COOPERATIVE ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY WITH HISTORICALLY BLACK COLLEGES AND UNIVERSITIES, FISCAL YEARS 1983-90

Edited by Angela E. Hall and Jonathon C. Scott

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ABSTRACT

The U.S. Department of the Interior, U.S. Geological Survey, has been involved in numerous cooperative activities with Historically Black Colleges and Universities. Assistance agreements, which include both grants and cooperative agreements, have fostered many educational research and development activities. These activities have included site visits, employment opportunities, curriculum development, seminars, and research projects. The activities are consistent with the Geological Survey's mission of conducting earth-science research and dissemination of the results. The cooperative programs have benefitted the Historically Black Colleges and Universities, their students, and the Geological Survey.

INTRODUCTION

As a large research organization, the U.S. Geological Survey (USGS) has a continuing need for highly skilled scientists, technicians, and administrators. Many of the cooperative activities of the USGS with Historically Black College and Universities (HBCU) are designed to assist these institutions in educating potential employees. Other activities relate to the earth-science research and the information-dissemination roles of the USGS. Cooperative activities with HBCU's are related to the USGS mission of providing geologic, topographic, and hydrologic information.

The USGS's activities described in this report are elements of the Federal government's HBCU program. The USGS seeks cooperation with HBCU's that have, or have the potential to develop, curricula in the earth sciences or computer science related to the earth-science fields. USGS personnel have performed on-site visits, provided employment opportunities, assisted with curriculum development, hosted seminars, and sponsored research.

Background

The USGS has a long history of cooperating with Historically Black Colleges and Universities. In the early 1950's, a USGS physicist developed a program with Howard University for projects with the USGS that frequently served as thesis or dissertation topics for the University's graduate students. With the creation of the Minority Participation in the Earth Sciences Program by the USGS in the fall of 1971, an additional thrust was

given to cooperative efforts. Early activities involving HBCU's in this program included: A traveling earth-science team that visited many of the HBCU's in the southeastern United States; preparation and presentation of seminars on topical geologic subjects that enhanced the curriculum, such as a series given at Virginia State University; and assistance to the geology department at Howard University.

The USGS-HBCU relationships were further developed and given greater visibility by the formalization of the HBCU initiative in the U.S. Department of the Interior. The Office of Historically Black College and University Programs and Job Corps was created in 1983 to develop cooperation between Interior and these institutions. Since the initiation of the formal program, the USGS has consistently been among the leaders in the Department of the Interior in expending time and money for this effort. The USGS has expended more than $5.6 million on HBCU-related activities (fig. 1). These activities have included a wide range of actions such as grants and cooperative agreements, the employment of HBCU students, and curriculum enhancement by making available teachers and books and by providing equipment (such as computers and cartographic instruments). In 1983, a symposium held at the USGS National Center brought together USGS and HBCU representatives to discuss the kinds of activities in which the USGS is engaged, areas of mutual interest, seminars for informing faculty of new technology, and employment opportunities.

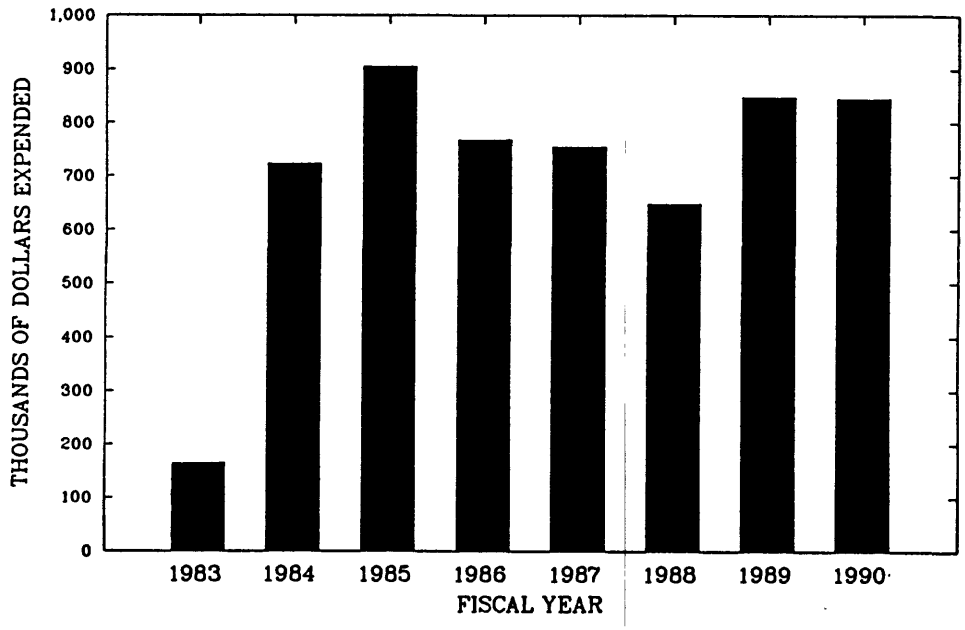

Figure 1.— Expenditures by the U.S. Geological Survey on cooperative activities with Historically Black Colleges and Universities, 1983-90

Purpose and Scope

This report describes the cooperative activities of the USGS with HBCU's from 1983 to 1990, but should not be considered an exhaustive review of all the activities that the USGS has undertaken with these schools during the 8-year period. The activities the USGS has conducted are grouped into categories and described herein using examples. Detailed descriptions of cooperative activities with two schools, Hampton University in Virginia and Langston University in Oklahoma, are presented in the Case Studies section of this report beginning on page 12.

Acknowledgments

The editors thank Frank D. Beatty, Edward C. Escowitz, Priscilla A. Mawyer, Maryjon McAvery, Charles E. Ogrosky, and Jane H. Wallace for contributing portions of this report that describe various USGS-HBCU cooperative projects and activities. The USGS interactions with HBCU's could not have occurred without commitment and hard work by past and present employees of the USGS. Outreach efforts by these individuals are gratefully acknowledged.

COOPERATIVE ACTIVITIES

The cooperative activities described in this report are grouped into five categories: Site visits, employment opportunities, curriculum development, seminars, and research. The USGS has cooperated with 47 different HBCU's in various combinations of these categories during the 8-year period from 1983-90 (table 1).

Site Visits

Representatives of many HBCU's were made aware of the potential for cooperative activities with the USGS during the 1983 symposium. Since then, USGS personnel have traveled to these and other institutions to explore development of cooperative projects and to recruit employees. Site visits by USGS personnel are among the most productive activities and often have led to more substantial cooperative undertakings.

Consultation

Representatives of the USGS and HBCU's have met to discuss the needs and capabilities of each organization. These conferences have been held for planning cooperative ventures, recruiting student employees, and developing research proposals.

Site visits have been undertaken to assist HBCU's in obtaining funding for water-resources research projects. The USGS administers funding for 54 Water-Resources Research Institutes (WRRI) (one in each state and in the District of Columbia, Guam, Puerto

Table 1.— *Activities of the U.S. Geological Survey with Historically Black Colleges and Universities, 1983-90*

Institution	Site visit	Student-faculty employment	Curriculum development	Seminar participation	Research
Alabama A & M U.	X		X	X	
Alabama State U.	X				
U. of Arkansas, Pine Bluff	X			X	
Bowie State	X	X			
Central State U.	X	X	X	X	
Cheyney State U.	X				
Clark Atlanta U.		X			
Coahoma Community College	X	X	X	X	
Delaware State College					X
Dillard U.				X	
U. of District of Columbia	X	X	X	X	X
Edward Waters College	X				
Elizabeth City State U.	X	X	X	X	X
Fayetteville State U.	X				
Fisk U.	X	X			
Florida A & M U.	X		X		X
Grambling State U.	X	X	X	X	
Hampton U.	X	X		X	X
Howard U.	X	X	X		X
Jackson State U.	X	X	X	X	
Johnson C. Smith U.	X				
Kentucky State U.	X				
Langston U.	X	X	X	X	X
Lincoln U.	X				
U. of Maryland Eastern Shore		X			
Morgan State U.	X	X			
Morris College		X			
Norfolk State U.		X			
North Carolina A & T State U.		X			
North Carolina Central U.	X	X		X	
Prairie View A & M U.	X	X		X	
St. Augustine's College	X				
Savannah State College					X
Shaw U.		X			X
South Carolina State U.		X			
Southern U. (La)	X	X		X	
Spelman College		X			
Tennessee State U.	X	X		X	
Texas Southern U.	X	X	X	X	
Tougaloo College		X			
Tuskegee U.		X			
Virginia State U.	X	X	X		
Virginia Union U.		X			
U. of the Virgin Islands	X		X		X
Wiley College		X			
Winston-Salem State U.	X				
Xavier U.	X				

Rico, and the Virgin Islands). The WRRI's sponsor water-resources research by soliciting and evaluating research-project proposals, and funding projects that have merit. The USGS has assisted HBCU's by encouraging grant applications and conducting on-site meetings to assist HBCU's in applying for, and obtaining funding for, proposals submitted through the Water-Resources Research Institutes. The WRRI program is discussed again in the Research section of this report beginning on page 10.

Career Fairs and Recruiting

Representatives of the USGS have participated in career fairs and conducted recruiting activities at many HBCU's. Students and career-placement personnel were made aware of the many employment opportunities with the USGS. Site visits frequently resulted in the employment of students or faculty members (table 1 and fig. 2).

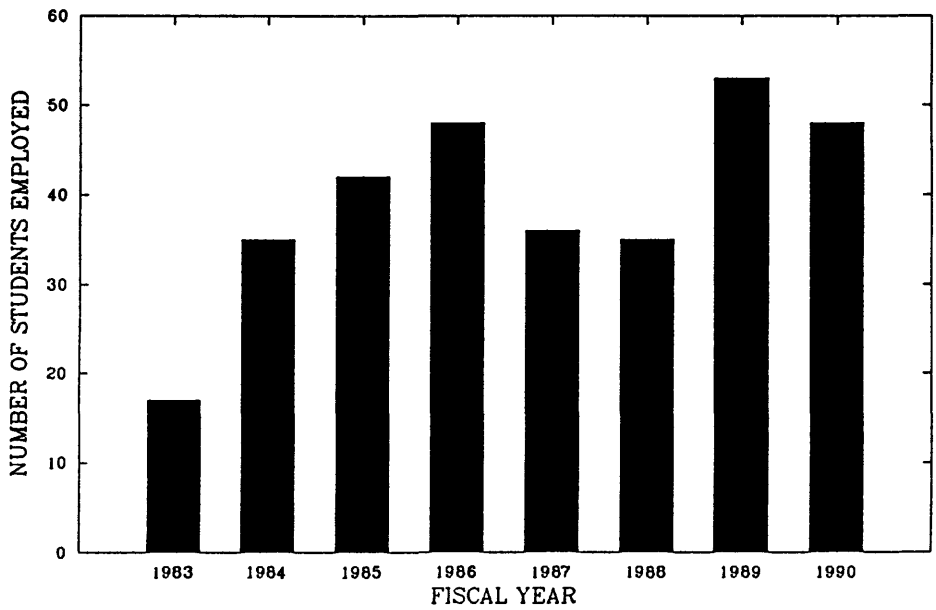

Figure 2.— Number of students from Historically Black Colleges and Universities employed by the U.S. Geological Survey, 1983-90

Employment Opportunities

The USGS offers a broad range of career possibilities to graduates in the earth sciences. Employment opportunities exist for cartographers, geologists, geophysicists, oceanographers, chemists, hydrologists, physical scientists, computer specialists, and administrative support personnel (table 2). Positions also are available for hydrologic, cartographic, and physical-science technicians for participating in research activities; calibrating or operating

instruments; setting up or operating test apparatus; making chemical analyses; collecting or analyzing scientific data; preparing charts and reports; drafting, digitizing and editing maps; and performing other technical functions. The work experience gained as a employee can yield skills, knowledge, and experience necessary to excel in a chosen career, as well as the opportunity to work with some of the Nation's outstanding research scientists.

The USGS is an equal-opportunity employer. All positions require U.S. citizenship. Employment opportunities are available for permanent and temporary positions using various programs and Federal appointing authorities. Many of the employment programs listed in table 2 have been used to hire students from HBCU's. The employment programs are designed to accommodate various work schedules, financial needs, and qualifications.

Table 2.— *Employment opportunities with the U.S. Geological Survey for students and faculty*

Employment program	Description of program
	Student Employment Opportunities
Stay-in-school	Stay-in-school appointments enable high school and undergraduate students to continue or resume their education by providing part-time jobs when employment might make the difference between staying in school or dropping out. Financial need is a part of the qualifications for this appointment. Employment may not exceed 20 hours in any calendar week when school is in session, but may extend to 40 hours a week during school vacation or holidays.
Volunteer-for-science	The Volunteer-for-science program provides students with an opportunity to work as unpaid volunteers assisting with a variety of scientific activities. Volunteers donate services for a few hours a day, for a few days a year, or for an extended period. Individuals may volunteer for a single project or for several different projects and may be paid for incidental expenses such as training, transportation, lodging, subsistence, equipment, and supplies.
Cooperative-education	Cooperative-education appointments provide students with full-time or part-time positions. The work periods can be alternated with study periods and are planned to be long enough to qualify students for noncompetitive conversion into the Federal service within 120 days after graduation. Students are permanent employees who are eligible for retirement, health benefits, and life insurance, as well as annual and sick leave.

Table 2.— *Employment opportunities with the U.S. Geological Survey for students and faculty*—Continued

Employment program	Description of program
Federal summer jobs	Federal summer jobs are announced each January by the Office of Personnel Management. The positions are available nationwide as early as May 13, but no later than September 30. Positions also are available for summer aides and are open to youths whose family income meets Federal guidelines. Students should inquire during the month of January to apply for temporary summer positions.
Federal junior fellowship	Federal junior fellowships provide summer and part-time employment for graduating high-school seniors who need earnings to attend college. Upon receiving a baccalaureate, associate, or undergraduate degree, certificate, or diploma, the appointment may be converted within 120 days to permanent status without further competition.
	Graduate-Student Employment Opportunities
Graduate-student appointments	Graduate-student appointments are available for graduate students to perform work for the USGS as a basis for completing academic requirements toward a graduate degree. Appointments of full-time graduate students are made for 1 year, but may be extended for an additional year, if necessary and with appropriate approval. There is no limitation on the number of hours that can be worked.
Graduate-research assistance	Graduate-research assistance is available to U.S. citizens who are full-time students pursuing graduate degrees in geology or geophysics at an accredited college or university in the U.S. The students coordinate their research on a thesis or dissertation in the earth sciences with a USGS project and receive some financial support for their work.
Research-associate	Research-associate positions are available on a temporary basis for persons having a recent doctoral degree in an appropriate scientific field of study, for research activities of mutual interest to appointees and the USGS. Appointments are limited to candidates referred by the National Research Council, under its postdoctoral research-associate program, and may not exceed 2 years. Selected candidates must satisfy an evaluation of their research during the first year.

Table 2.— *Employment opportunities with the U.S. Geological Survey for students and faculty*—Continued

Employment program	Description of program
Internal post-doctoral	Internal post-doctoral positions offer guest-researcher opportunities to outstanding scientists who have held doctoral degrees less than 5 years at the time awards are offered. Appointees serve as USGS employees under a temporary, limited appointment, but do not receive benefits other than salary and leave. Competitive announcements are made annually, usually in the early part of the calendar year.
	Faculty Employment Opportunities
Faculty appointments	Faculty appointments are available to college and university faculty members. Eligible faculty members must have special qualifications for the scientific positions in which they serve. Many are appointed on an intermittent basis and perform special studies for the USGS throughout the school year and the summer. The appointment is limited to 130 working days in a 12-month employment year.
Mathematics and science majors	Mathematics and science majors are eligible for positions as assistants to scientific, professional, or technical employees. Persons employed must be full-time high-school science or mathematics teachers or full-time students enrolled in a diploma/degree program at high schools or accredited colleges or universities who are pursuing courses related to the field in which employed. The appointment is limited to 1,040 working hours in a 12-month employment year.
The Intergovernmental Personnel Act	The Intergovernmental Personnel Act provides for the temporary assignment of personnel between the Federal Government and State, local, and Indian tribal governments, institutions of higher education, and certain other nonprofit organizations. During the assignment, assignees work on mutual problems and build interorganization understanding by gaining and sharing experience in another environment. Assignments may be made for as long as 2 years. Employees of eligible non-Federal organizations must be permanent employees who have been employed for at least 90 days. Cost-sharing arrangements are worked out between the participating organizations.

Curriculum Development

Curriculum development encompasses a variety of activities that assist educational institutions to improve and expand their course offerings. These activities include (1) loans and donations of equipment, supplies, books, and periodicals, (2) assistance with curriculum planning and cohosting of seminars, and (3) arrangement of guest lectures by current and retired USGS employees.

Educational Materials and Equipment

The USGS has provided excess physical property, such as instruments, books, supplies, and computers, to several HBCU's. These donations, though not measureable in dollars, have a qualitative impact on the schools' educational facilities.

The USGS has assisted four HBCU's by arranging donations of maps, periodicals, and books for the schools' libraries (Central State University, Elizabeth City State University, Langston University, and the University of the District of Columbia). A photogrammetric stereoplotter and materials for preparing topographic maps (including film negatives and positives, photographs, lettering plates, overlays, scribe guides, and related materials) have been donated to Elizabeth City State University. The USGS loaned equipment and provided technical guidance to graduate students at Howard University who conducted gravity surveys of nine 7 1/2-minute topographic map quadrangles.

Course Planning

USGS scientists have suggested additions or alterations to the schools' curricula to deal with changing technologies, practices, and difficulties of applying theoretical procedures to real-world problems. Both academicians and practitioners have difficulty staying abreast of developments in the rapidly changing disciplines of the earth sciences. When both groups work together in planning a course or conference, the participants frequently gain new and useful knowledge.

Retired and active-duty cartographers from the USGS worked with the faculty of Texas Southern University to enhance the geography and cartography curricula. A conference on cartography was cohosted at Texas Southern University in November 1984.

In 1985 and 1987, geography workshops for elementary and secondary teachers were cohosted by Jackson State University and the USGS. The sessions were designed to provide basic information and skills in the field of geography to improve the persistent national problem of geographic illiteracy. The workshops were held on the Jackson State campus. Student employees from Grambling State and Jackson State Universities assisted with the training.

The USGS, the U.S. Environmental Protection Agency (USEPA), and Hampton University jointly cohosted a seminar on ground-water pollution in March, 1984.

Guest Lecturers

Guest lectures provide an important addition to a school's curriculum. Students learn from and interact with individuals who are actively applying the sciences on a day-to-day basis. Many of these individuals are leading professionals in their field.

USGS scientists have presented guest lectures and served as part-time instructors at several HBCU's. USGS scientists have taught a course in cartography and a course in the field techniques of mapping and photogrammetry at Texas Southern University. A graduate-level cartography course was taught by a USGS scientist at Howard University. The USGS also has provided guest faculty members for Howard University's summer field geology camp. Four guest lecturers from the USGS have presented lessons in hydrography at Central State University.

Seminars

One of the most effective means of encouraging interest and developing expertise in the earth sciences is to share knowledge and technology with the faculty of universities and colleges. By training faculty members in new techniques, educational institutions place their earth-science research and academic programs on a solid foundation of modern technology.

The USGS has held seminars to help schools increase the expertise of their faculty members. These seminars have provided training in cartography, remote sensing, geographic information systems, interpretation of aerial photographs, and automated map production.

Many HBCU faculty members have attended these seminars (table 3). As a result, courses in remote sensing, digital-image processing, and digital cartography have been added to the curricula at HBCU's. These broadened curricula have produced many qualified, employable graduates.

Research

Research is an important component of a strong educational institution. Through successful research projects, faculty members become experts in their fields and are better able to teach students up-to-date information. Furthermore, a good research program serves to recruit high-caliber prospective students. Cooperative research in a field of interest to the USGS benefits both institutions.

Water-Resources Research Institutes are located at two HBCU's, the University of the District of Columbia and the University of the Virgin Islands. Both institutions receive financial support from the USGS for operation of the WRRI's. Funding for water-resources investigations at five HBCU's, including Delaware State College, Florida A & M, Howard University, Savannah State College, and Shaw University has been provided through the WRRI programs.

One project at Elizabeth City State University has been conducted to determine roundness, sphericity, and shape of mineral grains to aid in identifying sedimentary depositional

Table 3.— *Attendance from Historically Black Colleges and Universities at seminars hosted by the U.S. Geological Survey*

Year	Institutions represented
1984	Grambling State University
	Jackson State University
1985	Alabama A & M University
	Elizabeth City State University
	Grambling State University
	Jackson State University
	North Carolina Central University
	Tennessee State University
	Texas Southern University
	University of the District of Columbia
1986	Grambling State University
	Jackson State University
	North Carolina Central University
	University of the District of Columbia
1987	Alabama A & M University
	Jackson State University
	North Carolina Central University
1988	Alabama A & M University
	Elizabeth City State University
	North Carolina Central University
	Southern University (New Orleans)
	University of Arkansas (Pine Bluff)
	University of the District of Columbia
1989	Alabama A & M University
	Central State University
	Coahoma Community College
	Elizabeth City State University
	Langston University
	North Carolina Central University
	Prairie View A & M University
1990	Alabama A & M University
	Central State University
	Coahoma Community College
	Dillard University
	Elizabeth City State University
	Jackson State University
	North Carolina Central University
	Prairie View A & M University

environments. A second project at Elizabeth City State University was begun in 1988 to evaluate the heavy-mineral resource potential of the North Carolina Fall-Line region.

Howard University has conducted four cooperative research studies with USGS assistance. The first project required the development of a mass-spectrometry system. Two other projects pertained to modeling of argon concentrations in mineral samples, and estimating argon concentrations in the ancient Earth atmosphere. In the fourth project, the magnetic properties of rocks and minerals were studied.

In addition to the water-resources investigation mentioned previously, the School of Journalism, Media, and Graphic Arts of Florida A & M, in conjunction with the USGS, devised an innovative project for preparing publication-quality typesetting of complex equations, tables, and text in accordance with strict publication standards.

CASE STUDIES

Hampton University

In 1868, Hampton Normal and Agricultural Institute was founded by General Samuel Chapman Armstrong in Hampton, Virginia. The name was shortened in 1930 to Hampton Institute. In 1984, Hampton's Board of Trustees established Hampton University (fig. 3). The University now includes Hampton Institute as the Undergraduate College, a Graduate School, and a College of Continuing Education. Hampton offers Baccalaureate degrees in 45 areas and Masters degrees in 15 areas. Hampton's original orientation was to serve Black Americans and American Indians. Historically, it has had a multi-ethnic representation of students but has remained a predominately Black institute. By the close of the 1980's, Hampton Institute had made a successful transition to Hampton University by greatly broadening the total academic program.

In 1979, Hampton established a Center for Marine and Environmental Studies within the School of Pure and Applied Science. The Center, housed in one of Hampton's newest buildings, was created in response to a perceived under-representation of minorities in the fields of marine and environmental science. Research proposals from the Center have been submitted to a number of Federal Government agencies including the National Oceanic and Atmospheric Administration, USEPA, U.S. Navy, and USGS. In 1984, a cooperative research project was begun with Hampton as a adjunct to USGS investigations of heavy-mineral resources on the Atlantic Continental Shelf. Specifically, the technical work was directed toward definition of the geologic framework, and qualification and quantification of heavy-mineral assemblages of selected offshore areas.

The initial phase of the cooperative project was directed toward the establishment of a laboratory at Hampton for analyzing core samples of marine sediments. This involved facility construction, acquisition of laboratory equipment, and training of staff members. With the financial support of the USGS, a 288-square-foot building was constructed adjacent to the Marine Science Building for storage, opening, and analysis of cores. Hampton University students and faculty came to the USGS National Center and were provided guid-

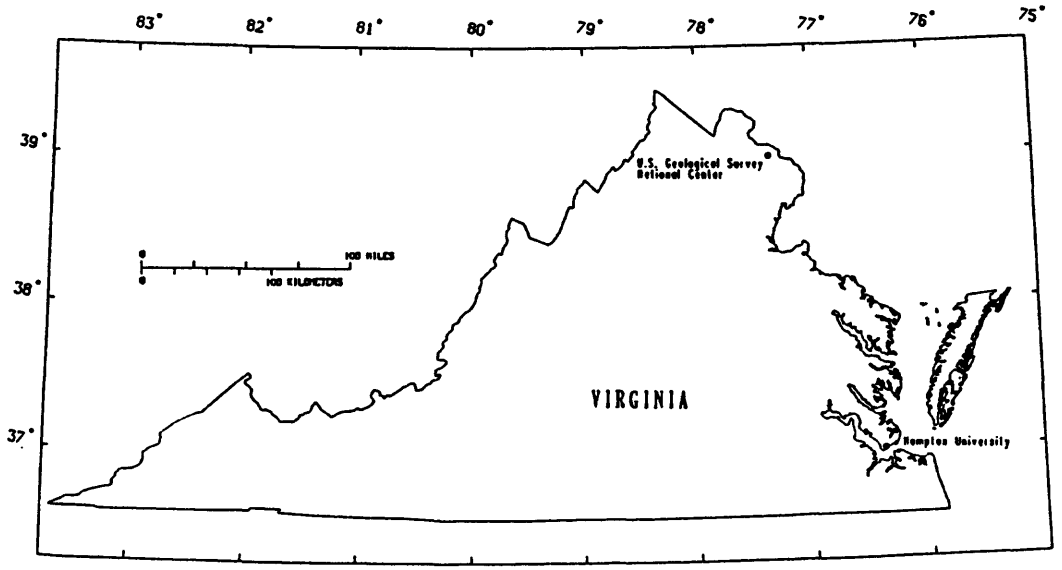

Figure 3.— Location of Hampton University and the U.S. Geological Survey's National Center.

ance, instruction, and briefings in technical areas. These included: Processing and analysis of marine-sediment cores, marine stratigraphy, heavy-mineral separation, fundamentals of mineral identification, mapping, and data-base management.

Subsequently, USGS personnel have worked with the Hampton staff to design laboratory facilities for analysis of sediment samples and separation of heavy minerals. The laboratory functions established in the Marine Science Building include facilities for spiral separation, magnetic separation, heavy-liquid separation, core photography, and data analysis.

The USGS scientific staff, Hampton students, and faculty have exchanged visits to maintain technical dialogue, exchange samples, and to keep the cooperative research work on course. Hampton University students have joined USGS personnel in the field to learn sample-acquisition techniques and to gather data for the heavy-mineral project. Students have used results of analytical work for this project to complete their degree requirements.

The project has resulted in completion of analyses of a series of cores from the Long Island Sound area and from offshore southern New Jersey. Depositional environments were defined, percentages of heavy minerals were determined, and mineral concentrates were prepared and provided to USGS for detailed mineralogic analysis.

Beginning in fiscal year 1989, USGS employees visited Hampton University to attend job fairs and interview potential full-time and cooperative-education employees from the computer-science department. The USGS employed two cooperative-education students from Hampton University as a result of these meetings. The students have worked in the

computer-visualization (graphics) and technology-assessment (research) fields. In addition, the USGS hired two Hampton graduates for full-time work in the areas of earth-science data-base maintenance and development, and computer-operating systems.

The site visits also were used to plan a guest-lecture series in the computer-science department. The USGS plans to begin the lecture series with a computer scientist speaking on the topic of object-oriented programming. Object-oriented programming has become the most popular programming model since structured programming. Data definitions and manipulation methods are programmed as a single object with this programming technique, thereby isolating these characteristics for easy modification. The planned lecture presents an overview of object-oriented programming, including definitions, a comparison with procedural programming, and possible applications. This is the first of several planned lectures tailored to the Hampton University curriculum.

Langston University

The Territorial Legislature established the Colored Agricultural and Normal University at Langston, Oklahoma in 1897 (fig. 4). The name was changed to Langston University in 1941. In the 1988-89 school year, 2,522 students were enrolled at the University and Black students were a large percentage of this enrollment.

In 1984, the USGS began a computer-science education program in cooperation with Langston University. The program provides modern computer equipment, guest lectures, and employment opportunities for students. The objective of the program is to enhance educational and employment opportunities for Langston students.

The USGS has installed a laboratory of computer hardware and software at the University (fig. 5). Students working in the laboratory can write and run computer programs on a 32-bit workstation that is interfaced with 11 terminals, 3 plotters, 2 printers, an optical scanner, and magnetic and optical disk drives. The equipment also is connected via dedicated communication circuits to a nationwide network of powerful minicomputers used by the USGS. Students use these minicomputers to learn about graphical, statistical, data-base management, and other types of computer programming.

Using the laboratory and the assistance of USGS employees, the University has added to its computer-science curriculum. Four new courses have been developed and taught: (1) Introduction to Scientific Computing, (2) Scientific-Data Management, (3) Applications of Computer Modeling, and (4) Seminars in Computer Applications. A computer programmer-analyst from the USGS Oklahoma District Office prepared and taught the first two courses during 1984-85. Two Langston faculty members received 2 weeks of training at the District Office during the summer of 1985, to prepare and refine the material presented in the four courses. Langston faculty subsequently have taught all four courses.

Guest lectures by USGS scientists have been an important part of the program. The guest-lecture series supplements the computer-science curriculum by providing the opportunity for students to learn from and to talk with researchers experienced at applying advanced computer technology to complex scientific problems. Guest lectures have been

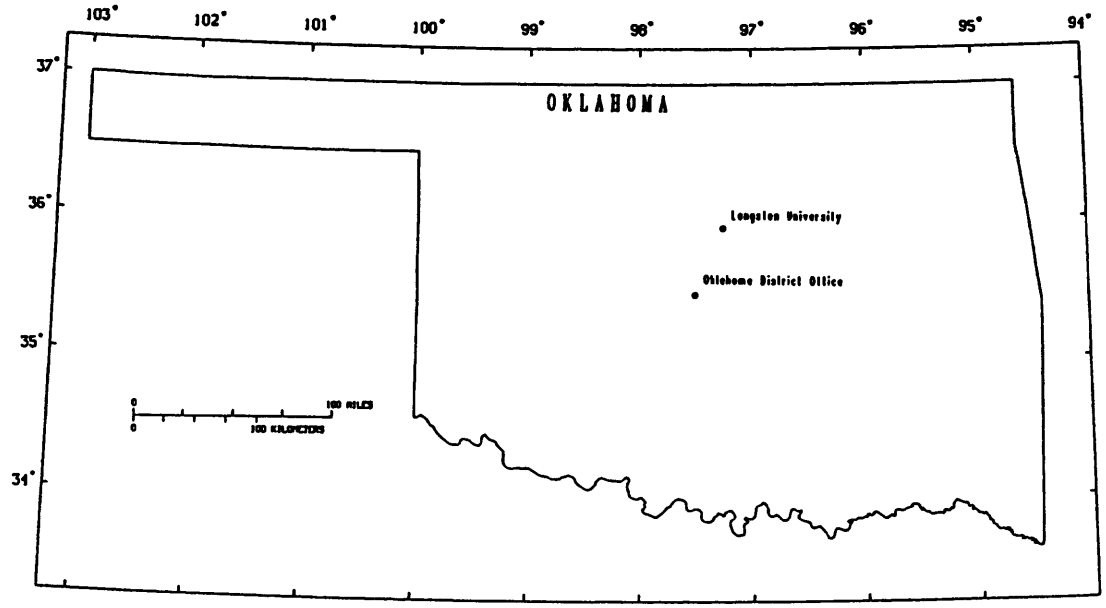

Figure 4.— Location of Langston University and the U.S. Geological Survey's Oklahoma District Office

presented on many subjects including elementary hydrodynamics, computer networking, computing technology trends, programming computerized graphics, and the economic analysis of computer-hardware acquisitions.

In 1989, the USGS provided funds for the purchase of a video camera, a video-tape player, and pre-recorded video-instruction courses for the University. These purchases have enabled the University to expand its curriculum in computer science without having to employ additional faculty.

The Langston faculty has been conducting research into the use of artificial-intelligence methods with assistance from the USGS. Artificial intelligence (AI) is a broad term for categorizing computerized methods for storing and utilizing the expertise and reasoning processes used by experts on a subject. Computer software that implements AI techniques can be used by persons with lesser experience in the subject to answer questions that would normally require expert consultation. The USGS provided faculty members with computers, software, and training in the use of AI. The professors have investigated methods for selecting AI software-development tools.

Other Federal Government personnel have served the University in a variety of ways. Dr. Dallas L. Peck, Director of the USGS, has encouraged cooperative activities. Mr. Louis Gallegos, Assistant Secretary of the U.S. Department of Interior, presented the commencement speech during the 1988 graduation ceremony. USGS employees have consulted with the Langston faculty during the preparation of project proposals, attended job fairs, and reviewed research papers.

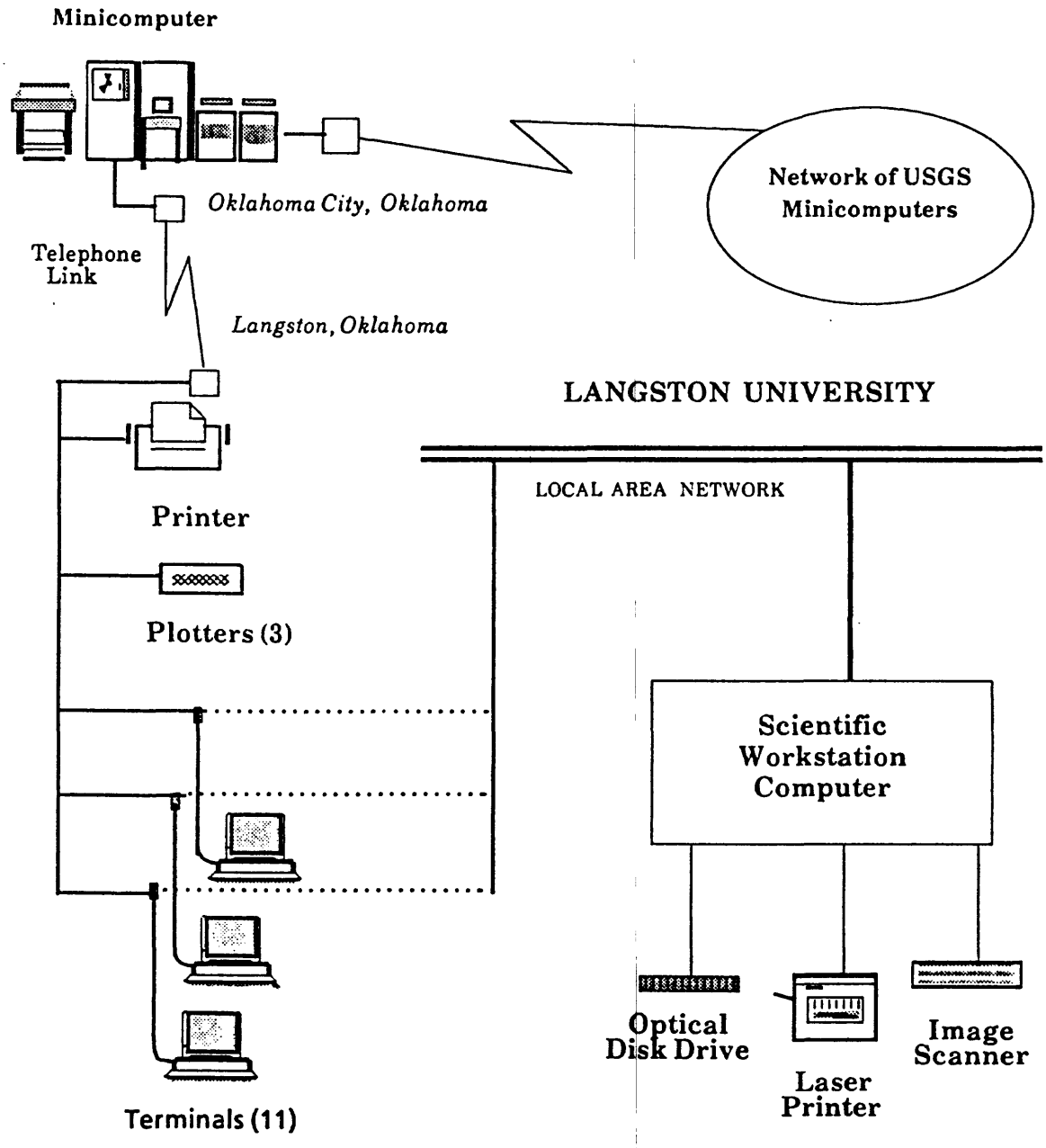

Figure 5.— Schematic diagram of the Langston University earth-sciences computer laboratory.

The USGS has employed many Langston students. Ten students have been employed part-time in the Oklahoma District Office while taking classes at the University. Some students have participated in a cooperative work-study arrangement in which alternate semesters are spent working and taking classes.

Four students have worked during the summer months as interns for the Distributed Information System Program, at the USGS Headquarters in Reston, Virginia. When the interns returned to the University in the fall, they helped manage the computer laboratory and assisted with teaching of the USGS-sponsored courses. One of these students received recognition and a cash award for his contribution to the development of a computerized streamflow-drought display.

Many students have benefitted from the training and experience and several have been accepted for graduate-education programs. Others have entered the work force, often at salaries significantly greater than those normally obtained by inexperienced computer-science graduates.

The program also has been beneficial to Langston University. According to Dr. Ernest L. Holloway, University President, the program has been "instrumental in helping to attract the high caliber of students that we strive to enroll at Langston." The USGS has benefitted by having the opportunity to work with these students, and to use the students' skills while conducting earth-science studies.

Mr. Charles D. Nethaway, Chief of the Distributed Information Program and project chief of the USGS's Langston program, stated that "the relationship between Langston University and the USGS has been especially beneficial to the HBCU students. It has given them the chance to see and use real-world, on-the-job advanced computer technology being put to practical use by real-world, on-the-job scientists."

Secretary of the Interior Mr. Manuel Lujan, has stated that the USGS's program at Langston Unversity "could serve as a model for other branches of the Federal Government that are trying to set up a viable HBCU program. It is a positive indication that the Federal Government and historically black schools are capable of working together to provide crucial opportunities to America's minorities."

CONCLUSIONS

The U.S. Geological Survey has demonstrated a commitment to working with Historically Black Colleges and Universities. The USGS's activities have been channeled into the five categories described in this report: Making site visits, providing employment opportunities, assisting with curriculum development, hosting seminars, and sponsoring research. Through these activities, the USGS has furthered its mission and, at the same time, has helped HBCU's. The USGS has pursued its mission by using employees hired from HBCU's, by providing a pool of employable graduates, by coordinating earth-science research, and by hosting technology-transfer seminars.

HBCU's will obtain additional benefits from continuing USGS assistance. Future efforts are likely to continue in the same five categories mentioned above. Additional outreach efforts might include: (1) Expanding existing activities to HBCU's not previously contacted, (2) providing greater availability of guest lecturers from the USGS, and (3) consulting with HBCU's to aid in the preparation of research proposals for funding from other sources.

APPENDIX.—U.S. Geological Survey liaison offices for Historically Black Colleges and Universities

HBCU representatives are encouraged to contact USGS representatives to obtain additional information and to explore opportunities for cooperative activities. The USGS has established HBCU-liaison offices, which are listed below, for each of its operating divisions. Individuals seeking information about employment opportunities should contact the job-placement office at their school, the Federal Office of Personnel Management, or the USGS Administrative Division liaison office.

Liaison office	Telephone	Address
Administrative Division	(703) 648-6131	215 National Center Reston, VA 22092
Information Systems Division	(703) 648-7169	802 National Center Reston, VA 22092
Geologic Division	(703) 648-6628	912 National Center Reston, VA 22092
National Mapping Division	(703) 648-4571	510 National Center Reston, VA 22092
Water Resources Division	(703) 648-5244	406 National Center Reston, VA 22092