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**Environmental Hazards Assessment Program
at the Medical University of South Carolina**

**Needs Assessment for the
Proposed Masters Degree Program
in Environmental Science**

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**NEEDS ASSESSMENT
FOR THE PROPOSED MASTERS DEGREE PROGRAM
IN ENVIRONMENTAL SCIENCE
AT THE
MEDICAL UNIVERSITY OF SOUTH CAROLINA**

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INTRODUCTION

There will be a critical shortage of professionals who are educated to deal with environmental problems by 1997. This was the major finding of a 1992 study conducted by the Oak Ridge Associated Universities, Incorporated and the Pacific Northwest Laboratory (Publication Number PAL- 8171, CU-700). The study was done to determine the manpower needs of the Office of Environmental Restoration and Waste Management in the US Department of Energy (DOE). Although the focus of the study was the 19 sites of the DOE complex, including the Savannah River Site in South Carolina, the study documented that such shortages will affect other major agencies and organizations including the US Department of Interior, the US Department of Defense, the Environmental Protection Agency, state and local governmental agencies, private agencies, and manufacturing enterprises throughout the State of South Carolina and the Nation. The Oak Ridge Study also documented that a variety of professional positions requiring environmental expertise are difficult to fill because traditional educational programs in physical science, engineering, health science, public policy, and administration have not adequately responded to the unique nature of these emerging specialties. This lack of educational preparation has necessitated extensive on-site training of new employees before they can become productive members of the environmental work force. Unique educational initiatives such as the Environmental Studies program proposed here are vital to address the long-term demand for environmental professionals.

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PROSPECTIVE STUDENT POOL

The interdisciplinary nature of the Environmental Studies program proposed by MUSC and UCSC will attract applicants with baccalaureate degrees in the health sciences, physical sciences, biological sciences, engineering, education, and public policy. Employment opportunities for new graduates and job advancement for professionals employed in environmental occupations will be key factors in attracting qualified applicants. To be a graduate of a formal educational program specific to environmental science and policy will give graduates a competitive advantage when seeking employment since such education is rare.

There are approximately 1,100 baccalaureate degrees in science and engineering awarded annually in the State of South Carolina (Statistical Abstracts, SC Commission on Higher Education, Edition 14). In the Charleston area, the College of Charleston and The Citadel annually award approximately 245 baccalaureate degrees in these disciplines. Projected population increases, combined with state and national efforts directed at increasing science and mathematics competency in schools, will result in projected increases of 15% - 20% of the science and engineering degrees by the year 2000. Graduates with these degrees will form a pool of prospective applicants to the Environmental Science program.

The desire for graduate education among employees of area businesses was documented in the 1989 study conducted by the Charleston Higher Education Consortium. Of 3200 employees responding to the survey, 33% indicated an interest in pursuing a higher degree.

Public and private school teachers, especially those who teach mathematics and biological and physical sciences, form a second applicant pool. Currently, approximately two-thirds of the about 205 Science/Math teachers high school teachers in Berkeley, Charleston, and Dorchester counties do not hold a Master's degree, and most of the earned Master's degree are in education. There are limited Master's degree options locally for degrees in the biological or physical sciences. At the same time, there is every indication that the science of the next decades will strongly emphasize environmental issues and that K-12 students will expect from their teachers substantive knowledge in this area. It is, therefore, to be anticipated that the Environmental Studies program will be an attractive option for science teachers who do not possess graduate degrees.

According to the 1989 Charleston Higher Education Consortium survey, approximately 67% of teachers with baccalaureate degrees would pursue graduate education if programs were available locally and if classes were offered primarily during evening hours. This is understandable because the graduate degree would promise personal reward in terms of promotions and salary increases. It would also provide greater job flexibility for the individual, given the increased demand for teachers with expertise in the environmental arena. Even a very conservative interpretation of this survey implies that a considerable number of teachers would constitute this second applicant pool.

Most of the science teachers would actually meet the admission requirements of the proposed program, but it is recognized that some applicant teachers may have deficiencies even if they are science-certified. It is noted that all course prerequisites can be satisfied locally through the College of Charleston or other institutions of higher education. Every effort will be made to assist qualified applicants in their preparation for entering the program.

In addition, a proviso is included in the admission procedure allowing exceptions to be made on a case by case basis depending on a candidate's background or experience.

Graduate education in Environmental Studies would provide an extraordinary opportunity for South Carolina to increase substantially the scientific competency of teachers, which is congruent with the national mandate. Additionally, the students of such teachers would develop an awareness of environmental issues and an interest in pursuing careers focused on these concerns, thus naturally initializing the "K-12 pipeline" toward higher education in Environmental Studies.

We will work closely with the school systems as part of our recruitment effort to assure that all science/mathematics teachers are fully informed about this new graduate education opportunity and its benefits to their career development.

A third pool of prospective students consists of professionals currently employed in agencies and organizations with an environmental facet. In a survey conducted in Fall, 1992, the following organizations indicated an interest in having some of their employees participate in an Environmental Science educational program: The Army Corps of Engineers, SC Coastal Council, SC Marine Resources, SC Ports Authority, the Charleston Aquarium, and the Charleston Soil and Water Conservation District. The combined response of these agencies documented that approximately 30-35 employees would participate annually in the proposed graduate program, either as degree candidates or as part-time non-matriculated students.

EMPLOYMENT OPPORTUNITIES FOR GRADUATES

Projections for employment in both the short-term (5-10 years) and the long-term (10-15 years) show an increased demand for individuals with graduate degrees in areas with an environmental specialization, including scientific, engineering, and management areas. Representatives of the Army Corps of Engineers, SC Coastal Council, SC Marine Resources, SC Ports Authority, the Charleston Aquarium, and the Charleston Soil and Water Conservation District have indicated that graduates of the MUSC/UCSC Environmental Studies program would be strongly and uniquely qualified to fill a variety of positions requiring environmental expertise. These agencies indicated that they would offer a combined total of 8-12 new positions annually in the Charleston area for individuals with graduate degrees in environmental studies.

Graduates of the program will also have excellent employment opportunity in the Savannah River Site and through out the State of South Carolina as discussed in the following paragraphs.

The South Carolina Employment Security Commission, through its Labor Market Division, provides long-term employment projections by occupation. Table 1 presents projected employment growth in South Carolina for positions for which the graduates of the MUSC/UCSC Environmental Studies Program would be qualified. These projections indicate an average of 611 new positions annually, through the year 2000. In addition to these positions, other employment opportunities exist in education and public policy agencies both in South Carolina and nationally. Individuals who have advanced degrees and preparation in environmental specialties will have a competitive advantage in these job markets.

TABLES

**Table 1: EMPLOYMENT PROJECTIONS
For Selected Occupations in the State of South Carolina**

Occupation	1990 Estimated Employment	2000 Estimated Employment	Percent Change	Annual Growth	Separations	Openings
Selected Engineers						
Areas:						
Chemical	1,573	1,955	+24.3	38	37	75
Civil	3,693	4,529	+22.6	84	79	163
Safety	365	449	+23.0	8	8	16
Marine	195	284	+45.6	9	5	14
Scientists:						
Chemists	1,335	1,630	+22.1	30	42	72
Geoscientists	281	355	+26.3	7	9	16
Conservationists	218	213	- 2.3	-1	7	6
Biologists	502	595	+18.5	9	16	25
Systems/ Computers/Math	3,354	4,789	42.8	144	22	166
Operations/Research	209	340	+62.7	13	2	15
Inspectors/Compliance Officers	1,479	1,689	+14.2	21	22	43
TOTALS	13,204	16,828	+27.5	362	249	611

Source: 1992 Report of the Employment Security Commission

The manpower assessment study cited projects a minimum increase of 45% over the present work force during the next 5 years. This increase in manpower requirements is for the 19 DOE sites and its contractor-operated facilities. The Savannah River Plant in SC, together with its major contractor-operated facilities (Bechtel SR Company, Westinghouse SR Company, US Forest Service at Savannah River, Wackenhut Service, and the University of Georgia) are regarded as a major DOE site. Table 2 presents the projected manpower needs for selected occupations for which the graduates of the Environmental Studies Program would be qualified at the DOE sites. Depending upon the area of specialization, approximately 25%-35% of the anticipated manpower will be at the Savannah River Site.

**Table 2: MANPOWER NEED PROJECTIONS FOR 1997
In Environmental Restoration and Waste Management
of the Department of Energy (Selected Occupations Only)**

OCCUPATION	CURRENT FTE	GROWTH FTE	ANTICIPATED FTE
Environmental Engineers	288	515	803
Environmental Scientists	100	200	300
Waste Management Engineers	77	214	291
Health Physicists	70	102	172
Risk Assessment Managers	36	50	86
Biologists	22	45	67
Statisticians/Mathematicians	29	34	63
Chemists	112	371	483
Operations Research Specialists	7	7	14
Hydrogeologists	67	132	199
Geologists	29	191	220
TOTAL	837	1861	2698

Note: These figures, which are extracted from Table 3.5 of the DOE document No. PNL-8171/UC-700, represent occupations requiring B.S. and advanced degrees for which the graduates of the proposed Environmental Studies program would qualify.

The Occupational Outlook Handbook published by the US Department of Labor and Bureau of Labor Statistics, 1992 Edition, provides projections for employment and salary data as presented in Table 3. This table contains selected representative occupations for which graduates of the Environmental Studies Program would be prepared and would possess a competitive advantage due to the unique interdisciplinary nature of the proposed program.

Table 3: JOBS AND SALARY EXPECTATIONS
Projected Growth Within the Time Frame: 1990-2005

OCCUPATION	PROJECTED GROWTH	1992 AVERAGE STARTING SALARIES WITH MASTERS
Biological Sciences	25-34%	\$26,800
Geologists	14-24%	26,500
Operations Research Analyst	35%+	30-35,000
Statisticians/Mathematicians	5-13%	32-36,000
Civil & Environmental Engineers	25-34%	32,000
Inspectors & Compliance Officers	25-34%	29,500

In summary, the Environmental Studies Program proposed by the Medical University of South Carolina and the University of Charleston is expected to draw upon a rich pool of potential applicants from graduates of local and state-wide baccalaureate programs and from individuals already employed in education or environmentally related occupations. Employment opportunities for graduates of the Environmental Studies Program will be plentiful due to the regional location of many government agencies and private organizations and businesses with needs for professional personnel with environmental expertise. The graduates of this program will have a competitive advantage due to the interdisciplinary and collaborative structure of the program in an emerging discipline where few formal educational programs exist today.

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