

ENVIRONMENTAL EDUCATION AND DEVELOPMENT

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ABSTRACT

The U.S. Department of Energy (DOE) Environmental Education and Development Program came into being following the Department's realization that, if it was going to be able to fulfill its Environmental Restoration and Waste Management goals, it would have to ensure that a sufficient number of trained and educated personnel would be available to develop and to implement solutions to environmental problems, both in the U.S. and abroad. The DOE also recognized that to do this, we need to develop and to participate in science, mathematics, engineering, and environmental education.

MISSION

The DOE has three components to its environmental restoration and waste management (ER/WM) educational mission. First, we want to *retain* and *retrain* the talented pool of people currently working for DOE and its contractors. This invaluable human resource assured that our Nation maintained a credible nuclear deterrent. We are once again calling upon these people to help our Nation maintain its quality of life and to improve the quality of life of other countries by restoring our planet to a state of environmental balance.

Secondly, we want to assist our academic institutions in developing a *pipeline* for the future ER/WM work force. The DOE has a direct stake in the quality and distribution of environmental education in our Nation. By every measure, our schools are failing to produce, in sufficient quantities, scientifically and environmentally literate graduates. Student achievement in mathematics and science is unacceptably low. Too many young people lack the preparation they need to advance to higher education and to careers in environmental and technical fields. Too few teachers receive training of the depth and currency required to deliver environmental instruction in a way that sparks student interest. The DOE is making a unique contribution through the use of its facilities and human resources. DOE laboratories and facilities have opened their doors to surrounding schools and communities; developed ER/WM programs for students and teachers; encouraged volunteerism and community service from their employees; and collaborated with the business sector, universities, school districts, other laboratories, science-technology centers, and community groups in order to improve environmental education.

Third, we want to create public awareness through *environmental literacy*. Public knowledge of scientific and technical environmental subjects is alarmingly inadequate in light of the complex environmental issues our Nation and planet face. Our Nation must be able to rely upon a scientifically, technologically, and environmentally informed citizenry to help chart a course for public environmental policy. We want our citizens to understand and to derive excitement from confronting the new frontiers in ER/WM. We want our citizens to appreciate their new ER/WM knowledge and their potential for bettering society and the world.

GOALS

The DOE wants to become the model to be followed in addressing, nationally and internationally, environmental

problems. Therefore, DOE has two bottom lines. One is to play a major role in supplying a work force to achieve and to assure environmental regulatory compliance in this country. The second is to supply the technical expertise needed in other countries to help them address their environmental problems. To achieve its goal, DOE has become involved in environmental education.

NEED

The need is obvious. The DOE needs to have trained personnel to clean up all of its facilities by the year 2020 and to assist other countries in remediation of their environmental problems. To do this, the DOE has adopted a new way of thinking. We recognize the environmental education initiatives represent a change in the mission for the DOE. The DOE must enter into a dialogue with the public about the environmental actions it purposes to do and then factor the public's comments into the decision making process.

The DOE realizes peoples' perceptions are just as important as the realities of the situation. The DOE needs to gain the respect and trust of the American public by providing timely and accurate information regarding the actions it takes to respond to environmental laws.

STRATEGIES

The DOE has excellent resources and program models that have been little known for too long. By 1996, these programs will be more visible. The DOE will have completed a training needs assessment for each DOE facility in need of cleanup, adapted existing educational programs and developed new programs to meet defined work force needs, reassessed training needs as cleanup technologies develop, and reviewed job categories for specialized training needs. These preliminary actions will have set the tone for addressing current work force needs.

To address future work force needs, by 1996, the DOE will not only have completed a manpower needs assessment; but also developed, implemented, institutionalized, and expanded additional *pipeline* programs that focus on women and minorities; and begun to include non-technical program support such as ER/WM law, policy, and economics.

By 2020, it is projected that DOE's environmental education programs will have produced the work force needed to meet DOE's environmental problems. Waste operations will be in place at every DOE site to treat/store/ dispose/reuse all hazardous wastes, and all necessary remedial actions will be implemented.

Internationally, by 2020 we plan that the DOE will have collaborated with and exchanged technologies and expert ER/WM personnel with other countries to address the changing environmental market and technologies. International environmental legislation will have been influenced by DOE policy and personnel.

ACCOMPLISHMENTS TO DATE

Academic Partnerships-Post Secondary

The Waste-Management Education and Research Consortium (WERC) is the world's first consortium of universities and national laboratories formed specifically to address waste management issues. The consortium's activities are designed to expand our nation's resources to address problems in both the public and private sectors associated with waste management. The consortium, located in New Mexico, includes New Mexico State University, the University of New Mexico, New Mexico Institute of Mining and Technology, Navajo Community College, and Los Alamos and Sandia National Laboratories. The consortium has reached 400 undergraduate and graduate students and 100 faculty members with its environmental education programs during the past 2 years.

One component currently being pursued within WERC is the Environmental Fellows Program. This program has strong Congressional support and has proposed to focus on training ER/WM personnel in Mexico to address the serious air, solid, and hazardous waste problems in Mexico.

The major universities in South Carolina have joined in a consortium identified as the South Carolina Universities Research and Education Foundation (SCUREF). This consortium provides significantly enhanced technical expertise to support the activities of the DOE Savannah River Site in fulfilling its mission, especially in the fields of ER/WM. The consortium, together with Westinghouse, a DOE management and operating contractor for the Savannah River Field Office, has formed a pilot center. This center addresses the ER/WM issues through mission-oriented research efforts and through the education of the next generation of scientists, engineers, and technologists required to meet the State's and Nation's needs for sound technical solutions to ER/WM problems. The key initiatives encompassed within the pilot center are (a) a program of education and training including a graduate degree program, curriculum enhancement and programs of outreach to the educationally disadvantaged; (b) a Distinguished Scientists Program; (c) technology transfer; (d) user facilities to encourage large-scale demonstrations of ER/WM technology by university/industry partnerships; and (e) research and development to address ER/WM problems at the Savannah River Site.

The Historically Black Colleges and Universities and Minority Institutions (HBCU/MI) Environmental Technologies and Waste Management Consortium has entered into a 5 year agreement with the DOE. The purpose of the agreement is to infuse an ER/WM focus into existing curriculums at the consortium's 17 institutions and to increase the participation of minority and educationally disadvantaged students in ER/WM related technologies. The consortium's primary focus on pre-college, post-secondary, and undergraduate educational components includes curriculum development, student and faculty development, and outreach activities. Consortium members are located throughout 11 states from

the District of Columbia to northern Arizona. The consortium has reached 22,000 students, 137 teachers, and 121 faculty members with programs in curriculum and faculty development, recruitment, and retention during the past 2 years.

The DOE has found academic partnerships to be a successful component in fulfilling our mission.

CURRENT WORK FORCE

We have already begun the process of *training, retraining* and *retaining* the current force of motivated, competent, responsible workers by providing them with instruction designed to develop and/or improve their job performance skills. Our current employees are becoming more efficient and effective in operating DOE facilities in compliance with the Nation's environmental laws and regulations. For that we are thankful, and we are encouraged that our mission will become easier with time.

The DOE has identified 5 areas of training specific to ER. They are:

- Statutory/Regulatory/Administrative Issues
- Human Health and Environmental Assessment
- Technical Issues, relevant to ER/WM
- Community Relations
- Emergency Response

Our training needs assessment is already underway by our Field Offices and contractors, but progress is uneven across the DOE complexes. This unevenness arises because problems and needs are different at each site, manpower resources vary, training records are dissimilar, and data bases are incompatible. However, our preliminary manpower assessments have revealed that shortages of scientists, engineers, and technicians are site specific. In other words, shortages are not DOE-wide. The 5 fields of expertise that are in high demand are chemical engineers, environmental engineers (radionuclide), project managers, safety engineers (radionuclide), and health physics technicians. The DOE finds it still needs the same people that possess solid, basic science and technology skills, but the reorientation occurs in *knowing* how to apply the environmental regulations to their specific task. We believe training needs to be centralized on environmental regulations.

FUTURE WORK FORCE

The DOE will continue to produce a set of projects that will help the Nation encourage women, minority, and handicapped students to pursue mathematics and science courses and careers. The number of underrepresented minorities, females, and persons with disabilities pursuing science and mathematics professions is so low that it is the first order of business to increase those numbers. The ability to increase the mathematics and science competency of our ever-increasing minority population, and the ever-increasing numbers of female and disabled persons entering the work force, will require the coalescing of adequate resources to compensate for current deficits. The DOE has taken the following action to significantly increase the numbers of female, minority, disabled, and disadvantaged students who will complete a K-12 education program, advance to the highest levels of mathematics and science education, enter careers in mathematics and science education, and complete teaching programs in these fields.

Students Watching Over Our Planet Earth (SWOOPE) is a hands-on environmental science education pilot program. The primary focus of SWOOPE is to inspire students to pursue environmental sciences, to train teachers in the scientific area and in the use of hands-on equipment in the classroom, and to raise the general level of scientific literacy in the family and community. SWOOPE students use discovery kits to gather environmental data in their communities. Collected data is then returned to Los Alamos National Laboratory for analysis and use in a student newsletter. The discovery kits used in SWOOPE are: radiation and radon, map reading, and water quality. The SWOOPE program has reached 5000 students and 110 teachers during the past 2 years. The program will soon be piloted in Washington, DC at 3 inner city schools in conjunction with the Environmental Protection Agency (EPA).

Interagency cooperation is underway between the DOE and the EPA to assure nationwide institutionalization of the SWOOPE project.

The DOE will be entering into cooperative agreements with community colleges located in the near vicinity of DOE sites that require ER/WM remediation. The goals and objectives are (a) to increase the work force available to DOE and DOE contractors with 2-year certified or Associate of Arts/Sciences degrees specializing in ER/WM, (b) to increase the participation of female, minority, disabled, and educationally disadvantaged groups in ER/WM career areas, and (c) to retrain existing DOE and DOE contractor personnel for new positions in ER/WM.

The DOE anticipates these ER/WM trained technicians will infiltrate into the industrial sector to benefit all communities in their cleanup efforts.

The DOE will be providing undergraduate scholarships to Native Americans pursuing science, mathematics, or engineering credentials in the occupational areas of ER/WM. The DOE is already involved in assisting Native American people remedy ER/WM problems on their reservations through a WERC project on the Navajo Reservation titled, "Navajo Dryland Environments Laboratory". The DOE hopes to continue to assist Native American people in this capacity.

ENVIRONMENTAL LITERACY

Environmental literacy means knowing enough about science and the environment to understand how to protect it. An environmentally literate citizen will be familiar with EM education and career opportunities, as well as with basic principles of radioactivity, risk and risk management, waste management, and other science and environmental issues.

The Environmental Literacy Program aims to put the right message before the right audience at the right time.

Educating the general public about EM makes good sense for two reasons. First, EM's mission requires vast human resources: Environmental Literacy initiatives let the public know EM manpower needs. Second, DOE has embraced a new public openness to which the Secretary is particularly committed.

An environmentally literate public can yield positive results for all. Environmental literacy leads to better decision making because public participation is required in many cleanup situations. A knowledgeable citizen is a valuable participant.

In developing its Environmental Literacy Program the DOE has already begun:

- Informational Materials ("EM: An Introduction")
- Working with the Popular Media (DOE sponsored a PBS show along with IBM and ARCO)
- Science Newsletters Published by EM

SIGNIFICANT ACHIEVEMENTS

The Academic Partnerships of WERC, HBCU/MI, and SCUREF have reached 22,000 students, 220 faculty members, and 210 teachers.

Scholarships and fellowships have reached 100 undergraduates, 50 graduates, and 12 faculty members.

Pre-college Outreach has reached 44,000 students and 1400 teachers.

These numbers are especially impressive because our ER/WM educational initiatives have been in existence only 2 years. We are determined to expand the number of students and teachers we touch.

SUMMARY

Business, industry, and government need to do a great deal to get the American people *interested* in things scientific, *enthusiastic* about engineering, and *excited* about the opportunity to contribute to the technological solutions to the environmental problems we face. The DOE will be doing its part. Obviously, we are only one bridge between America's scientific educational issues and an increasingly needy world's cry for environmental expertise and harmony. But, the DOE is optimistic about the potential created when solving environmental problems. Just think of the opportunities that are being generated to develop untapped human resources and new technologies. We *can* solve our Nation's and the world's environmental problems: the DOE is dedicated to this end.