic courses and in gaining career awareness in the environmental technology areas. The third strategy used by many institutions was to create or expand bridge programs to recruit from 2-year and 4-year institutions. While some students may stop at two-year degrees with technician training, others were encouraged to complete bachelor's, master's, or doctoral work in the environmental technology areas.

OUTREACH WITH THE PUBLIC SCHOOL SYSTEM

The Consortium's programs offered support for developing or disseminating environmental science materials or curriculum enhancements for students. The emphasis for K-12 faculty is on updating teaching methodologies (e.g., adopting more of a hands-on, process model of instruction), improving curriculum content and linking technology development to current trends 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 academies in which students are provided opportunities for hands-on involvement to arouse their interests in science and mathematics. Summer programs vary from two days to eight 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 for and requirements of careers in the environmental sciences and technology. A Consortium-wide offering, now at eight schools, is the Environmental Management Pre-college Analytical Chemistry (EMPAC) program in which over 150 high school students, and 54 teachers have now participated. The EMPAC program is more fully described starting on page 45 of this report.

OUTREACH WITH THE COMMUNITY-AT-LARGE AND MINORITY BUSINESSES

Outreach activities also target the non-academic community. Good environmental practices such as establishing and publicizing recycling programs are being fostered. Programs address environmental issues in each locale to increase community awareness and minority involvement. A related outreach activity targets minority businesses in an effort to transfer technology skills necessary for competitive participation 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 sophisticated contracts in environmental technology. This outreach work includes assessing the skills and interests of existing companies and then directing them to the necessary education or training programs that will make them more competitive.

ACTIVITIES

CONSORTIUM ACTIVITIES

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. This 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 Pre-college Programs; Undergraduate Education and Postsecondary Training; Graduate and Post-Graduate Education and Research; and Technology Transfer. Two Ad-Hoc committees were formed: The Communications Ad-Hoc Committee addresses the development and implementation of an inter-institutional electronic communications network and newsletter. The Quality Assurance/Quality Control Ad-Hoc Committee is developing procedures for scheduling, setting budget priorities, establishing technical baseline information, monitoring milestones, evaluating program effectiveness and pre-publication materials review.

During this past year, these committees teamed with working committees of academic and industry representatives to form the 1993 National Congress for the Advancement of Minorities in the Environmental Professions. As a result of this union, the 1993 National Congress proposed a national agenda to assist minority advancement in environmental professions.

Consortium-wide Activities for 1992-1993 included:

2/26-27/92	National Congress Executive Committee Meeting	Atlanta, GA
4/20-22/92	DOE Weapons Complex Monitor RDDT&E Colloquium	Phoenix, AZ
4/20-22/92	HBCU/MI Consortium Steering Committee and National Congress Planning Meeting	Phoenix, AZ
7/9-11/92	EMPAC/EMCOM Program Review	Oak Ridge, TN
8/23-27/92	Spectrum '92	Boise, Idaho
10/15-17/92	A Forum on Undergraduate Research Experiences	Atlanta, GA
10/15-17/92	EMCOM Program Review	Atlanta, GA
10/31-11/2/92	Council of Presidents and Steering Committee Meeting Alabama A&M University	Huntsville, AL

Consortium-wide Activities for 1992-1993 continued:		
12/10-11/92	Administrative Workshop I	Atlanta, GA
2/24-26/93	National Congress for the Advancement of Minorities in the Environmental Professions	Washington, DC
4/6-8/93	DOE Program Review	Rockville, MD
4/20-23/93	DOE Weapons Complex Monitor RDDT&E Colloquium	Phoenix, AZ
4/20-23/93	HBCU/MI Consortium Steering Committee Meeting	Phoenix, AZ
4/20-23/93	EMCOM Selection Committee Meeting	Phoenix, AZ
4/23-25/93	Waste Management Education and Research Consortium New Mexico State University	Las Cruces, New Mexico
4/26-28/93	National Energy Research Conference	San Juan, Puerto Rico
5/6-7/93	EMPAC/EMCOM Program Review	Washington, DC
5/27-28/93	DOE Outreach Program Review	Denver, CO
6/9-11/93	Curriculum Development Workshop II	Atlanta, GA
6/15-16/93	DOE Academic Partnerships Program Review	Rockville, MD
7/13-14/93	EMPAC Review	Atlanta, GA
8/19-20/93	Waste Information Network (WIN) Training Southern University	Baton Rouge, LA
9/13/93	National Congress Working Committee Meeting	Washington, DC
9/24-26/93	Faculty Review Meeting	Salt Lake City, Utah
11/7-8/93	Council of Presidents and Steering Committee Meeting Florida A&M University	Tallahassee, FL
12/10-11/93	Administrative Workshop II	New Orleans, LA

MARKETING

MARKETING THE CONSORTIUM TO GOVERNMENT, INDUSTRY AND LOCAL COMMUNITIES

The Consortium undertook a full schedule of meetings with federal agencies that are involved with environmental policy making, R&D and technology development. Other nonprofit groups and agencies were contacted to discuss the mission of the Consortium and explore potential alliances.

American Association for the Advancement of Science (AAAS) Initiative

A Consortium effort to promote community outreach was a link to an American Association for the Advancement of Science (AAAS) initiative. Each institution designated an Environmental Outreach Coordinator to participate in a training workshop that would help them plan subsequent community outreach and orientation workshops. Two subsequent community efforts planned by AAAS included a survey and national database of environmental attitudes among African Americans, Hispanics, and Native American Indians. A second initiative, the Enviro-Links newsletter, is an initiative designed to assist the Consortium in introducing minority youth and adults to environmental issues, programs, and careers.

The Environmental Partners Scholarship and Internship (EPSI) Program

The Environmental Partners Scholarship and Internship (EPSI) program is part of a larger Consortium national effort to mobilize resources to encourage minority students toward academic excellence and active participation in environmental careers. The Consortium challenges environmental and energy-related companies to create internship opportunities and provide scholarship and employment support for minority students. The Consortium uses this alliance with business to build upon the successful track record of its seventeen member institutions in educating and training African Americans, Hispanics and Native American Indians in engineering and the sciences. EPSI offers a unique opportunity for environmental industries and minority universities to build a partnership that expands the workforce, enhances productivity, and provides environmental solutions. Areas of internship interest covered by the program include: environmental management; environmental safety and health; facilities management and operations; waste management; and, scientific analysis and research.

Conference Presentations

One of the Consortium goals is to involve undergraduate and graduate students in scientific research and the presentation of their findings. An important part of student preparation lies beyond the boundaries of the classrooms. More than 103 students have been supported by Consortium funds to present their original research. The experience introduces students to one aspect of research careers while giving them important laboratory skills. The conferences also give students opportunities to meet academic and industry leaders in the diverse scientific community. It also brings them into the most up-to-date communication environment where they learn about new techniques, solutions, and technologies months and years ahead of the

formal publication of this information. They learn about problems and solutions with state-of-the-art technologies that are not accessible to their classroom and campuses. In addition to national conferences, the Consortium planned and implemented an October 1992 conference at Clark Atlanta University in Atlanta. During the conference students presented posters from their prior summer research experience in DOE and other research facilities.

MINORITY OUTREACH AND PRE-COLLEGE PROGRAMS

The Energy and Environmental Science Program (E&ESP) began as a continuum of the After School Mathematics and Science Program in September 1991. The program, conducted at Oglethorpe Elementary School, was developed to strengthen mathematics and science skills; familiarize students with scientific methodology; and introduce concepts and interrelationships of energy and environmental science. In 1992, the format was modified to place a greater emphasis on scientific methodology and to involve faculty and local environmental professionals by sharing their technical and environmental education expertise. Group activities, experiments, field trips and guest speakers are some of the mechanisms used to reinforce science concepts. Forty-eight students participated during the 1992-93 academic year. As a result of students' participation in the E&ESP program, there was a significant increase in their scoring above national norms on reading and mathematics standardized achievement tests.

Undergraduate Education and Postsecondary Training

The goal of this component is to increase the number of underrepresented minorities ready for entry-level positions in the environmental industry. The approach is to strengthen environmental management, science and technology curricula at each Consortium institution and local feeder institutions. The first year objective called for adding enhancements to existing scientific and non-scientific courses and surveying workforce data to determine the curricula enhancements necessary for entry-level positions. The second and third year objectives were to promote closer relationships with industry, including support for internships, mentoring programs and undergraduate research opportunities. Once strategies and curricula have been refined locally, Consortium efforts will go into disseminating materials. Other long-term projects will address laboratory needs and help retool faculty to stay abreast of current research techniques, strategies and demands.

Graduate and Postgraduate Education and Research

The goal is to expand the Consortium's reputation as a national resource for basic and applied technology, increase the number of underrepresented minorities with advanced environmentally related degrees and promote joint research ventures. Initial objectives are to promote better communication between industry and the institutions about development needs and institutional capabilities, to gain the support of industry advisors and to intensify recruiting for graduate programs and postgraduate fellowships. Subsequent objectives are to increase internship and co-op opportunities, establish mechanisms for faculty exchanges, use practitioners as visiting instructors and to gain accreditation for environmental science graduate programs. Other plans include recruiting non-science graduates into postgraduate scientific disciplines and addressing the public policy, community awareness, technology and environmental restoration processes.

TECHNOLOGY TRANSFER

The goal of the Consortium since inception has been to build the critical mass needed to produce technology and technological innovation through the development of new knowledge, innovative products and varied processes. To achieve these goals, the following objectives were developed: create Consortium Environmental Technology Development Centers (CETDCs); acquire contract and subcontract opportunities; develop joint Consortium and industry technologies; obtain student and faculty placement with industry; initiate resource exchanges (personnel, equipment and facilities); create minority technical business resource and incubator centers; develop credited and non-credited courses; and sponsor certified training programs for industry and government personnel. Technology Transfer interactions with the private sector have increased over the past three years. Brief descriptions of activities are outlined below:

Air Force Center for Environmental Excellence (AFCEE)

Representatives from minority environmental firms and the HBCU/MI Consortium met in May 1992, to discuss interactions with the Air Force Center for Environmental Excellence (AFCEE). AFCEE aggregates in a single organization at Brooks AFB a capability to provide a full range of technical services to Air Force commanders in areas related to Environmental Compliance, Pollution Prevention, Hazardous Waste Cleanup (IRP), Environmental Planning and Impact Assessments.

In July 1992, representatives from the HBCU/MI Consortium and minority firms attended a Pentagon Air Force meeting. The Air Force detailed its mission, opportunities, and environmental initiatives while the Consortium presented its capabilities and interests. It was agreed that the Consortium and the Air Force would work closely together to promote HBCUs/MIs' participation in contracting opportunities and increase diversity in the DOD workforce.

McBon Environmental & Construction, Inc.

In November 1992, the Consortium signed a cooperative partnership agreement with McBon Environmental & Construction, Inc., a minority, woman-owned environmental consulting and professional service firm. In December 1992, McBon and the Consortium submitted a proposal to assist AFCEE with environmental planning, compliance, pollution prevention and general environmental services. An Occupational Safety Training Institute (OSTI) complements McBon by providing a reservoir of trained and certified vocational professionals to work directly in the effort to improve the environment. The curriculum is approved by the U.S. Environmental Protection Agency, and is accredited by the Southern Association of Colleges and Schools and the Department of Education. Students receive up to nine different certifications of achievement when they complete the four-month program.

Army Environmental Policy Institute (AEPI)

Several meetings have been held with the Department of the Army Environmental Policy Institute (AEPI) to establish long-term support, and to provide training and student internships. Through a competitive procurement solicitation, the AEPI awarded an indefinite delivery contract to the Consortium. Tasks that have been undertaken by the Consortium for the AEPI include:

- Identifying efficient database and graphic visualization support for environmental risk/cost models;
- Conducting hazardous waste rate/disposal capacity studies;
- Conducting investigations of ecotoxicity and biotreatment of co-contaminant systems;
- Integrating a master plan at Fort Lewis;
- Developing options to promote sustainable development by prioritizing remediation;
- Assessing emerging technologies on barrier reactors for hazardous waste management; and
- Identifying policies and implications of the Clean Air Act Emission Trading Program.

Douglass Environmental Services, Inc.

A cooperative partnership with Douglass Environmental Services, Inc. for teaming arrangements, training, student internships and consulting was signed in December 1992. Several projects that will place the Consortium at the cutting edge of technology transfer have evolved from this ongoing partnership.

CDM Federal Programs Corporation

(A subsidiary of Camp, Dresser & McKee, Inc.)

In February 1993, the Consortium teamed with CDM Federal Programs Corporation to respond to an Indefinite Delivery Contract solicitation for Hazardous Waste Management for the Baltimore District Corps of Engineers. CDM was not awarded the solicitation but has requested several other teaming agreements.

EODT Services, Inc.

A Memorandum of Understanding (MOU) that establishes opportunities in research, development, demonstration, testing, evaluation, and training in Technology Transfer was signed with EODT Services, Inc. in February 1993. This MOU also establishes tuition support, testing and evaluation of facilities and services, and joint development of standards for environmental remediation of ordinance explosive waste contaminated sites.

Environmental Careers Organization (ECO)

Meetings have been held with the president, national director and development manager of ECO and the Consortium to explore possible areas of collaboration.

EnvironTRADE Partnership/Sandia National Laboratories and DOE

The Consortium has teamed with the U.S. Environmental Technology Export Council (ETEC) to respond to a DOE solicitation for the Environmental Technologies for Remedial Actions Data Exchange (EnvironTRADE) information systems. The ETEC team views the development of EnvironTRADE in the broad context of improving the international competitiveness

of the United States environmental industry. EnvironTRADE is a sophisticated graphics and textual database system with international information on environmental problems and environmental technologies. This system has been developed for DOE's Office of Environmental Restoration and Waste Management by Sandia National Laboratories. Its search and match algorithms locate technologies relevant to specific environmental problems and identify sites where a technology may be applicable. EnvironTRADE also provides other kinds of database searches and reports. The exceptionally strong ETEC team to develop, manage and commercialize EnvironTRADE includes:

- International Strategies, Inc. (ISI): operator of the extensively used Export Hotline;
- Pasha Publications: prominent publisher of environmental information; and
- IIT Research Institute: developer of the Defense Gateway Information System.

The ETEC team was selected as the first choice to begin negotiations with Sandia National Laboratory and the Department of Energy on EnvironTRADE.

THE ENVIRONMENTAL MANAGEMENT CAREER OPPORTUNITIES FOR MINORITIES (EMCOM) PROGRAM

The EMCOM program's primary goal is to increase the number of minority professionals available to work in and teach environmental science and engineering. Students pursuing degrees in fields related to the mission of DOE's Office of Environmental Restoration and Waste Management and the newly created office of Environmental Management 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.

During the summer for a minimum of 10 weeks EMCOM students conduct research at a DOE laboratory. Summer stipends are \$1,000 per month for undergraduates and \$1,400 for the graduate students. Travel and housing allowances are also included in these awards. The required summer research experience allows students to conduct research in environmental management topics. These experiences blend theory and practice, providing students with a look at 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 a professional and research environment. The process skills are guided by faculty and laboratory mentors who help students understand and interface with the new environment and, at the same time, permits development of a collegial framework for communication and interaction with the mentors. This mentoring eases the student transition to laboratory life.

In FY 1992 and 1993 students and faculty conducted research and related environmental field-based activities at the following DOE facilities:

- Ames Laboratory (AL)
- Brookhaven National Laboratory (BNL)
- Fermi National Accelerator Laboratory (FNAL)
- Fernald Environmental Management Project (FEMP)
- Hazardous Substance Waste Remedial Actions Program (HAZWRAP)
- Idaho National Engineering Laboratory (INEL)
- Inhalation Toxicology Research Institute (ITRI)
- Lawrence Berkeley Laboratory (LBL)
- Lawrence Livermore National Laboratory (LLNL)
- Los Alamos National Laboratory (LANL)
- National Institute for Petroleum and Energy Research (NIPER)
- National Renewable Energy Laboratory (NREL)
- Nevada Test Site (NTS)
- Oakridge National Laboratory (ORNL)
- Pacific Northwest Laboratory (PNL)
- Sandia National Laboratory (SNL)
- Savannah River Technology Center (SRTC)
- Waste Isolation Pilot Plant (WIPP)

Fourteen faculty and forty students participated in the FY 1992 Summer program; nineteen faculty and forty-nine students were involved in FY 1993. All Consortium schools were represented in both fiscal years. In FY 1992 there were 44 undergraduate and eleven graduate students; and in FY 1993 there were forty-nine undergraduate and fifteen graduate students respectively in the academic year.

Tables 8 and 9 provide brief student and faculty project descriptions. Many projects involved field-based applied activities in support of DOE site remediation and restoration efforts.

TABLE 8 FY 1992 EMCOM STUDENTS SUMMER RESEARCH ASSIGNMENTS

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
AAMU	Woods, Charles C.	LBL/LHS	Lawrence Hall of Science, science curriculum development
AAMU	Minniefield, Kelvin D.	LLNL	Assisting scientists in measuring the content of soils
CAU	McDonald, Victorine	AMES	Solution spinning techniques for the production of continuous SIC fibers
CAU	Johnson, Shirlan	LBL	Effects of triadimefon on cholineergic enzymes
CAU	Jones, LaVonn Y.	PNL	Solid waste management, public involvement, and environmental permitting
CAU	Torres, Angel O.	PNL	Tank waste characterization needs assessment, tank waste remediation system decision
FAMU	Banks, Donna	AMES	Sampling and analysis in genetic improvement of poplars and use in environmental remediation
FIU	Carballo, Maritza	ORNL	Advanced ceramic composites - assessment of role of processing variables
FIU	Davis, Horace R.	ORNL	Development of a microwave decontamination equipment for the Chem-Tech division
HaU	Campbell, Cherie L.	BNL	Support ecological monitoring program in support of environmental remediation
HaU	Gainor, Shawn	LLNL	Sampling equipment and methodology will be prepared for a field project
JSU	Weathersby, Pam	PNL	Culture of human bronchial epithelial cells and evaluation of radon induced chromosome damage
NMHU	Furlano, Aramando C.	LANL	Remote sensing technical development for monitoring surface features and processes at ER sites
NMHU	Furlano, Crystal H.	LANL	Remote sensing technical development for monitoring surface features and processes at ER sites
NMHU	Archibeque, Anita L.	NREL	Waste pickups from labs, groundwater sampling, botanical survey
NCAT	Peele, Linwood	PNL	Scientific support program, hydrogeologic modeling for performance assessment

TABLE 8 FY 1992 EMCOM STUDENTS SUMMER RESEARCH ASSIGNMENTS Cont'd

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
NAU	Lederer-Cano, Adam	LANL	Sample preparation methods and their impact on the quality of environmental data
NAU	Wero, Maeuneka C.	LANL	Sample preparation methods and their impact on the quality of data
NAU	Gene, Delfred	LLNL	NOx and SO2 emissions estimates from fossil fuel combustion
PVAM	Butler, Frederick W.	ORNL	Numerical simulation of concrete degradation and radionuclide leaching
SU	Bethley, Charles	PNL	Study of waste forms and release of contaminant from waste forms
SU	Lynch, Barbara L.	PNL	Development of bioremediation techniques for organic contaminants
SU	Robinson, LaSandra	PNL	Development of bioremediation techniques for organic contaminants
SU	Thompson, Toyla	PNL	Development of bioremediation techniques for organic contaminants
TAMU-K	Reina, Robert G.	LBL	Fluid flow and transport in fractured geologic media
TAMU-K	Walzel, Allen	ORNL	Cancer detection using electro-optical techniques
TSU	Buggs, Holton V.	NIPER	Environmental safety and health projects, including water and air
TU	Morris, Rogers	INEL	Engineering design of high pressure tanks, piping, valves and necessary connections
TU	Alexander, Niccole M.	SRL	Wastewater flow characterization for production and laboratory facilities
UTEP	Torres, Michael	LLNL	Nitrogen oxide removal in combustion gas streams by catalyst design
UTEP	Ybarra, Adriana	NREL	Detoxification group involved in the modeling of ponds
UTEP	Castillo, Ana M.	PNL	Project documentation to meet NEPA requirements
XU	Washington, William J.	INEL	Regulatory compliance plans for buried waste integration development
XU	Reddick, Linda	ITRI	Effects of inhaled beryllium metal on lung clearance and toxicity in mice

TABLE 8 FY 1992 EMCOM STUDENTS SUMMER RESEARCH ASSIGNMENTS Cont'd

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
XU	Lewis, Crystal A.	LBL	Earth science research project
XU	Zippert, Alexandra	LBL	Production and characterization of various oxide-type electrocatalysts
AAMU	Minniefield, Kelvin D.	NTS	Field data collection for DOE/YMP and DOE/NV environmental programs on the NTS
AAMU	Woods, Charles C.	ORNL	Environmental and waste management
AAMU	Washington, Kimberly	SRTC	Environmental restoration project
CAU	McDonald, Victorine	CAMPUS	Solution spinning techniques for the production of continuous SIC fibers
CAU	Jackson, Erica E.	HAZWRAP	ER self-assessment staff-document review and data input
FAMU	Ikaiddi, Margaretmary	ORNL	DNA isolated from environmental samples and analyzed
FAMU	Banks, Donna	UNIV. FL	Molecular-genetic characterization of key enzymes of aromatic amino acid biosynthesis in plants
FIU	Davis, Horace R.	HAZWRAP	Waste characterization, stabilization and gas dispositioning
FIU	Carballo, Maritza	ORNL	Structured ceramics group of metals and ceramics
FIU	Cazanas, Beatrice	ORNL	Multi-facility waste water discharge verification to support Clean Water Act
FIU	Keith, Laurel M.	ORNL	Rate of migration uranium contaminated waste through simulated landfill scenarios
HaU	Moses, Simone A.	BNL	Field work and documentation of location and character of environmental wastes
HaU	Gainor, Shawn	HAZWRAP	Literature search to determine chemical composition of gasoline additives
HaU	Campbell, Cherie L.	RFP	Ecological monitoring
HoU	Williams, Winston M.	HAZWRAP	Input basemap data from Lawrence Livermore's Site 300
HoU	Johnson, Willie L.	INEL	Environmental restoration scoping process
HoU	Spaulding, Scott K.	INEL	Develop solid models of advanced test reactor (ATR) core internal components

TABLE 8 FY 1992 EMCOM STUDENTS SUMMER RESEARCH ASSIGNMENTS Cont'd

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
HoU	Jackson, Michelle M.	PNL	Influence of carcinogens on DNA-chromosome structure and gene expression
JSU	Coleman, Mary E.	HAZWRAP	Health and safety studies
JSU	Moore, Jacqueline A.	LBL	Sampling of ground and surface water, soil, and plants
JSU	Weathersby, Pam	PNL	Microbial consortia for mineralization of petroleum hydrocarbons and production of hydrogen
JSU	Hall, Louis J.	SRTC	Environmental sciences in ecology related research
NMHU	Martinez, Edward A.	INEL	Indicators to assess ecological condition in arid ecosystems
NMHU	Gutierrez, Benjamin S.	LANL	Field studies of ecosystem processes
NMHU	Martinez, Eldon Q.	LANL	Field studies of ecosystem processes
NCAT	Brinson, Earl J.	ORNL	Computer control system for programming and downloading
NCAT	Reid, James A.	SNL, NM	Research and development to demonstrate safe disposal of radioactive wastes
NAU	Johnson, Angelee L.	LANL	Assist in analysis of soil and water samples
NAU	Lederer-Cano, Adam	LANL	Environmental chemistry
NAU	Wero, Maeuneka C.	LANL	Environmental chemistry
NAU	Harper, Patricia A.	NREL	Microtox 500 toxicity assimilation system to evaluate relative toxicity of sample materials
PVAM	Butler, Frederick W.	ORNL	Damage to DNA from environmental stressors
SU	Lynch, Barbara L.	ORNL	Prototype knowledge base for assisting in material balance calculations
SU	Robinson, LaSandra D.	PNL	Study of microorganisms responsible for carbon tetrachloride degradation
TAMU-K	Walzel, Allen	CAMP/ORNL	Research in cancer detection using electro-optical techniques
TAMU-K	Burrell, Richard D.	HAZWRAP	Field support activities for hydrogeologists
TAMU-K	Harr, Thomas L.	HAZWRAP	Input basemap data for the rocky flats plants operable unit 1

TABLE 8 FY 1992 EMCOM STUDENTS SUMMER RESEARCH ASSIGNMENTS Cont'd

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
TAMU-K	Perez, Mary	HAZWRAP	Microbial polymerization of polycyclic aromatic hydrocarbons in rhizosphere of sweet/clover
TSU	Buggs, Holton V.	HAZWRAP	Remedial investigations at Otis ANGB, MA
TSU	Terrell, Lamont R.	HAZWRAP	Pollution prevention program
TSU	Newsome, Tina M.	PNL	Synthesis of inorganic metal oxide ion exchanges for waste cleanup
TU	Johnson, Jerry L.	SRTC	Defense waste processing and hydrogen technology group
TU	Thompkins, Toi D.	SRTC	Environmental restoration
UTEP	Castillo, Ana M.	FEMP	Field investigation of uranium transport in soil
UTEP	Dominguez, Lourdes	LANL	Data collection and corrosion modeling
UTEP	Torres, Michael	LLNL	NO _x remediation of oil shale
XU	Washington, William J.	INEL	Organic synthesis to prepare iodoalkanes
XU	Higgs, Felicia J.	LBL	CEPUP for students in New Orleans

TABLE 9 FY 1992 EMCOM FACULTY SUMMER RESEARCH ASSIGNMENTS

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
AAMU	Kale, Purushcttarn	BNL	Repair mechanism affecting survival and mutagenesis of explosives
AAMU	Kale, Ranjini	BNL	Chromosomal radiosensitivity in human cells
CAU	Moeti, Lebone T.	AMES	Solution spinning techniques
CAU	Phillips, Peter C.	PNL	Use of microbial consortia for mineralization of petroleum hydrocarbons
FIU	Munroe, Norman D.H.	ORNL	Waste R&D development of biological processes of site restoration
JSU	Gaulden, Charlie	LBL/LHS	Development of hazardous materials curriculum
NMHU	Lessard, Robert H.	LANL	Global warming
NCAT	Shahbazi, Abolghasem	NREL	Evaluate biological processing residues
NAU	Foust Jr., Richard D.	LANL	Sampling preparation methods/ environmental impact on groundwater
SU	Onu, Chukwu	PNL	Research on triadineton
TAMU-K	Abdul-Razzak, Hayder	LBL	Atmospheric aerosol research
TAMU-K	McGehee, Thomas L.	ORNL	Input base map data for rocky flats #1
TSU	Hill, Gerald D.	NIPER	Studies of organic acids
UTEP	Robbins, Mary C.	NREL	Detoxification of ponds as photocatalytic reactors
AAMU	Kale, Purushottam	BNL	Repair mechanism affecting survival and mutagenesis of explosives
AAMU	Kala, Ranjini	ORNL	Chromosome segregation behavior in mouse oocytes
CAU	Abotsi, Godfried M.K.	HAZWRAP	Wastewater decontamination/new techniques with carbon and clay
CAU	Moeti, Lebone T.	AMES	Solution spinning techniques
CAU	Phillips, Peter C.	PNL	Mineralization of hydrocarbons
FIU	Munroe, Norman D.H.	ORNL	Uranium binding and transformation by <i>Pseudomonas aeruginosa</i>
FIU	Yih, Tachung	LBL	Designing automated devices for genetic testing

TABLE 9 FY 1992 EMCOM FACULTY SUMMER RESEARCH ASSIGNMENTS Cont'd

UNIVERSITY	NAME	LAB	PROJECT DESCRIPTION
JSU	Sun, Kunquan	LBL	Electromagnetic wave radiation effects on the environment
NMHU	Bentson, Kenneth P.	LANL	Field study and analysis of ecosystem processes
NMHU	Lessard, Robert H.	LANL	Global warming
NCAT	Sarin, Sanjiv	ORNL	Computer control system for programming tools
NAU	Foust, Jr., Richard D.	LANL	Research in analytical chemistry
NAU	Odem, Wilbert I.	LANL	Field experiments for hydrological parameters in mixed waste streams
NAU	Trotta, Paul D.	INEL	Experiments in aquifer stress and infiltration testing of groundwater
SU	Mirshams, Reza A.	ORNL	Extrusion process modeling
SU	Omafuaire, Moses O.	RFP	Ecological monitoring for environmental remediation of buffer zone at RFP
TAMU-K	Abdul-Razzak, Hayder A.	LBL	Atmospheric aerosol research
TAMU-K	McGehee, Thomas L.	HAZWRAP	Inputting base map data for rocky flats #1/teaching course
TSU	Hill, Gerald D.	NIPER	Emissions measurements for alternative fuels vehicles

Figures 2 and 3 provide identification of the students by ethnicity and gender.

FIGURE 2 FY 1993 EMCOM ETHNICITY

FIGURE 3 FY 1993 EMCOM GENDER

Students who have graduated from EMCOM to date either have entered the workforce or are pursuing advanced degrees. Most in environmentally relevant disciplines. Several have entered federal employment; others have secured industrial positions. Most have expressed continued interest in a career in an environmental area. A number of students have reported that EMCOM and their research experiences assisted in their being selected for employment, graduate study, or a postdoctoral position.

THE ENVIRONMENTAL MANAGEMENT PRE-COLLEGE ANALYTICAL CHEMISTRY (EMPAC) PROGRAM

The EMPAC Program is a rigorous campus-based academic achievement program adopted by the Consortium to strengthen the pre-college pipeline into undergraduate science and engineering disciplines. Initially piloted by AWU/DOE in 1985 at San Jose State University, the goal of this program is to motivate high school students to pursue science and engineering careers through providing them an opportunity to master a college level science course. Evaluation data from the first six years of EMPAC show that the participants tended to elect undergraduate disciplines in the sciences and then to choose technology-based careers. These data specifically cite participation in EMPAC as a major factor in these decisions.

The choice of analytical chemistry as the academic content is especially pertinent to the achievement of the goals for this program and to the interests of the Consortium. The study of analytical chemistry involves students in a quantitative laboratory-based experience, with personalized support and supervision by a team of high school teachers and university faculty instructors. Engaging students in this way teaches them study techniques, independent thinking, and problem solving skills in a team environment. The required hands-on experiments with an environmental science focus, reinforced by relevant field trips and guest lectures, contribute directly to student understanding of environmental issues and needs. Many times, examples of these issues are found in their own home communities. Students emerge with a greater respect for their world and a desire to preserve it as both consumers and potential scientists.

The program is conducted similarly on each site for a period of seven or eight weeks. Students attend lectures daily, have scheduled laboratory experiments and independent and team projects to round out each week. Field trips to governmental and industrial environmental research facilities and laboratories are part of every program. Invited speakers discuss environmentally relevant topics. Students receive university level credit if they complete the program satisfactorily.

A maximum of 20 students compose a class; mentors include the faculty, high school teachers and laboratory assistants. Students receive a modest weekly stipend of \$60; all tuition and fees and other course-related costs are provided. The value of the EMPAC Student Fellowship is approximately \$2,000 averaged across the participating sites. Student demographics are presented in Figure 4.

FIGURE 4 FY 1992/1993 EMPAC GENDER & ETHNICITY

High school chemistry teachers selected to participate in the program as mentors and laboratory instructors receive a stipend of \$550 weekly for the length of the program.

During FY 1992 and FY 1993, five Consortium schools implemented the EMPAC Program: Clark Atlanta, Hampton, Jackson State, Southern and Texas A&M University-Kingsville. Seventy-nine students, ten high school teachers, and eight faculty participated each year. More than 70% of the students achieved a grade of C or better. Viewed nationally, this approaches, and at some institutions exceeds, the achievement of undergraduates pursuing the same course content. Figures 5 and 6 show this achievement.

FIGURE 5 FY 1992 EMPAC STUDENT ACHIEVEMENT/GRADES AWARDED

FIGURE 6 FY 1993 EMPAC STUDENT ACHIEVEMENT/GRADES AWARDED

LEGEND

Passed: A, B, C, D
Withdrawn: W
Failed: F

The program has been evaluated annually and student and teacher follow-up is continuing. The data after two years report that 54% of the students plan to take more science and environmental courses and 62% plan to major in a science or engineering discipline. Students also say they have gained self-confidence, learned new study and laboratory skills and are more certain of their ability to succeed in college. Research shows that many students who lack these attributes find the transition to college difficult and tend to be less successful, especially in the early undergraduate years.

Teachers also report benefiting from the program, specifically in the learning of laboratory skills and techniques and in the application of analytical chemistry to environmental concerns. One year or more after the program, they introduce new experiments into their curriculum, implement safer laboratory practices and advise students to consider enrolling in the EMPAC program to explore environmental science career possibilities.

In FY 1993, three additional institutions entered their planning year: North Carolina A&T State, Northern Arizona, and Tuskegee Universities. During this phase, the chemistry faculty instructors attend several Associated Western Universities, Inc. (AWU) workshops on development of course objectives and core content, design appropriate laboratory experiments, establish their recruitment and selection criteria and processes, propose their implementation year budgets, visit ongoing site programs, and participate in the annual faculty program review. Eight faculty received summer fellowship and/or travel support to participate in this development.

THE 1993 NATIONAL CONGRESS FOR THE ADVANCEMENT OF MINORITIES IN THE ENVIRONMENTAL PROFESSIONS

In order to enhance the effectiveness and ensure a more flourishing future in environmental management, the National Congress for the Advancement of Minorities in the Environmental Professions recognized a collaborative need for government officials, private sector representatives and educators to establish extensive partnerships. These partnerships address the underrepresentation of African American, Hispanic and Native American Indian minority groups in four areas: Minority Outreach and Pre-college Education; Undergraduate Education and Postsecondary Training; Graduate and Post-Graduate Education and Research and Technology Transfer.

Deliberations among four National Congress Working Committees, each assigned to one of these areas, provided the driving force for the National Congress. The reports of these committees are included in The National Partnerships Action Agenda (NPAA), a five-year plan designed to improve the participation of minorities in the environmental professions. Environmental strategies and recommendations to enhance Consortium institution partnerships in the environmental industry are also included. The major NPAA recommendations made by the working committees in each of the four areas are highlighted.

Minority Outreach and Pre-college Education

Create partnerships with local school districts and local environmental industries to develop effective environmental outreach programs and materials.

National pre-college environmental curricular models that employ a variety of successful strategies and activities are key to developing three-way partnerships. Effective environmental educational awareness programs for pre-college students should be implemented by utilizing the resources of a local environmental industry, the local school district and a Consortium institution.

Undergraduate Education and Postsecondary Education

Enhance environmental management curricula in engineering, environmental sciences, the natural, social and information sciences and mathematics at the undergraduate level. Enhancement of the environmental management curricula is envisioned as a threefold effort that would:

- Prepare students to meet the current demands and challenges facing the environmental management industry;
- Provide Consortium institutions with tools and resources to guide curriculum development that anticipates the future needs of the environmental management industry and
- Strengthen the viability between the undergraduate and graduate pipeline.

Graduate and Post-Graduate Education and Research

Intensify efforts to identify and recruit capable, full-time minority students in environmental-related graduate and post-graduate programs.

The "greening" of all disciplines in the HBCU/MI Consortium institutions is necessary to increase the number of graduate environmental students. Groups of students should be identified to enter into Consortium graduate programs and name share networks should be established among the institutions. These programs should be patterned after similar undergraduate programs.

Technology Transfer

Establish Consortium Environmental Technology Development Centers (CETDCs).

The main purpose of the CETDCs is to act as clearinghouses of information for new technologies and technology transfer. This information would be targeted to the entrepreneurial interests of small and minority environmental businesses interested in providing their services nationally and internationally.

Sited at designated HBCU/MI Consortium institutions as regional centers, CETDCs would utilize the talent of students, researcher, and staff from all of the HBCU/MI Consortium institutions to provide national, statewide and local technical services. The CETDC concept would promote teaming between large corporations and small businesses; among technical schools, colleges and universities; as well as among a variety of public and private partners including national laboratories and quasi-governmental authorities.

Implementation of these recommendations will require broad-based support to establish partnerships that increase the involvement of underrepresented minority groups (African American, Hispanic and Native American Indian) in the environmental professions.

The report of the 1993 National Congress elaborates on these recommendations.

MANAGEMENT

EXECUTIVE MANAGEMENT

*Dr. Frederick Humphries, President
Florida A&M University*

Dr. Frederick S. Humphries, Florida A&M University's eighth president, is the current chair of the Consortium Council of Presidents. He graduated magna cum laude in 1957, receiving the Bachelor of Science degree in Chemistry from Florida A&M University, and was awarded the doctorate in chemistry by the University of Pittsburgh. Dr. Humphries' achievements as a student and as an educator have won him significant honors, including the Thurgood Marshall Education Achievement Award and the University of Pittsburgh Bicentennial Medal of Distinction. He began his professional career as a commissioned officer in the U.S. Army and, subsequently, has held several prestigious positions, including president of Tennessee State University.

He has served on many boards, committees and commissions, and presently is a member of The White House Science and Technology Advisory Committee, the chair of the NAFEO Science and Technology Advisory Committee, the Board of Directors of the Florida Prison Rehabilitative Industries, Diversified Enterprises, Inc. and a host of others. Dr. Humphries has made numerous contributions to higher education in general, and higher education for African Americans in particular.

*Dr. Diana Natalicio, President
University of Texas at El Paso*

Dr. Diana Natalicio served as chair of the Consortium Council of Presidents from November 1991 through October 1993. She received the B.S. degree in Spanish, summa cum laude, from St. Louis University in 1961, the master's degree in Portuguese and the Ph.D. in Linguistics from the University of Texas at Austin in 1964 and 1969, respectively. During 1961-62, she was a Fulbright Scholar in Rio de Janeiro, Brazil and in 1964-65 a visiting scholar in Lisbon, Portugal.

After serving as a Research Associate at the Center for Communication Research at the University of Texas at Austin, Dr. Natalicio joined the faculty of the University of Texas at El Paso in 1971. In addition to her teaching and research responsibilities in the Departments of Linguistics and Modern Languages, Dr. Natalicio has served the university in numerous administrative capacities, including Chair of Modern Languages (1973-77), Associate Dean, Dean of Liberal Arts (1977-84), Vice President for Academic Affairs (1984-88), Interim President (1987-88) and President (1988 - present).

Dr. Natalicio has authored numerous professional books, monographs, articles and reviews in the field of applied linguistics. She has also participated in many professional and civic activities, including the Society of International Business Fellows, Texas Business and Education Coalition, Governor's Executive Development Program, Texas-Chihuahua Regional Commission, American Council on Education's Commission on Women in Higher Education, the Hogg Foundation Commission on the Mental Health of Adolescents and Young Adults, and Leadership El Paso.

*Dr. Kofi Bota, Vice President for
Research and Sponsored Programs
Clark Atlanta University*

Dr. Kofi B. Bota, Clark Atlanta University, serves as Director of the Consortium, Secretary to the Council and Chair of the Steering Committee. He is Vice President for Research and Sponsored Programs and Professor of Chemistry at Clark Atlanta University (CAU). Over the past two decades, Dr. Bota has served in several professional and administrative capacities at Clark Atlanta, including Associate and Professor of Chemistry and Physics (1979-1986), Chair of the Department of Physics (1980-1982), Provost and Vice President for Academic Affairs (1982-1986), and Acting President (1983-1984).

In these positions, he has provided managerial and academic program development leadership for a wide range of disciplines, including the natural sciences and technology, science and mathematics education, international affairs and development, public administration and policy, criminal justice, and economic development.

Dr. Bota also has provided leadership on the national, regional, and local scenes on legislative, R&D, policy and education issues in higher education and pre-college, and government/industry/university partnerships. He has a special commitment to the meaningful involvement of minorities and HBCUs in these issues. He has played a key role for HBCUs in discussions of these matters with the Department of Energy, the Agency for International Development, NSF, NASA, EPA, DOD, and other federal agencies.

Dr. Bota is chair of the energy subcommittee of the Science and Technology Advisory Committee of the National Association for Equal Opportunity (NAFEO). In this capacity, he has organized several workshops on energy technologies for the Department of Energy. He was elected the first Director of The HBCU/MI Consortium, in January, 1990. He is also Director of the HBCU Fossil Energy Consortium formed in December 1988. Dr. Bota serves on the EPA National Advisory Council for Environmental Policy and Technology (NACEPT). He has been appointed an inaugural member of the Board of Trustees of the National Environmental Education Foundation established in November, 1990, by Congressional Act. Dr. Bota has participated in several environmental and science and technology policy discussions, workshops, and conferences of the Army Environmental Policy Institute (AEPI), U. S. Army Toxic and Hazardous Materials Agency (USA THAMA), and other federal agencies.

Dr. Bota's areas of research expertise are stochastic processes in physical and chemical systems, physical properties of polymers, and chemical kinetics. He has published several scientific papers in these and related areas.

Mr. August O. Curley
Program Advisor

Mr. August O. Curley, USEPA Visiting Scientist at Clark Atlanta University, serves as the Program Advisor to the HBCU/MI Consortium. Mr. Curley has over 25 years experience in government R&D, Laboratory Program Planning and Development and Management. His research includes analytical methods adopted nationally and internationally for chlorinated hydrocarbon compounds in human blood and other substrates. He has been principal and co-principal investigator on several major human and domestic animal poisonings nationally and internationally involving organomercurials, arsenic, chlorinated hydrocarbons, chlorinated phenols, and organophosphorous compounds used as insecticides and nerve gases.

He has served as an expert to the World Health Organization (WHO) in Geneva, Switzerland on DDT, and conducted collaborative studies on Chlorinated Hydrocarbon Insecticides in World Populations as related to cancer induction for the WHO International Agency for Research on Cancer in Lyon, France. He has served as an Environmental Advisor for the Ministry of Industry to the Arab Republic of Egypt for development of pollution control in its public and private sector industries. Under this assignment, he assisted the Egyptian government in establishing environmental laws, an Environmental Affairs Agency, and an Environmental Monitoring Laboratory for a water, wastewater and air quality monitoring program in the industrial sector. He provided consultation to USAID on the metropolitan, provincial and canal cities water, wastewater and infrastructure projects.

He served as consultant to the World Bank, Washington, D.C. on the Mediterranean Basin Project for Pollution Control. He has published more than 31 articles on pesticides and toxics in peer reviewed journals, two book chapters and an International Symposium Proceeding. He has served as an expert witness for the Department of Justice on Kepone and the Republic of France, Pontoise on hexachlorophene. He was, also, an advisor to the State of North Carolina on the polychlorinated biphenyl discharge along public roads.

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY CONSORTIUM STAFF

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Betty A. Johnson, Project Assistant
Bernice M. Jones, Financial Assistant
Reginald Lindsey, Ph.D., Associate Director
Faye Lyons-Gary, Director, Industrial Relations
Gisele A. Parker, Director, Pre-College and Outreach Programs
Jacqueline Williams, Program Coordinator

August O. Curley, M.S., on IPA Assignment as Program Advisor
V. Anne Heard, J.D., On IPA Assignment as Legal Advisor
James McDuffie, M.S., On IPA Assignment as Program Training Advisor

SUPPORT 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 R&D community are met.

Basic Technologies International

Basic Technologies International (BTI) is a metropolitan Washington, DC company providing support services in science and engineering based technologies. Founded in 1988 as a minority female-owned firm, BTI targets training and technical concerns which support the nation's energy, environmental technology, transportation, worker health and safety, defense construction, aerospace, waste management and communication industries.

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Prairie View, Texas 77446

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Tallahassee, Florida 32307

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Baton Rouge, Louisiana 70813

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Houston, Texas 77004

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President
Jackson State University
Jackson, Mississippi 39217

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President
Tuskegee University
Tuskegee, Alabama 36088

Dr. Selimo Rael
President
New Mexico Highlands University
Las Vegas, New Mexico 87701

Dr. Diana Natalicio
President (past)
University of Texas, El Paso
El Paso, Texas 79968

Dr. Edward B. Fort
Chancellor
North Carolina A&T State University
Greensboro, North Carolina 27411

Dr. Norman C. Fancis
President
Xavier University of Louisiana
New Orleans, Louisiana 70125