

# Los Alamos

NATIONAL LABORATORY

Date: December 10, 1996  
Refer to: EM/IS&T:96-200

**Environmental Management**  
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R E C E I V E D

DEC 12 1996

DOE OVERSIGHT BUREAU

John Parker  
U.S. Department of Energy  
Oversight Bureau  
2044-A Galisteo Street  
Santa Fe, New Mexico 87505

**Subject: Field Research Center for the new Natural and Accelerated  
Bioremediation Research Centers (NABIR)**

Dear Mr. Parker:

Los Alamos National Laboratory is responding to an October 15, 1996 request (attached as appendix) from the Department of Energy (Office of Energy Research, Office of Health and Environmental Research) to provide Field Research Centers (FRC's) for the new Natural and Accelerated Bioremediation Research (NABIR) Program. On November 7, 1996, Laboratory Director Dr. S. S. Hecker notified the Department of Energy (DOE) that Los Alamos would be interested in hosting a FRC. In response to the NABIR Program request, Laboratory staff have prepared a package outlining how Los Alamos would support NEPA requirements should we be requested to submit a full FRC proposal.

The purpose of this letter is to alert relevant DOE, State, Pueblo, and stakeholder parties to Los Alamos' interest in hosting such a FRC and to request assistance in formulating a full proposal should Los Alamos be selected to submit one. We believe that bioremediation research can provide a long-term tool in site remediation but that such a tool should only be applied with the cognizance of a relevant parties. Feel free to contact either of the involved program managers for further information.



LAU/L Geneva 1

LAU/L Geneva 1

Los Alamos program contacts are:

Dennis L. Hjeresen, Ph.D.  
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Environmental Management Program Office  
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Mail Stop J591

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Sincerely,

*for*   
Dennis L. Hjeresen, Ph.D.  
Environmental Management Program Office  
Integrated Science and Technology

DLH:gs

Attachment a/s

Cy: EM File  
James Brainard, CST-18, MS 345

same package  
sent to dir



**Department of Energy**  
Germantown, MD 20874-1290

OCT 15 1996

Dr. Dennis Hjeresen  
Los Alamos National Laboratory  
P.O. Bo 1663  
1100 4th Street, MS-J591  
Los Alamos, NM 87545

*Denny*

Dear Dr. Hjeresen:

The U.S. Department of Energy (DOE), Office of Energy Research, Office of Health and Environmental Research (OHER), is now implementing the Natural and Accelerated Bioremediation Research (NABIR) Program. The NABIR Program is a fundamental research program designed to provide the scientific understanding needed to use natural biogeochemical processes and to develop methods to accelerate these processes for the bioremediation of contaminated soils, sediments, and groundwater at DOE sites.

One of the steps in implementing the NABIR Program will be the selection of up to three Field Research Centers. The Field Research Centers (FRCs) will be the preferred sites for NABIR Program field research activities. FRC staff activities will include facilitating access to contaminated areas at DOE sites and ensuring coordination of research activities and compliance with applicable ES&H requirements for field research. Once FRCs are established, we intend to spend approximately \$1-3 million per year per FRC, and we anticipate in-kind support from the DOE site.

Contaminant priorities for research activities in the NABIR Program include radionuclide and heavy metal contamination due to historical weapons production activities, as well as other contaminants that are associated with those radionuclides and heavy metals. We believe that your site has radionuclide and heavy metal contamination due to historical weapons production activities, and it also appears to have laboratory research and development facilities, infrastructure, and the scientific expertise that will be needed at an FRC.

At this time, we are requesting a brief statement indicating your interest in being included on our list of potential FRC sites. If you are interested, we are also requesting information to support National Environmental Policy Act (NEPA) documentation of the NABIR Program and the FRC selection process. This letter is not a request to respond with qualifications that would enable us to select FRCs. However, if you indicate that you are interested in being included on our list of potential FRCs, then at a later date you will be asked to respond to specific FRC selection criteria.



Enclosure 1 contains a brief explanation of our intent, due dates, and contact points, Enclosure 2 contains the minimum criteria that we believe must be met by a site to establish and operate an FRC under the NABIR Program and Enclosure 3 contains a list of the information needed to support NEPA documentation. In addition to these three enclosures, one-page descriptions of the overall NABIR Program the scientific research elements, the Field Research Centers, and the Bioremediation and its Social Implications and Concerns (BASIC) components of the NABIR Program are included.

The deadline for receipt of a statement indicating your interest in being included on our list of potential FRCs is 4:30 P.M., E.S.T., November 8, 1996. The deadline for receipt of information to support NEPA documentation is 4:30 P.M., E.S.T., December 6, 1996. A response to both requests is required for further consideration as a potential FRC site.

If you would like any additional information on this correspondence and the Enclosures, please contact Mr. Paul Bayer, Office of Health and Environmental Research, at (301) 903-5324, or by e-mail at paul.bayer@oer.doe.gov.



Ari Patrinos, Ph.D.  
Associate Director for Health  
and Environmental Research  
Office of Energy Research

Enclosures

cc:

Martha Krebs, ER-1  
Jim Decker, ER-2  
John Wooley, ER-1  
Charlie Billups, ER-4  
Michelle Broido, ER-74  
Robert Zich, ER-64  
William Burrier, ER-64  
Clarence Hickey, ER-8  
Rick Ahern, GC-51  
Steve Domotor, EM-52

**Enclosure 1**  
**NABIR Program Request for**  
**Statement of Interest and Information to Support NEPA**

**Introduction and Purpose**

The United States Department of Energy (DOE), Office of Health and Environmental Research (OHER), seeks DOE sites to support the research needs of the Natural and Accelerated Bioremediation Research (NABIR) Program. The mission of the NABIR program is to provide the scientific understanding needed to use natural biogeochemical processes and to develop fundamental understanding to accelerate these processes for bioremediation of contaminated soils, sediments, and groundwater at DOE sites.

This "NABIR Program Request for Statement of Interest and Information to Support NEPA" is intended to: 1) assist the OHER in determining the potential array of possible sites for FRCs, and 2) begin to acquire information on potential Field Research Centers (FRCs) at DOE sites to support National Environmental Policy Act (NEPA) documentation.

**Background**

The Office of Health and Environmental Research (OHER) has a long tradition of supporting fundamental research in the life and environmental sciences. For example, OHER has supported environmental research in subsurface science, ecosystems, global climate change, and ocean margins areas, and life sciences research in the structural biology, genomics, nuclear medicine, and instrumentation areas. The NABIR program builds on these foundations to develop a body of knowledge that will help support environmental restoration of DOE facilities.

Under the NABIR program, OHER proposes to conduct a coordinated approach to fundamental laboratory and field research. This fundamental research will provide the opportunity to understand the biological, chemical, and hydrogeologic interactions occurring at contaminated sites, and to develop methods to enhance these interactions and processes for possible bioremediation of contaminated sites. This research is needed to assess bioremediation processes in environments where complex interactions among microorganisms, contaminants, and chemical and physical processes occur, so that other organizations (within DOE and external to DOE) can use this understanding to develop bioremediation technologies for application at contaminated DOE sites.

One of the mechanisms for creating a coordinated and focused NABIR Program is the establishment of FRCs; FRCs will serve as the preferred sites for field research efforts. In addition, FRCs will help facilitate access to contaminated areas at the DOE site and ensure coordination of research activities and compliance with applicable ES&H requirements. The selected FRCs and the supporting infrastructure will be used to facilitate long-term, interdisciplinary research and will be available as user sites for investigator-initiated research by scientists funded through this and other programs. As many as three FRCs may be selected during this 10 year program, depending on funding availability and the outcome of the NEPA analysis. Once FRCs are established, OHER intends to spend approximately \$1-3 million per year per site, and anticipates in-kind support from the site.

Research that DOE anticipates will be conducted at FRCs includes biotransformation and biodegradation; community dynamics and microbial ecology; biomolecular science and engineering; biogeochemical dynamics; assessment; acceleration; and system integration, prediction and optimization. Further information on these planned research elements is contained in the NABIR Program Plan (see the Further Information section of this Enclosure).

### **Limitations**

Enclosure 2 (Minimum Criteria for a Field Research Center) will assist you in making a determination as to whether your site meets the minimum criteria that OHER considers necessary to establish and operate an FRC.

### **Information Requested**

Enclosure 3 (Standardized Information Request to Support NEPA Documentation) is provided as an outline of the types of information that will be used to support NEPA documentation. Much of the information requested should be readily available in existing environmental documentation (e.g., existing site NEPA documents, Annual Site Environmental Reports, etc.).

### **Due Dates and Submission Information**

Interested DOE sites are asked to respond with a statement of interest in being included in future correspondence from OHER on FRCs for the NABIR Program. The deadline for receipt of a statement of interest is 4:30 P.M., E.S.T., November 8, 1996.

Interested DOE sites are also asked to respond to the information requested in Enclosure 3, "Standardized Information Request to Support NEPA Documentation." The deadline for receipt of information to support NEPA documentation is 4:30 P.M., E.S.T., December 6, 1996.

The statement of interest and the information to support NEPA documentation should be submitted to the attention of Mr. Paul Bayer, Office of Health and Environmental Research, ER-74, GTN, U.S. Department of Energy, 19901 Germantown Rd., Germantown, MD 20874-1290. The statement of interest can be sent electronically via the internet to paul.bayer@oer.doe.gov, but hard copy with original signature is required. The information to support NEPA documentation can be sent electronically via the internet to paul.bayer@oer.doe.gov, but hard copy is also required.

Facsimile and telephone responses will not be accepted.

### **Further Information**

A copy of the NABIR Program Plan is available on the Office of Health and Environmental Research's Environmental Remediation Research World Wide Web page at [http://www.er.doe.gov/production/oher/EPR/ESD\\_epr.html](http://www.er.doe.gov/production/oher/EPR/ESD_epr.html).

For further information on the NABIR Program contact Dr. Jay Grimes or Dr. John Houghton at the Office of Health and Environmental Research, ER-74, GTN, U.S. Department of Energy, 19901 Germantown Rd., Germantown, MD 20874-1290. Dr. Grimes is available by telephone at (301) 903-4183, or by e-mail at darrell.grimes@oer.doe.gov. Dr. Houghton is available by telephone at (301) 903-8288, or by e-mail at john.houghton@oer.doe.gov.

For further information on the FRCs or the statement of interest, contact Mr. Paul Bayer, at the Office of Health and Environmental Research, ER-74, GTN, U.S. Department of Energy, 19901 Germantown Rd., Germantown, MD 20874-1290, or by telephone at (301) 903-5324, or by e-mail at paul.bayer@oer.doe.gov.

For further clarification on the information being requested for the NEPA process, contact the NEPA Compliance Officer, Mr. Clarence Hickey, at the Office of Energy Research, ER-8, GTN, U.S. Department of Energy, 19901 Germantown Rd., Germantown, MD 20874-1290, or by telephone at (301) 903-2314, or by e-mail at clarence.hickey@oer.doe.gov.

## Enclosure 2

### Minimum Criteria for a Field Research Center\*

The following lists minimum criteria considered by OHER to be essential to establish and operate a Field Research Center that meets the needs of the NABIR Program. The FRC complex is likely to consist of a field site(s), offices for a small group of FRC staff, and lab equipment and facilities that are available for use.

<p>General Field Site Features</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Contaminated site, unlikely to be restored affordably using available technologies</li> <li><input type="checkbox"/> Available for 5 - 10 years (i.e., not subject to Records of Decision requiring clean up within 5 years)</li> <li><input type="checkbox"/> Does not present an imminent threat to human health or the local ecosystem</li> <li><input type="checkbox"/> Contains an heterogeneous geological and microbial environment</li> <li><input type="checkbox"/> Large enough to be partitioned for replication studies into multiple matched subsites</li> <li><input type="checkbox"/> Contains non-contaminated control sites representative of contaminated sites</li> <li><input type="checkbox"/> Secure from vandalism and other activities that could interfere with research projects</li> <li><input type="checkbox"/> Presence of radionuclide and heavy metal contaminants due to weapons production activities</li> <li><input type="checkbox"/> Presence of other contaminants that are associated with the radionuclides and heavy metals</li> <li><input type="checkbox"/> Presence of low concentrations of contaminants in a vadose and saturated zone</li> </ul>
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<p>Specific FRC Infrastructure Requirements</p>	<ul style="list-style-type: none"> <li>□ An FRC complex will consist of: <ul style="list-style-type: none"> <li>- 4+ hectare field site(s) (i.e., 10+ acres), including both contaminated and representative uncontaminated (for control purposes) areas</li> <li>- offices for a small group of FRC staff</li> <li>- access to laboratory research facilities (including analytical laboratories), either as existing facilities within reasonable proximity, or as temporary research trailers, and/or temporary buildings</li> </ul> </li>   <li>□ In addition, the following needs should be met: <ul style="list-style-type: none"> <li>- Availability of nearby temporary lodging</li> <li>- Access restricted and controlled to accommodate ES&amp;H concerns, but available to outside researchers for field research</li> <li>- Accessible by passenger vehicles and heavy equipment (such as drilling rigs)</li> <li>- Access to electrical power or ability to provide as required (220V, 30 Amp; and 110V, 30 Amp)</li> <li>- Access to/availability of at least a surface or groundwater water supply (either can be made available or can be developed)</li> <li>- Accessible terrain for field site characterization activities (i.e., well drilling and monitoring)</li> <li>- Access to/availability to use existing wells for sampling and/or data collection</li> </ul> </li> </ul>
<p>Field Site Characterization</p>	<ul style="list-style-type: none"> <li>□ Well characterized with respect to general field site features such as: <ul style="list-style-type: none"> <li>- local ecological/historical/geological/cultural/archaeological/hydrological conditions</li> <li>- nature and extent of contamination</li> </ul> </li> </ul>

\*Modified from "Strategies and Mechanisms for Field Research for Environmental Bioremediation." American Academy of Microbiology, 1994.

## Enclosure 3

### Standardized Information Request to Support NEPA Documentation

To assist each interested Department of Energy (DOE) site in responding to the DOE Office of Health and Environmental Research (OHER) "NABIR Program Request for Statement of Interest and Information to Support NEPA," OHER has developed the "Standardized Information Request to Support NEPA Documentation." The information provided will be used to: 1) support a National Environmental Policy Act (NEPA) review of the NABIR Program, including the potential environmental impacts of selecting specific FRCs; and 2) confirm and reflect the minimum criteria that OHER believes are needed to establish and operate an FRC. This is not a request to respond with qualifications that would enable us to make a decision on FRCs.

To the extent that information and data are readily available, responses should include the following specific information/data:

1. Detailed map indicating the potential FRC complex (both laboratory facilities and the range of field site locations), and showing topography and proximity to other support sites (i.e., access, power lines, etc.).
2. Geological cross section map(s) showing the heterogeneity of units for the range of potential field sites.
3. Detailed description of the potential FRC physical research facilities that are available to support the range of potential field sites, including: laboratory, office and research sites; available sampling equipment; analytical laboratory sites for sample processing and analysis; and storage.
4. Period of time that the potential FRC complex is available for use, including a listing of any future-use or land use plans or planning documentation that could affect (positively or negatively) use of any of the range of potential field site(s) or facilities.
5. Background characterization, including:
  - general features of the range of potential field site(s), such as natural resources, sensitive environmental concerns that could be impacted by NABIR activities, and limitations on the accessibility or use of natural resources (e.g., uncontaminated aquifers, etc.)

- data that describe the degree or amount of characterization available for the range of potential field site(s), such as nature and quantification of the contamination (in the soils, and groundwater; on the soil surface; and any potential airborne emissions); a listing of the diversity of contaminants (including mixed and radioactive) and any co-contaminants at the range of potential field site(s) .
6. A listing of all available regulatory/compliance/permitting documentation (i.e., NEPA, CERCLA, RCRA, TSCA, etc.), federal and/or state/local, prepared within the last five years (or in preparation) that indicates the level of environmental compliance for the field site(s) within the potential FRC complex, including the status and availability of Annual Site Environmental Reports (ASER) that may include information on any potential field site. A list of any cleanup agreements for the range of potential field site(s) should be included as well.
7. Information on security for the range of potential field site(s) including:
- protection from commercial development, vandalism, and other activities that would preclude/limit/disrupt the conduct of the research or evaluation of its results.
  - accessibility to outside investigators.
8. A brief description of:
- ongoing bioremediation research or technology demonstration projects at or in close proximity to the range of potential field site(s), (description to include number of scientific and support staff; funding source(s); laboratory sites; types of field work associated with each project; specific technologies applied in each project; stakeholder outreach activities; and regulatory permitting of the projects, as appropriate.
  - other ongoing research or technology demonstration projects at or in close proximity to the range of potential field site(s), (description to include number of scientific and support staff; funding source(s); laboratory sites; types of field work associated with each project; specific technologies applied in each project; stakeholder outreach activities; and regulatory permitting of the projects, as appropriate.
  - the types of fundamental bioremediation research that might be applicable/appropriate for each potential FRC.

9. A description of existing local public and stakeholder interactions, and an indication of whether these existing mechanisms may be used in NABIR-funded activities to interact with stakeholders. Examples of existing stakeholder interactions could include those occurring through the NEPA process, technology R&D efforts, cleanup mandates, or other mechanisms.
10. Contact point for additional information on the potential FRC complex.

If any of the information requested above is available electronically, please provide specifications on how to access such information. For example, some DOE sites and/or laboratories may have a NEPA database, ASERs and future-use plans in electronic format, site characterization databases, permits databases, etc. DOE site or laboratory contacts for accessing the electronic information should also be included.

## THE NATURAL AND ACCELERATED BIOREMEDIATION RESEARCH (NABIR) PROGRAM

### Mission

The Natural and Accelerated Bioremediation Research (NABIR) program will provide the scientific understanding needed to use natural processes and to develop methods to accelerate these processes for the bioremediation of contaminated soils, sediments, and groundwater at Department of Energy (DOE) facilities.

### Background

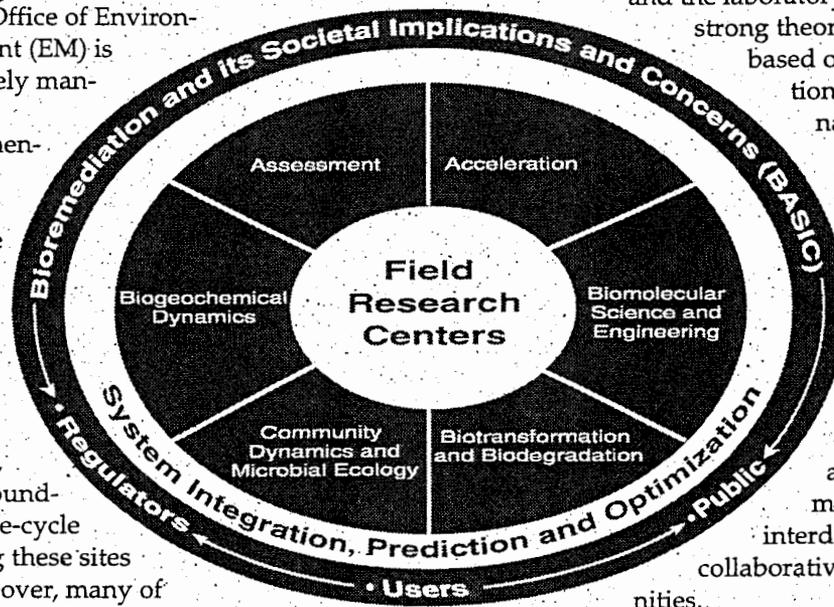
DOE has a 50-year legacy of environmental problems resulting from the production of nuclear weapons. DOE's Office of Environmental Management (EM) is responsible for safely managing this legacy through a comprehensive program of environmental remediation, waste management, and facility transitioning. Among the most serious problems are widespread contamination of soils, sediments, and groundwater. The total life-cycle cost of remediating these sites is unknown. Moreover, many of the contaminated soils, sediments, and aquifers are believed to be impossible to remediate with existing technologies. Bioremediation has the potential to meet some of these challenges.

DOE's Office of Health and Environmental Research (OHER) has a long tradition of supporting fundamental research in the life and environmental sciences. NABIR builds on OHER's foundation to develop a body of knowledge that will support environmental restoration of DOE's facilities. It is one part of the Office of Energy Research's (OER's) commitment to help address DOE's environmental management problems.

### Scope

NABIR will focus on developing the scientific foundation needed to bioremediate the complex mixtures of contaminants at DOE facilities. The most challenging of these mixtures include industrial solvents and complexing agents, together with heavy metals and radionuclides.

The scientific foundation will be developed by a combination of field, laboratory, and theoretical research. These activities will provide opportunities to iterate experiments, alternating between the field and the laboratory, and to develop a strong theoretical foundation based on realistic conditions that are found in natural environments. Critical issues such as scale-up from the laboratory to the field will be addressed readily. Field research centers, unique instrumentation facilities, and computational models will enhance interdisciplinary and collaborative research opportunities.



### Goals

Over a ten-year period, the scientific knowledge needed to use natural biogeochemical processes and develop methods to accelerate these processes will be achieved by meeting the following goals:

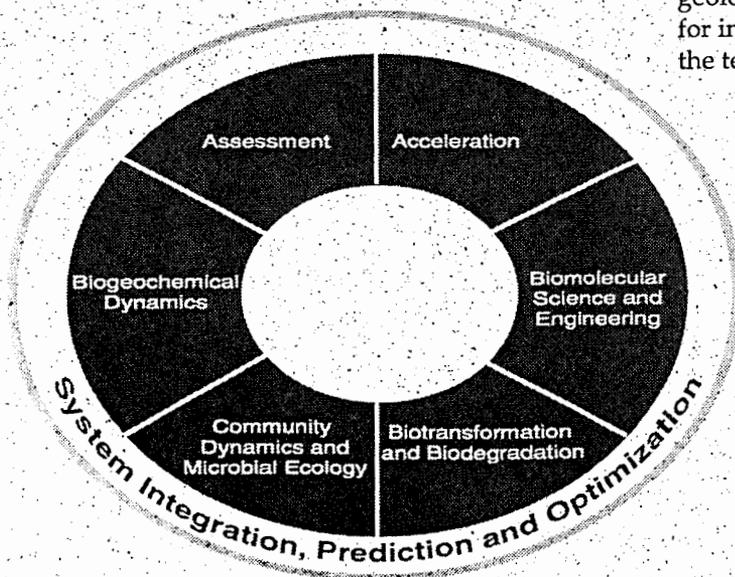
- Develop interdisciplinary teams and focus them on gaining the fundamental knowledge necessary to overcome the obstacles facing current technologies for remediating complex contaminant mixtures in natural environments.
- Establish field research centers for long-term research on the scientific foundations underpinning bioremediation.

## SCIENTIFIC ELEMENTS OF THE NABIR PROGRAM: AN INTEGRATED RESEARCH FRAMEWORK

**M**icroorganisms are known to oxidize, reduce, sequester, and otherwise transform most of the elements of the periodic table. Bioremediation uses these abilities to decontaminate and detoxify soils, sediments, and groundwater. The Natural and Accelerated Bioremediation Research (NABIR) program will provide the scientific foundations to extend the practice of bioremediation to the most common and recalcitrant mixtures of contaminants present at the Department of Energy's (DOE) facilities. These mixtures typically include chlorinated hydrocarbons, complexing agents, metals and, in some locations, radionuclides. NABIR provides an integrated framework of basic research in each of the key scientific areas needed to extend the applicability of bioremediation to many of DOE's environmental problems.

NABIR's scientific program elements include:

- 1. Biotransformation and Biodegradation.** Fundamental research in microbiology to elucidate the mechanisms and pathways of biotransformation and biodegradation of complex contaminant mixtures.
- 2. Community Dynamics and Microbial Ecology.** Fundamental research in ecological processes and interactions of biotic and abiotic components of ecosystems to understand their influence on the degradation, persistence, mobility, and toxicity of mixed contaminants.
- 3. Biomolecular Science and Engineering.** Fundamental research in molecular and structural biology to enhance our understanding of bioremediation, improve the efficacy of bioremediation organisms, and identify novel remedial genes and gene products.
- 4. Biogeochemical Dynamics.** Fundamental research in the dynamic relationships among *in situ* geochemical, geological, hydrological, and microbial processes.
- 5. Assessment.** Fundamental research in monitoring and verifying the biological and geochemical processes of bioremediation.
- 6. Acceleration.** Fundamental interdisciplinary research in flow and transport of nutrients and microorganisms, focused on developing effective methods for accelerating and optimizing bioremediation rates.
- 7. System Integration, Prediction, and Optimization.** Fundamental research to develop conceptual and quantitative methods for describing the integral components of bioremediation processes in complex geologic systems. These models will provide tools for integration, prediction, and optimization—from the test tube to the field.



**For more information about NABIR, contact:**  
Jay Grimes or John Houghton

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## FIELD RESEARCH CENTERS: PROMOTING INTERDISCIPLINARY TEAMWORK

**F**undamental field- and laboratory-based research is required to advance our understanding of the biological, chemical, and physical processes important for natural and accelerated bioremediation. Scientific breakthroughs are most likely to come from interdisciplinary, field-based research involving microbiology, structural and molecular biology, genomics, geochemistry, hydrology, and transport processes.

The Department of Energy's Natural and Accelerated Bioremediation Research (NABIR) program is organized around field research centers to promote and coordinate the interdisciplinary teamwork needed for predicting, optimizing, and validating bioremediation processes. Performing research at contaminated sites will help identify and prioritize research needs and will facilitate the integration of scientific results into site remediation strategies. Access to field research centers will also provide opportunities for addressing difficult issues such as scale-up from the laboratory to the field.

NABIR is designed to break down the traditional barriers to cross-fertilization of knowledge. Shared R&D infrastructure, shared computational models, efficient communication networks, and links to related research and technology development programs will enhance the productivity of the field research centers. The result will be synergistic integration of fundamental research with technology development.

Field research centers are a key component of NABIR's strategy for moving laboratory-based research to the field and transferring new bioremediation technologies to environmental

problem-holders and potential industrial partners. NABIR will develop up to three field research centers to address a range of hydrogeologic environments and contaminant mixtures that are important to DOE. The centers are expected to support four types of activities:

1. **Multi-investigator interdisciplinary monitoring and analysis** of the key processes and rates of natural (intrinsic) bioremediation.
2. **Multi-investigator interdisciplinary experiments** where the scientific foundations for accelerating bioremediation can be evaluated.
3. **Single-investigator experiments** designed to resolve specific issues related to improving the scientific foundations of *in situ* bioremediation.
4. **Pilot-scale evaluation** of new methods for accelerating, monitoring, or predicting the effectiveness of bioremediation.

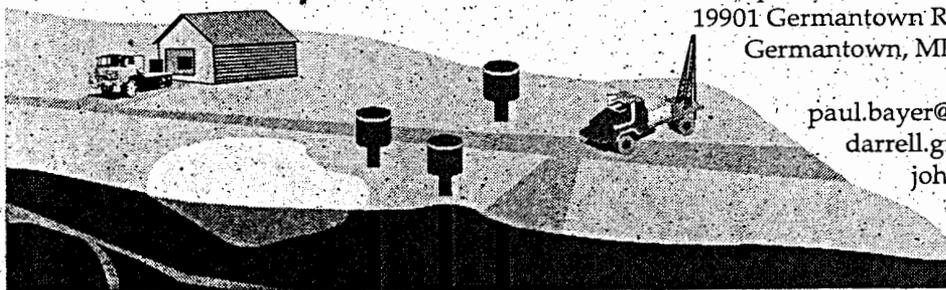
NABIR's field research centers will be available to academic, national laboratory, industrial, and federal researchers who have been selected to participate in the NABIR program through a peer review process.

**For more information about field research centers, contact:**  
Paul Bayer

**For general information about NABIR, contact:**  
Jay Grimes or John Houghton

Environmental Sciences Division, ER-74  
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U.S. Department of Energy  
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## BIOREMEDIATION AND ITS SOCIETAL IMPLICATIONS AND CONCERNS (BASIC)

A variety of societal concerns are raised by the field testing or deliberate release of microorganisms for environmental cleanup—whether those organisms are natural to a site, imported from another site, or genetically modified. The Bioremediation and its Societal Implications and Concerns (BASIC) program will address these concerns and help guide the NABIR program.

Addressing these societal issues directly, honestly, and openly from the outset is critical to the success of NABIR. The BASIC program will seek maximum communication and collaboration among all of the relevant stakeholders—community leaders and representatives, engineers, scientists, lawyers, etc.

BASIC issues are expected to include:

- Early solicitation of community involvement in decision-making on the use of bioremediation
- Education of involved communities regarding the costs and benefits of bioremediation strategies
- Realistic, scientifically based assessment and communication of the potential for bioremediation to effectively reduce risks
- Intellectual property protection and other legal issues associated with the use of microorganisms in bioremediation
- Management and communication of relevant regulatory processes

Early goals of the BASIC program will be defining and prioritizing BASIC issues, fostering close communication and commitment among scientists and other participants in the BASIC process, and identifying principles that can guide the development of NABIR's bioremediation strategies.

**For more information about BASIC, contact:**

Dan Drell  
Health Effects and Life Sciences Research Division,  
ER-72

**For general information about NABIR, contact:**

Jay Grimes or John Houghton  
Environmental Sciences Division, ER-74

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