Office of Energy Research

Notice 96-10
Environmental Management Science Program

Department of Energy
Office of Energy Research and
Office of Environmental Management

Energy Research Financial Assistance Program Notice 96-10; Environmental Management Science Program

AGENCY: U.S. Department of Energy (DOE)

ACTION: Notice inviting grant applications

SUMMARY: The Offices of Energy Research (ER) and Environmental Management (EM), U.S. Department of Energy, hereby announce their interest in receiving grant applications for performance of innovative, fundamental research to support the management and disposal of DOE radioactive, hazardous chemical, and mixed wastes.

This basic research should contribute to environmental management and restoration actions that would decrease risk for the public and workers, provide opportunities for major cost reductions, reduce time required to achieve EM s mission goals, and, in general, should address problems that are considered intractable without new knowledge. This program is designed to inspire "breakthroughs" in areas critical to the EM mission through long- term research and will be managed in partnership with ER. ER's well-established procedures, as set forth in the Energy Research Merit Review System, as published in the Federal Register, March 11, 1991, Vol. 56, No. 47, pages 10244-10246, will be used for merit review of applications submitted in response to this notice.

DATES: Potential applicants are strongly encouraged to submit a brief preapplication. All preapplications, referencing Program Notice 96-10, should be received by DOE by 4:30 P.M. E.S.T., February 28, 1996. A response discussing the potential program relevance of a formal application generally will be communicated to the applicant within 15 days of receipt. The deadline for receipt of formal applications is 4:30 P.M., E.D.T., May 8, 1996, in order to be accepted for merit review and to permit timely consideration for award in fiscal year 1996.

ADDRESSES: All preapplications, referencing Program Notice 96-10, should be sent to Ms. Bobbi Parra, Office of Health and Environmental Research, ER-74, U.S. Department of Energy, 19901 Germantown Road, Germantown, Maryland 20874-1290, 301-903-3316, fax 301-903-8519, or by the internet email address bobbi.parra@oer.doe.gov.

After receiving notification from DOE concerning successful preapplications, applicants may prepare formal applications and send them to: U.S. Department of Energy, Office of Energy Research, Grants and Contracts Division, ER-64, 19901 Germantown Road, Germantown, Maryland 20874-1290, Attn: Program Notice 96- 10. The above address for formal applications must also be used when submitting formal applications by U.S. Postal Service Express Mail, any commercial mail delivery service, or when hand carried by the applicant. Please note that notification of a successful preapplication is not indication that an award will be made in response to the formal application.

It is anticipated that up to $20,000,000 will be available for grant awards during FY 1996 that will enable innovative fundamental research contingent upon the availability of appropriated funds. Multiple-year funding of grant awards is expected and is also contingent upon the availability of funds. Award sizes are expected to be on the order of $100,000 - $300,000 per year for total project costs for a typical three year grant.

FOR FURTHER INFORMATION CONTACT: Dr. Michelle Broido, Office of Health and Environmental Research, ER-74, Office of Energy Research, 19901 Germantown Road, Germantown, Maryland 20874-1290. Telephone: (301) 903-3281, or Dr. Carol Henry, Office of Science and Risk Policy, Office of Environmental Management, 1000 Independence Ave. SW, Washington, D.C. 20585, Telephone:(202) 586-7150.

SUPPLEMENTARY INFORMATION: The Office of Environmental Management, in partnership with the Office of Energy Research, is initiating an Environmental Management Science Program to fulfill DOE's continuing commitment for the cleanup of DOE's environmental legacy. Funding to initiate this program was established in the Conference Report accompanying the FY 1996 Energy and Water Development Appropriation Bill.

Purpose

The need to build a stronger scientific basis for the Environmental Management effort has been established in a number of recent studies and reports. Among the important observations and recommendations made by the Galvin Commission (Alternative Futures for the Department of Energy National Laboratories, February 1995) are the following:

There is a particular need for long term, basic research in disciplines related to environmental cleanup... Adopting a science-based approach that includes supporting development of technologies and expertise... could lead to both reduced cleanup costs and smaller environmental impacts at existing sites and to the development of a scientific foundation for advances in environmental technologies.

The objectives of the basic science program are to:

Provide scientific knowledge that will revolutionize technologies and clean-up approaches to significantly reduce future costs, schedules, and risks; and Bridge the Gap between broad fundamental research that has wide-ranging applicability such as that performed in DOE s Office of Energy Research and needs-driven applied technology development that is conducted in EM s

Office of Science and Technology; and Focus the Nation s science infrastructure on critical DOE environmental management problems.

Representative Research Areas

Basic research is solicited for areas of concern to the Department's environmental management programs including but not limited to: chemical characterization of wastes and contaminants on an atomic and molecular level; development of knowledge of the physical and chemical behavior of such species; physical and chemical basis for waste separations and treatment; characterization and modeling of multi-phase chemical systems in natural systems, waste tanks and process streams; and monitoring, controlling, and assessing these processes. Understanding the fate of contaminants already in the environment includes the identification of the biological and geochemical reactions that sequester or degrade contaminants; understanding colloids or complexes of associated contaminants; and quantifying the impacts of geologic heterogeneity on the effectiveness of various remediation strategies. Indirect characterization of the geological environment by geophysical techniques provides the basic structural information essential in planning and monitoring remedial actions. Also important are studies to characterize flow and reactive transport through fractured and porous rocks and soils, and to characterize the physiological, biochemical, and genetic mechanisms for the uptake, transport, and sequestering of inorganic ions and organic molecules related to the use of plants and microorganisms for the cleanup of hazardous wastes.

Advances in information and monitoring technologies will also allow evaluation of progress in addressing these problems and devising new solutions. In the future, the focus will be on increasing efficiency in terms of materials and energy use. Better means of monitoring and controlling present system operations will significantly improve process efficiency and reduce waste outputs.

Specific examples illustrating the general subject areas, above, are found in the background section of this document.

Applicants in this program are strongly encouraged to collaborate with researchers in industry and/or the DOE National Laboratories, when appropriate, and to incorporate cost sharing and/or consortia wherever feasible. Grant applications are encouraged from all disciplines.

Merit Review and Evaluation Criteria

Formal applications will be subjected to formal merit review (peer review) and will be evaluated against the following evaluation criteria codified at 10 CFR 605.10(d).

1. Scientific and/or Technical Merit of the Project
2. Appropriateness of the Proposed Method or Approach
3. Competency of Applicant's Personnel and Adequacy of Proposed Resources
4. Reasonableness and Appropriateness of the Proposed Budget

Examples of the considerations associated with determining the scientific and/or technical merit of the project include, but are not limited to:

- Potential for addressing problems identified by DOE, with meaningful progress within the proposed time frame.
- Benefits and merits of an application e.g. public purpose, time savings, extent of applicability, cost and risk reduction.

DOE shall also consider, as part of the evaluation, program policy factors such as an appropriate balance among the program areas.

Note, external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of- interest issues. Non-federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

Preapplications:

The brief preapplication, in accordance with 10 CFR 600.10(d)(2), should consist of two to three pages of narrative describing the research objectives and methods of accomplishment together with a brief summary of the principal investigator s publication and research background. The preapplications will be reviewed relative to the scope and research needs of the DOE's Environmental Management Science Program by qualified DOE program managers from both ER and EM. Telephone and FAX numbers are required parts of the preapplication, and electronic mail addresses are desirable.

Information:

Information about the development, submission of applications, eligibility, limitations, evaluation, the selection process, and other policies and procedures may be found in 10 CFR Part 605, and in the Application Guide for the Office of Energy Research Financial Assistance Program. The Application Guide is available from the U.S. Department of Energy, Office of Energy Research, ER-74, 19901 Germantown Road, Germantown, Maryland 20874-1290. Telephone requests may be made by calling (301) 903-3316. Electronic access to ER's Financial Assistance Application Guide is possible via the World Wide Web at: http://www.er.doe.gov/production/grants/grants.html.

Background

The justification for such a program is grounded in the long-term costs for the Environmental Management program estimated at $200 -350 billion over 75 years; in 10 years at current budget projections, $60 billion will have been spent, with over two thirds of the program yet remaining. This is the largest legacy from the Cold War of any other Federal program, dwarfing the Department of Defense s DOD s legacy by ten-fold. The Office of Environmental Management is responsible for waste management and cleanup of DOE sites. The EM operations have been historically compliance-based and driven to meet established goals in the shortest time possible

using either existing technologies or those that could be developed and demonstrated within a few years. The Office of Energy Research addresses fundamental, frequently long-term, research issues related to the many missions of the Department. The Environmental Management Science Program will use ER's experience in managing fundamental research to address the needs of technology breakthroughs in EM's programs.

This research agenda has been initiated for Fiscal Year 1996, along with a development process for a long term program within the Office of Environmental Management, with the objective of providing continuity in scientific knowledge that will revolutionize technologies and clean-up approaches for solving DOE s most complex environmental problems.

Specific examples of areas of interest for research under this solicitation are:

Advanced characterization methods that accelerate treatment and immobilization of high-level wastes. Pretreatment and separation methods that lead to a significant reduction in the amount of immobilized high-level waste requiring long-term isolation. Innovative separations for solids and for liquids, needed to significantly reduce projected high-level waste volume.

In-situ characterization of dense non-aqueous phase liquid to allow comparative risk assessments of alternative treatment methods. In situ immobilization of subsurface contaminants to reduce pump and treat costs. Permeable in situ treatment barriers and factors governing in situ treatment processes to replace unsatisfactory, extant alternatives for treatment of large plumes. Degradation and extraction methods for radioactive and hazardous contaminants from soil/water. Dissolution of water-soluble sludge; washing of water soluble sludge, with recovery of cesium, strontium, technetium.

Characterization of heterogeneous wastes needed to optimize decontamination and decommissioning recycling alternatives. Surface stabilization to reduce the ultimate waste volume and to enhance recycling. Selective and non-selective removal of contaminants from surfaces or bulk materials. Recycling of valuable commodities into general commerce.

Non-destructive and in situ characterization methods to characterize the hazard of landfills. Innovative immobilization and transformation concepts that significantly reduce the cost of remediation. Ex-situ separation and treatment concepts to rapidly and safely destroy or immobilize landfill constituents.

Emission-free destruction of organic wastes. Off-gas treatment that eliminates emissions in the environment that exceed Environmental Protection Agency requirements. Non-thermal treatment concepts for mixed waste. Bioremediation, enzymatic reactions, enzyme redesign, genetic engineering, microbial gene sequencing.

Plutonium behavior in mixed matrices. Long-term monitoring concepts for plutonium

New concepts for waste stabilization of spent nuclear fuel. Long-term monitoring and performance assessment of spent nuclear fuel. Physics and chemistry of radionuclides in mixed matrices

Specialized waste forms. Performance assessment concepts for nuclear waste disposal.

Ecology. Comprehensive understanding of the flow and use of materials and energy in our environmental system and the implications of those flows with respect to the environment. Ecosystem restoration and management; conduct monitoring, modeling, and process research to improve understanding of threatened and damaged ecosystems, technologies to restore the productivity and quality of these ecosystems.

Biomarkers and sensors of exposure to contaminated media. Multi-site epidemiology studies. Effort to address current health concerns while continuing to conduct research that will promote a better future understanding of the relationship between exposure and health impacts.

The program will be competitive and offered to investigators in universities or other institutions of higher education, or other non-profit or for-profit organizations, non-Federal agencies or entities, or unaffiliated individuals. Apart from this notice, the program also will be offered to DOE national laboratories and other Federal laboratories, which will compete separately for appropriated funds. To ensure that the program is mission- oriented and that its achievements are recognized and used by EM, the Environmental Management Science Program will be closely integrated with EM s Technology Development Focus Areas and will also be closely coordinated with the Office of Energy Research to ensure use of broad-based fundamental research and development supported by that office.

Details of the programs of the Office of Environmental Management and the technologies currently under development or in use by Environmental Management Program can be found on the World Wide Web at http://www.em.doe.gov and at the extensive links contained therein. These programs and technologies should be used as guidance when considering areas of research to be proposed.

The United States involvement in nuclear weapons development for the last 50 years has resulted in the development of a vast research, production, and testing network known as the nuclear weapons complex. The Department has begun the environmental remediation of the complex, encompassing radiological an nonradiological hazards, vast volumes of contaminated water and soil, and over 7,000 contaminated structures. The Department must characterize, treat, and dispose of hazardous and radioactive wastes that have been accumulating for more than 50 years at 120 sites in 36 states and territories. By 1995, the Department had spent about $23 billion in identifying and characterizing its waste, managing it, and assessing the remediation necessary for its sites and facilities. The Department estimates that the remedial actions at Department sites (not including groundwater cleanup, currently operating facilities and Naval facilities) could cost a total of $200-350 billion and take at least 75 years to complete. According to the estimates of the total program cost, 49% would go to waste management and 28% to environmental restoration, 10% to nuclear material and facility stabilization, and 5% to research and technology development with the remaining 8% for activities such as site security, transportation, and other landlord activities. The estimated life cycle costs over 75 years for the seven highest cost problem areas within the programs in descending order are as follows:

- Decommissioning
- High Level Waste
- Remedial Actions
- Low Level Waste
- Transuranic Waste
- Mixed Low Level Waste
- Spent Nuclear Fuel

Environmental Management is also responsible for conducting the program for waste minimization and pollution prevention for the Department. The variety and volume of the Department s current activities make this effort a challenge itself. In some cases, fundamental science questions will have to be addressed before a technology or process can be engineered. For example, improved understanding of the principles of pollutant transport in groundwater is required for important advancement in the development of effective groundwater-remediation technology. There is a need to involve more basic science researchers in the challenges of the Department s remediation effort.

References for Background Information on the Mission Responsibilities of the Office of Environmental Management:

Note: World Wide Web locations of these documents are provided where possible. For those without access to the World Wide Web, hard copies of these references may be obtained by writing Dr. Carol Henry at the address listed in the contacts section.

DOE. 1995. Closing the Circle on Splitting of the Atom: The Environmental Legacy of Nuclear Weapons Production in the United States and What the Department of Energy is Doing About It. The U.S. Department of Energy, Office of Environmental Management, Office of Strategic Planning and Analysis, Washington, D.C. http://www.em.doe.gov/circle/index.html

DOE. 1995. Estimating the Cold War Mortgage: The 1995 Baseline Environmental Management Report. Volume I, March 1995. U.S. Department of Energy Office of Environmental Management, Washington, D.C. http://www.em.doe.gov/bemr/index.html

DOE. 1995. Environmental Management 1995: Progress and Plans of the Environmental Management Program. The U.S. Department of Energy, Office of Environmental Management, Washington, D.C. http://www.em.doe.gov/em95/index.html

DOE. 1995. Risks and the Risk Debate: Searching for Common Ground The First Step . The U.S. Department of Energy, Office of Environmental Management, Washington, D.C. http://raleigh.dis.anl.gov:81/cgi-bin/dispdoc_return.pl?rrd+1

DOE. 1995. Technology Summary Reports, June 1995 (Rainbow Books) http://www.em.doe.gov/emnet5.html

DOE. 1995. Office of Science and Technology EM-50. http://www.em.doe.gov/emnet5.html

National Academy of Sciences. Allocating Federal Funds for Science and Technology. 1995. National Academy Press, Washington, D.C. http://www.nas.edu/nap/online/fedfunds/

National Commission on Superfund Members. Final Consensus Report of the National Commission on Superfund. March 1994. Keystone Center and the Environmental Law Center of Vermont Law School. N/A

National Environmental Technology Strategy. Bridge to a Sustainable Future. April 1995. National Science and Technology Council, Washington, D.C. http://iridium.nttc.edu/env/envstrat.txt

National Research Council. Improving the Environment: An Evaluation of DOE s Environmental Management Program. 1995. National Academy Press, Washington, D.C. N/A

Secretary of Energy Advisory Board. Alternative Futures for the Department of Energy National Laboratories. February 1995. Task Force on alternative Futures for the Department of Energy National Laboratories, Washington, D.C. http://www.doe.gov/html/doe/whatsnew/galvin/tf-rpt.html

U.S. Congress, Office of Technology Assessment. Complex Cleanup: The Environmental Legacy of Nuclear Weapons Production, February 1991. U.S. Government Printing Office, Washington, D.C. N/A

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