

Office of Science
Notice 00-21

***Bioremediation and its Societal Implications and
Concerns (BASIC) Research Program***

Department of Energy
Office of Science

**Office of Science Financial Assistance Program Notice 00-21: Bioremediation
and its Societal Implications and Concerns (BASIC) Research Program**

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

ACTION: Notice inviting grant applications.

SUMMARY: The Office of Biological and Environmental Research (OBER) of the Office of Science (SC), U.S. Department of Energy (DOE) hereby announces its interest in receiving applications for research grants in Bioremediation and its Societal Implications and Concerns (BASIC). BASIC is a key element of the Natural and Accelerated Bioremediation Research (NABIR) program that provides the fundamental science underlying bioremediation of radionuclides and metals in subsurface environments at DOE sites. Research is encouraged that identifies critical societal, cultural, legal, policy, regulatory or other issues that could enhance or complicate the development and utilization of bioremediation methods or approaches. Educational activities that enhance the dialogue among scientists, regulators and community members about plausible implementation of bioremediation of radionuclides and metals are also being sought. Partnerships between social scientists and physical/biological scientists in the development of BASIC projects are strongly encouraged.

DATES: Researchers are strongly encouraged to submit a preapplication for programmatic review. Early submission of preapplications is encouraged, to allow time for review for programmatic relevance. The deadline for receipt of preapplications is November 6, 2000. A brief preapplication should consist of one or two pages of narrative describing the research objectives and methods.

The deadline for receipt of formal applications is 4:30 p.m., E.S.T., December 21, 2000 to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2001 or in early Fiscal Year 2002. An original and seven copies of the

application must be submitted; however, applicants are requested not to submit applications using more than one delivery or mail service.

ADDRESSES: If submitting a preapplication, it should reference Program Notice 00-21, and may be sent by e-mail to: daniel.drell@science.doe.gov. Hard copies can be sent to Daniel Drell, Ph.D., Life Sciences Division, SC-72/GTN, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290.

Formal applications referencing Program Notice 00-21 on the cover page must be forwarded to: U.S. Department of Energy, Office of Science, Grants and Contracts Division, SC-64, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Notice 00-21. This address must also be used when submitting applications by U.S. Postal Service Express Mail or any other commercial overnight delivery service, or when hand-carried by the applicant.

FOR FURTHER INFORMATION CONTACT: Dr. Daniel Drell, Life Sciences Division, SC-72, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, telephone: (301) 903-4742, e-mail: daniel.drell@science.doe.gov, fax: (301) 903-8521. The full text of Program Notice 00-21 is available via the World Wide Web at the following address: <http://www.sc.doe.gov/production/grants/grants.html>.

SUPPLEMENTARY INFORMATION: Approximately 50 years of U.S. production of nuclear weapons have left a legacy of radioactive, chemical and other hazardous waste at DOE sites. Much of this legacy consists of mixtures of these waste components. Cleanup or stabilization of contaminated sites using conventional technologies such as landfilling, vitrification or incineration carries a very high price tag, estimated to be in excess of \$100 billion. This high cost has sparked interest in the development of innovative and potentially cost-saving technologies such as bioremediation. Bioremediation of metals and radionuclides involves the use of microorganisms to remove these contaminants from the aqueous phase by precipitation or complexation, thus reducing the risk to humans and the environment. Such approaches may involve stabilizing the radionuclides and metals by immobilizing them in place, and long-term stewardship to ensure that they are not remobilized over time.

The Natural and Accelerated Bioremediation Research (NABIR) Program provides the fundamental science to serve as the basis for development of cost-effective bioremediation of radionuclides and metals in subsurface environments at DOE sites. NABIR research encompasses both intrinsic bioremediation by naturally occurring microbial communities, as well as accelerated bioremediation through the use of

nutrient amendments or addition of microorganisms. At present, the program is exploring the use of naturally occurring microorganisms as amendments; however, genetically engineered microorganisms may also be considered in the future. The program consists of seven interrelated scientific research elements (Biogeochemical Dynamics, Biotransformation, Community Dynamics and Microbial Ecology, Assessment, Biomolecular Science and Engineering, Bacterial Transport, and Systems Integration/Data Management). A Field Research Center (FRC) for NABIR research has recently been established in Bear Creek Valley near the Y-12 site at the Oak Ridge National Laboratory in Oak Ridge, Tennessee. The FRC provides an area containing both contaminated and uncontaminated subsurface environments for performing field-scale, hypothesis-driven research and for collecting field samples for laboratory based studies. Additional information about NABIR and the Field Research Center may be found on the NABIR homepage: <http://www.lbl.gov/NABIR> or on the FRC homepage: <http://www.esd.ornl.gov/BCV-FieldSite>.

The NABIR program also includes an element addressing educational, legal and societal issues of bioremediation called Bioremediation and its Societal Implications and Concerns (BASIC) which is the subject of this solicitation. The BASIC element is directed at defining and understanding the societal implications of implementing in situ bioremediation approaches for metals and radionuclides. Stabilization of radionuclides and metals in place through biologically mediated immobilization is a bioremediation approach under investigation by NABIR researchers. Such an approach, however, necessitates long term stewardship to ensure the contaminants remain immobilized. Communities and other stakeholders may have concerns regarding this potential bioremediation strategy. The introduction of non-native microorganisms or the manipulation of the environment to change its microbial composition or chemical characteristics may raise concerns among those who live or work nearby. Even the reintroduction of native microorganisms into their natural environment can raise concerns. Although it might be many years before genetically engineered microorganisms may be considered for limited release to clean up DOE sites, it is wise to begin now to consider some of the issues involved. It is a fundamental principle of the NABIR program that stakeholders associated with affected communities must be involved in any discussions about the possible use of novel approaches and/or processes to remediate a contaminated site and that identifying issues of potential concern to stakeholders should be done well in advance of any possible deployment decisions.

DOE seeks applications for research to investigate societal issues and to inform stakeholders and the general public on bioremediation issues related to NABIR. Applications should address effective ways to:

(1) Define the societal, legal, ethical, cultural and regulatory concerns associated with plausible application of in situ bioremediation of radionuclides and metals. Concerns to be addressed might include: 1) introduction of chemical additives to the subsurface to enhance immobilization of radionuclides or metals and to reduce risk; 2) introduction of naturally occurring but non-indigenous microorganisms to enhance bioremediation; 3) introduction of genetically engineered microorganisms to stabilize radionuclides and metals at contaminated sites; and 4) public attitudes toward long term stewardship for sites where radionuclides and metals are left in place in an immobile, biologically unavailable form, following bioremediation. Research and conferences are encouraged that identify critical regulatory, policy, societal, legal and other issues that could enhance or complicate the development and plausible implementation of NABIR bioremediation approaches or methods. Partnerships between social scientists and physical/biological scientists in the development of BASIC projects are strongly encouraged.

(2) Develop and promote greater understanding of the science and societal implications of bioremediation. DOE solicits applications for the preparation and dissemination of educational materials, in any appropriate medium, that will enhance understanding of the scientific as well as the societal aspects of bioremediation among the general public or specified groups. Educational efforts that target specific groups should include a detailed description of the relationship between NABIR and that group or community in addition to assessment measures for determining the effectiveness of the educational effort. DOE also encourages applications for the support of conferences focusing on the legal and societal implications of NABIR.

Applicants should demonstrate their knowledge of any relevant literature and should include detailed plans for the gathering and analysis of factual information and its societal implications. Applicants are encouraged to make use of NABIR relevant activities or field sites, such as the DOE Field Research Center at the Oak Ridge National Laboratory, where bioremediation experiments are planned or underway. All research applications should address the issue of efficient dissemination of results to the widest appropriate audience; free availability via the World Wide Web is strongly encouraged, where appropriate. Examples of possible BASIC research topics include, but are not limited to:

Cultural risks and concerns about bioremediation - Applications are sought to identify and explore cultural concerns relating to bioremediation and its possible implementation. Of particular interest is understanding the potential impacts of bioremediation. Would bioremediation be viewed in a positive or

negative way in light of its impact on, and potential future uses of, the land? If so, what are the cultural bases for these views? What are the cultural positions or attitudes on the potential need for long term stewardship of sites, where contaminants are stabilized, and what are its impacts? What variation can be described in attitudes towards the risks that might be associated with the use of bioremediation?

Legal issues - Research should address the potential legal issues surrounding the use of naturally occurring or genetically engineered microorganisms for in situ bioremediation of radionuclides and metals. Such issues might include intellectual property rights, community consent for the use of bioremediation strategies, and adjudication scenarios involving controversies over the use of bioremediation. Potential legal issues involving the need for long term stewardship of sites where contaminants have been stabilized are of special interest. Also, while risk assessments are not a subject of this solicitation, legal perspectives on the implications of potential bioremediation strategies compared to other strategies could be explored.

Education of stakeholders and the general public on bioremediation - Educational activities that promote interactions and communications between NABIR scientists and involved stakeholders, as well as enhance the knowledge base of scientists, regulators and community members are strongly encouraged. Of particular interest are communities adjacent to DOE sites. Relevant activities could include 1) the development, deployment and implementation of educational curriculum units on bioremediation and its implications; 2) the development of educational materials using diverse media; or 3) the sponsoring of educational forums bringing together bioremediation scientists, stakeholders, and members of other interested communities (e.g., judges, regulators, etc.). Applications in response to this element of this solicitation should include discussion of dissemination plans as well as ways to assess the impact of the proposed educational activities on the targeted group following completion of the grant period.

Program Funding

It is anticipated that up to \$500,000 per year will be available for multiple awards to be made in late FY 2001 and early FY 2002 in the categories described above, contingent on availability of appropriated funds. Applications may request project support up to three years, with out-year support contingent on availability of funds, progress of the research and programmatic needs. Annual budgets for projects in the BASIC Program are expected to range from \$50,000 to \$200,000 total costs. DOE may encourage collaboration among prospective investigators to promote joint

applications or joint research projects by using information obtained through the preapplications or through other forms of communication.

Merit Review

Applications will be subjected to formal merit review (peer review) and will be evaluated against the following evaluation criteria, which are listed in descending order of importance 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.

Also, as part of the evaluation, program policy factors become a selection priority. External peer reviewers are selected with regard to both their scientific expertise and the absence of conflict- of-interest issues. Non-federal reviewers will often be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

Submission 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 Science Financial Assistance Program.

Electronic access to SC's Financial Assistance Application Guide is possible via the World Wide Web at: <http://www.sc.doe.gov/production/grants/grants.html>. DOE is under no obligation to pay for any costs associated with the preparation or submission of applications if an award is not made. In addition, for this notice, the research description must be 20 pages or less, exclusive of attachments, and must contain an abstract or summary of the proposed research (to include the work to be undertaken or the hypotheses being tested, the proposed approach(s) and method(s), and the names of all investigators and their affiliations). Attachments should include short curriculum vitae for all key personnel, a QA/QC plan, a listing of all current and pending federal support and letters of intent when collaborations are part of the proposed research. Curriculum vitae should be submitted in a form similar to that of NIH or NSF (two to three pages), see for example: <http://www.nsf.gov:80/bfa/cpo/gpg/fkit.htm#forms-9>.

Additional information on the NABIR Program is available on the World Wide Web at: <http://www.lbl.gov/NABIR/>. For researchers who do not have access to the world

wide web, please contact Karen Carlson, Environmental Sciences Division, SC-74, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, phone: (301) 903-3338, fax: (301) 903-8519, E-mail: karen.carlson@science.doe.gov, for hard copies of background material mentioned in this solicitation.

The Catalog of Federal Domestic Assistance Number for this program is 81.049, and the solicitation control number is ERFAP 10 CFR Part 605.

John Rodney Clark
Associate Director of Science
for Resource Management

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