

# **Program Announcement To DOE National Laboratories LAB 00-05**

## ***Natural and Accelerated Bioremediation Research Program***

The Office of Biological and Environmental Research (OBER) of the Office of Science, U.S. Department of Energy (DOE), hereby announces its interest in receiving proposals for research in the Natural and Accelerated Bioremediation Research (NABIR) Program. Proposals should describe research projects in one of the following categories:

1. Research projects that address the scientific aims of individual NABIR elements including Biogeochemistry, Biotransformation, Community Dynamics, Biomolecular Science and Engineering, and Assessment.
2. Research projects to be performed at a Field Research Center addressing field scale biostimulation of microbiological processes that immobilize metals and/or radionuclides. Interdisciplinary teams should include, at a minimum, experts in the fields of microbiology, geochemistry, and hydrology.

DOE has proposed to establish a Field Research Center (FRC) at one of two national laboratories, either the Y-12 site near Oak Ridge National Laboratory (ORNL) or the Hanford site at Pacific Northwest National Laboratory (PNNL). DOE is now preparing an Environmental Assessment pursuant to the National Environmental Policy Act (NEPA) to determine whether to prepare an environmental impact statement or a finding of no significant impact for the establishment of an FRC at one of these alternative sites. As part of its assessment, the Department will also evaluate a “no-action” alternative under which it would preserve the status quo and establish no FRC. The Department has identified ORNL as its preferred alternative in the draft Environmental Assessment.

Any awards made to perform research at the FRC will be contingent upon the outcome of this NEPA review, and no awards will be made until the appropriate NEPA review is completed. All research proposals that are bounded by the assumptions, impacts, and analysis of the Environmental Assessment will be presumed to be covered by the Assessment. All research proposals that appear to exceed the assumptions, impacts, or analysis of the Assessment will be reviewed to determine what, if any additional NEPA review is required.

Proposals for research in the Bacterial Transport (Acceleration) or System Integration Elements will not be considered at this time. Proposals for research on Bioremediation and its Societal Implications and Concerns (BASIC) will be solicited under a separate announcement.

**SUPPLEMENTARY INFORMATION:** The mission of the NABIR Program is to provide the fundamental science to serve as the basis for development of cost-effective bioremediation of radionuclides and metals in the subsurface 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 (inorganic, organic or enzymatic) or

microbial amendments. The program consists of seven interrelated scientific research elements (Biogeochemical Dynamics, Biotransformation, Community Dynamics and Microbial Ecology, Biomolecular Science and Engineering, Biotransformation and Biodegradation, Bacterial Transport, and Systems Integration/Data Management). The program also includes an element addressing ethical, legal and social issues of bioremediation called Bioremediation and its Societal Implications and Concerns (BASIC). The NABIR program desires to integrate a field research capability with its existing research program. DOE has proposed to establish a Field Research Center (FRC) at one of two national laboratories, either the Y-12 site near Oak Ridge National Laboratory (ORNL) or the Hanford site at Pacific Northwest National Laboratory (PNNL). DOE is now preparing an Environmental Assessment pursuant to the National Environmental Policy Act (NEPA) to determine whether to prepare an environmental impact statement or a finding of no significant impact for the establishment of an FRC at one of these alternative sites. As part of its assessment, the Department will also evaluate a “no-action” alternative under which it would preserve the status quo and establish no FRC. The Department has identified ORNL as its preferred alternative in the draft Environmental Assessment. Any awards made for research to be performed at the FRC will be contingent upon the outcome of this NEPA review, and no awards will be made until the appropriate NEPA review is completed. All research proposals that are bounded by the assumptions, impacts, and analysis of the Environmental Assessment will be presumed to be covered by the Assessment. All research proposals that appear to exceed the assumptions, impacts, or analysis of the Assessment will be reviewed to determine what, if any, additional NEPA review is required. Additional information about NABIR and the proposed Field Research Center can be accessed from the NABIR Homepage: <http://www.lbl.gov/NABIR/>.

### ***Program Focus***

The NABIR Program supports hypothesis-driven research that will help determine the potential for, and advance the field of, bioremediation as a cleanup option at the DOE sites. The focus of the NABIR Program is on field-scale research addressing metal and radionuclide contamination in subsurface environments at DOE sites. However, the research program will support laboratory, theoretical, modeling, and other non-field research projects, if they fill gaps that would be necessary to complete understanding for field-scale proposals. Although the program is directed at specific goals, it supports research that is more fundamental in nature than demonstration projects. The NABIR program emphasizes the bioremediation of metals and radionuclides in the subsurface below the root zone, including both vadose and saturated zones. Typically, the bioremediation of metals and radionuclides involves, but is not limited to, mobilization and immobilization scenarios. Investigators without access to laboratories licensed to work with radionuclides may propose research with non-radioactive surrogates of radionuclides, or collaborate with investigators working in a licensed laboratory. Research on bioremediation of organic contaminants, such as solvents and complexing agents will not be considered, except to the extent that they influence the primary goal of understanding the remediation of metals and radionuclides. The NABIR Program will not support research to evaluate the risk to humans or to the environment. Proposers are encouraged to review the NABIR Primer, available at <http://www.lbl.gov/NABIR/primer/primer.html>, for information on contaminants of DOE interest.

NABIR is a research program designed to serve as a foundation for developing microbial in situ bioremediation techniques. Although ancillary benefits of the research to other cleanup needs such as the use of bioreactors to process waste streams are anticipated, NABIR will not support research leading to ex situ treatments. NABIR research may, however, lead to the application of in situ bioremediation in conjunction with other cleanup methods, for example, using bioremediation to mobilize radionuclides so that pump-and-treat techniques could be more effective. Problems characterized by large areas with low-concentration of contaminants are emphasized over problems of localized, high concentrations. Research on phytoremediation will not be supported by NABIR.

Research plans that involve the potential release of nutrients, enzymes, and/or chemicals to the field (both at contaminated and non-contaminated control sites) should discuss the involvement of the public or stakeholders in their research, beginning with experimental design through completion of the project. All proposers should discuss other relevant societal issues, where appropriate, which may include intellectual property protection, and communication with and outreach to affected communities (including members of affected minority communities where appropriate) to explain the proposed research.

A centrally-maintained database is being developed to provide appropriate data, such as site characterization and kinetics data, needed by a broad segment of investigators. Proposals shall include a short discussion of the Quality Assurance and Quality Control (QA/QC) measures that will be applied in data gathering and analysis activities. Successful awardees will be expected to coordinate their QA/QC measures with NABIR program personnel.

### ***Current Request for Proposals***

Two kinds of projects are solicited in this request for proposals:

1. Research projects that address the scientific aims of individual NABIR elements including Biogeochemistry, Biotransformation, Community Dynamics, Biomolecular Science and Engineering, and Assessment.
2. Research projects to be performed at a Field Research Center addressing field scale biostimulation of microbiological processes that immobilize metals and/or radionuclides. Research would be conducted at the proposed NABIR Field Research. Interdisciplinary teams should include, at a minimum, experts in the fields of microbiology, geochemistry, and hydrology.

Proposals for research on Bacterial Transport and Systems Integration will not be addressed at this time. Proposals for research on Bioremediation and its Societal Implications and Concerns (BASIC) will be solicited under a separate announcement.

### ***Research Projects Addressing Individual Elements***

Proposers for research projects within individual program elements should state which science element is most closely aligned with the proposed research. Although proposers may propose

research that transcends more than one research element, a primary element should be specified for the purpose of merit review.

**Biogeochemical Dynamics:** Successful bioremediation of metals and radionuclides at DOE sites is closely linked to understanding the complex and dynamic interplay of hydrological, geochemical, and biological processes within geological media. Understanding the natural biogeochemical processes that control the mobility and form of radionuclides is one of the most challenging problems affecting the future viability of bioremediation at DOE sites, particularly within the thick vadose zones and saturated zones below the root zone where much of the contamination resides.

DOE cleanup problems are at the field scale; the immediate priority in biogeochemical dynamics is to understand the underlying mechanisms and processes governing metal and radionuclide behavior to the field. Focus will be on understanding how natural biogeochemical processes control the mobility and stability of contaminants in waste mixtures, including the biogeochemical processes that modify the form and behavior of contaminants in mixtures. New and creative scientific approaches are sought that address the following fundamental research questions:

- What are the principal biogeochemical reactions that govern the concentration, chemical speciation, and distribution of metals and radionuclides between the aqueous and solid phases?
- What are the thermodynamic and kinetic controls on these reactions?
- What are the major factors controlling the rate and extent of oxidation and reduction of multivalent radionuclides and naturally-occurring metals in various mineral phases? How can these factors be manipulated to enhance or limit the mobility of contaminants?
- What are the biogeochemical and transport processes that control biological availability, transformation, and movement of radionuclides and metals?

**Biotransformation:** Biotransformation of metals and radionuclides in subsurface environments is poorly understood, and predictive models based on laboratory studies have not always accurately simulated the observed fate of metals and radionuclides in the field. Knowledge of the metabolic pathways for transformation of these contaminants by naturally occurring microbial communities in vadose zones, saturated zones and the waste plume is needed. It is important to understand the kinetics of desirable metal and radionuclide biotransformations and the physicochemical factors affecting those kinetics. Research is needed to address questions such as:

- What are the metal- and radionuclide-transforming capabilities of indigenous microorganisms in deep vadose or saturated zones representative of DOE sites?
- What are the metabolic pathways for microbial transformation of metals and radionuclides, and can these biological processes be harnessed to sequester metals and/or radionuclides in the subsurface?
- What factors control the kinetics of desirable metal and radionuclide biotransformations in vadose and saturated zones?

- How important are microbial consortial interactions in the biotransformation of metals and radionuclides?
- How is the biotransformation of metals and radionuclides affected by chelators?

**Community Dynamics and Microbial Ecology:** Fundamental research in Community Dynamics and Microbial Ecology at both the molecular and the microbial level is needed to understand the natural intrinsic processes of bioremediation at contaminated sites. Knowledge of microbial community structure and function may ultimately provide the ability to control or stimulate subsurface communities capable of transformation of radionuclides and metals. The influence of environmental factors on subsurface communities is important to determining the potential for metal and radionuclide biotransformation. Research should be directed toward the characterization of microbial communities at contaminated sites, and toward understanding microbial community dynamics in the presence of metals and radionuclides. Research is needed to address questions such as:

- Is there sufficient biological activity and diversity in subsurface environments to support natural and/or accelerated bioremediation of metals and radionuclides?
- What are the effects of metals and radionuclides on microbial community activity and diversity, including both metabolic and genetic activity and diversity?
- Do different microbial species interact within communities in subsurface environments contaminated with metals and radionuclides? Such interactions might include competition for substrate, or consortial interactions for transformation of metals and radionuclides.

**Biomolecular Science and Engineering:** The overall goal of research in the Biomolecular Science and Engineering element is to use molecular and structural biology to enhance understanding of bioremediation of metals and radionuclides, and to genetically modify macromolecules and microorganisms to improve their bioremedial activities. Using information and data gained from other program elements, the molecules, enzymes, and enzymatic pathways that are most effective for bioremediation of metals and radionuclides will be identified. DOE objectives and priorities for research in Biomolecular Science and Engineering are to: (i) identify, clone, and sequence novel genes and promoters important to the bioremediation of metals and radionuclides; (ii) construct or enhance bioremedial enzymatic pathways; and (iii) transfer key genes for bioremediation to microbes that can survive and compete effectively in a contaminated subsurface environment. Field release of genetically engineered microorganisms at the proposed FRC, however, will not be allowed. Research in these areas is encouraged that includes:

- How can we identify and characterize important genes, gene clusters, promoter elements, proteins, and protein pathways involved in the detoxification of metals and radionuclides or that affect the ability of organisms to live and survive under conditions in which metals and radionuclides are present in significant amounts?
- How can we identify and characterize genes, gene clusters, and promoter elements from different organisms that can work together to effect bioremediation?

- How can we identify and characterize the transfer or acquisition of genes, gene clusters, and promoter elements from one organism to another that can influence processes involved in bioremediation?
- What novel and innovative technologies for the identification and characterization of genes, gene clusters, promoters, and pathways involved in bioremediation can be explored and, on a field scale, used?

**Assessment:** The two primary objectives of research in the Assessment program element are to study innovative and effective methods for assessing or quantifying (i) bioremediation rate and activity, including microbial community structure and dynamics, biotransformation processes and rates, and electron flow; and (ii) bioremediation end points, including not only the concentration and speciation of the contaminants and byproducts but also the stability and bioavailability of residual end-products. NABIR will not, however, fund projects that examine human health risks of end points. Priority will be given to research proposals that could lead to fieldable, cost-effective, real time assessment techniques and/or instrumentation. Assessment research addressing bacterial transport will not be covered in this solicitation. Research is sought to answer questions such as:

- Can quantitative techniques be adapted or developed for measurement of microbial community structure, activity, and effectiveness during bioremediation?
- What are the geophysical, geochemical, and hydrologic properties critical to bioremediation effectiveness and how can they be quantitatively determined?
- Can bioremediation endpoints that accurately measure bioavailability be quantitatively established?

### ***Field Scale Bioremediation Experiment***

Although bioremediation of metals and radionuclides has been studied in the laboratory, and bioremediation technologies have been demonstrated in the field, there are few examples of carefully controlled, hypothesis-driven, in situ bioremediation research at the field-scale. The availability of contaminated sites for NABIR research at the proposed Field Research Center would create an opportunity for such field scale experiments. The focus of the first set of field experiments at the proposed FRC would be on immobilization of metals or radionuclides in situ by microbiological processes.

Proposers should propose a testable hypothesis for field research, and they should describe a detailed technical approach that should include 1) establishing an experimental and control plot within the proposed contaminated field site, and 2) manipulating the experimental plot by amendments of nutrients or other chemicals that might stimulate microbial communities to immobilize contaminants such as uranium. A statistically robust sampling regimen to determine the efficacy of the manipulation should also be described. Moreover, the proposer must explain the technical feasibility of performing the proposed field research.

The proposers should propose research to be performed as an interdisciplinary team including, at a minimum, expertise in microbiology, geochemistry and hydrology. The Principal Investigator for the team must have prior experience in relevant field research. Multi-institutional

partnerships are strongly encouraged; for example, proposers may draw expertise from National Laboratories, academia, and other institutions engaged in basic research. The proposers should also describe how they would communicate their proposed experimental design and their results to stakeholders, regulators, and community groups. Although compliance with NEPA is the responsibility of DOE, awardees proposing to conduct field research are expected to provide information necessary for the DOE to complete the NEPA review and documentation. For further information on the proposed FRC, access the NABIR Homepage or contact Mr. Paul Bayer (paul.bayer@science.doe.gov).

**DATES:** Researchers are strongly encouraged (but not required) to submit a preproposal for programmatic review. Early submission of preproposals is encouraged, to allow time for review for programmatic relevance. A brief preproposal should consist of one or two pages of narrative describing the research objectives and methods.

The deadline for receipt of formal proposals is 4:30 p.m., E.S.T., February 28, 2000, to be accepted for merit review and to permit timely consideration for award late in Fiscal Year 2000 or in early Fiscal Year 2001. An original and seven copies of the proposal must be submitted; however, proposers are requested not to submit multiple proposals using more than one delivery or mail service.

**ADDRESSES:** If submitting a preproposal, referencing Program Announcement LAB 00-05, it should be sent by e-mail to [anna.palmisano@science.doe.gov](mailto:anna.palmisano@science.doe.gov).

Formal proposals referencing Program Announcement LAB 00-05 on the cover page must be forwarded to: U.S. Department of Energy, Office of Science, Office of Biological and Environmental Research, SC-74, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 00-05. This address must also be used when submitting proposals by U.S. Postal Service Express Mail or any other commercial overnight delivery service, or when hand-carried by the proposer.

**FOR FURTHER INFORMATION CONTACT:** Dr. Anna Palmisano, Environmental Sciences Division, SC-74, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, telephone: (301) 903-9963, e-mail: [anna.palmisano@science.doe.gov](mailto:anna.palmisano@science.doe.gov), fax: (301) 903-8519.

### **Program Funding**

It is anticipated that approximately \$5 million will be available for multiple awards to be made in late FY 2000 and early FY 2001 in the categories described above, contingent on availability of appropriated funds. Proposals 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 five scientific research element projects are expected to range from \$100,000 to \$400,000 total costs. Annual budgets for interdisciplinary field research projects at the proposed FRC are expected to range from \$300,000 - \$1,000,000 for total costs. Costs for drilling at the proposed FRC should not be included in the proposer's budget. DOE may encourage collaboration among prospective investigators to promote joint proposals or joint

research projects by using information obtained through the preproposals or through other forms of communication.

For this solicitation, 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 hypotheses being tested, the proposed experimental design, and the names of all investigators and their affiliations). Attachments should include short curriculum vitae, 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>.

Any recipient of an award from SC performing research involving recombinant DNA molecules and/or organisms and viruses containing recombinant DNA molecules shall comply with NIH "Guidelines for Research Involving Recombinant DNA Molecules," which is available via the world wide web at: <http://www.niehs.nih.gov/odhsb/biosafe/nih/rdna-apr98.pdf>, (59 FR 34496, July 5, 1994,) or such later revision of those guidelines as may be published in the Federal Register.

Awardees must also comply with other federal and state laws and regulations as appropriate, for example, the Toxic Substances Control Act (TSCA) as it applies to genetically modified organisms. Although compliance with NEPA is the responsibility of DOE, awardees proposing to conduct field research are expected to provide information necessary for the DOE to complete the NEPA review and documentation.

Additional information on the NABIR Program is available at the following web site: <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 instructions and format described below should be followed. Reference Program Announcement LAB 00-05 on all submissions and inquiries about this program.

**OFFICE OF SCIENCE**  
**GUIDE FOR PREPARATION OF SCIENTIFIC/TECHNICAL PROPOSALS**  
**TO BE SUBMITTED BY NATIONAL LABORATORIES**

Proposals from National Laboratories submitted to the Office of Science (SC) as a result of this program announcement will follow the Department of Energy Field Work Proposal process with additional information requested to allow for scientific/technical merit review. The following guidelines for content and format are intended to facilitate an understanding of the requirements necessary for SC to conduct a merit review of a proposal. Please follow the guidelines carefully, as deviations could be cause for declination of a proposal without merit review.

**1. Evaluation Criteria**



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

Scientific and/or technical merit of the project

Appropriateness of the proposed method or approach

Competency of the personnel and adequacy of the proposed resources

Reasonableness and appropriateness of the proposed budget

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement, the uniqueness of the proposer's capabilities, and demonstrated usefulness of the research for proposals in other DOE Program Offices as evidenced by a history of programmatic support directly related to the proposed work.

## **2. Summary of Proposal Contents**

Field Work Proposal (FWP) Format (Reference DOE Order 5700.7C) (DOE ONLY)

Proposal Cover Page

Table of Contents

Abstract

Narrative

Literature Cited

Budget and Budget Explanation

Other support of investigators

Biographical Sketches

Description of facilities and resources

Appendix

### **2.1 Number of Copies to Submit**

An original and seven copies of the formal proposal/FWP must be submitted.

## **3. Detailed Contents of the Proposal**

Proposals must be readily legible, when photocopied, and must conform to the following three requirements: the height of the letters must be no smaller than 10 point with at least 2 points of spacing between lines (leading); the type density must average no more than 17 characters per inch; the margins must be at least one-half inch on all sides. Figures, charts, tables, figure legends, etc., may include type smaller than these requirements so long as they are still fully legible.

### **3.1 Field Work Proposal Format (Reference DOE Order 5700.7C) (DOE ONLY)**

The Field Work Proposal (FWP) is to be prepared and submitted consistent with policies of the investigator's laboratory and the local DOE Operations Office. Additional information is also requested to allow for scientific/technical merit review.

Laboratories may submit proposals directly to the SC Program office listed above. A copy should also be provided to the appropriate DOE operations office.

### **3.2 Proposal Cover Page**

The following proposal cover page information may be placed on plain paper. No form is required.

Title of proposed project  
SC Program announcement title  
Name of laboratory  
Name of principal investigator (PI)  
Position title of PI  
Mailing address of PI  
Telephone of PI  
Fax number of PI  
Electronic mail address of PI  
Name of official signing for laboratory\*  
Title of official  
Fax number of official  
Telephone of official  
Electronic mail address of official  
Requested funding for each year; total request  
Use of human subjects in proposed project:  
    If activities involving human subjects are not planned at any time during the proposed project period, state "No"; otherwise state "Yes", provide the IRB Approval date and Assurance of Compliance Number and include all necessary information with the proposal should human subjects be involved.  
Use of vertebrate animals in proposed project:  
    If activities involving vertebrate animals are not planned at any time during this project, state "No"; otherwise state "Yes" and provide the IACUC Approval date and Animal Welfare Assurance number from NIH and include all necessary information with the proposal.  
Signature of PI, date of signature  
Signature of official, date of signature\*

\*The signature certifies that personnel and facilities are available as stated in the proposal, if the project is funded.

### **3.3 Table of Contents**

Provide the initial page number for each of the sections of the proposal. Number pages consecutively at the bottom of each page throughout the proposal. Start each major section at the top of a new page. Do not use unnumbered pages and do not use suffices, such as 5a, 5b.

### **3.4 Abstract**

Provide an abstract of no more than 250 words. Give the broad, long-term objectives and what the specific research proposed is intended to accomplish. State the hypotheses to be tested. Indicate how the proposed research addresses the SC scientific/technical area specifically described in this announcement.

### **3.5 Narrative**

The narrative comprises the research plan for the project and is limited to 25 pages. It should contain the following subsections:

**Background and Significance:** Briefly sketch the background leading to the present proposal, critically evaluate existing knowledge, and specifically identify the gaps which the project is intended to fill. State concisely the importance of the research described in the proposal. Explain the relevance of the project to the research needs identified by the Office of Science. Include references to relevant published literature, both to work of the investigators and to work done by other researchers.

**Preliminary Studies:** Use this section to provide an account of any preliminary studies that may be pertinent to the proposal. Include any other information that will help to establish the experience and competence of the investigators to pursue the proposed project. References to appropriate publications and manuscripts submitted or accepted for publication may be included.

**Research Design and Methods:** Describe the research design and the procedures to be used to accomplish the specific aims of the project. Describe new techniques and methodologies and explain the advantages over existing techniques and methodologies. As part of this section, provide a tentative sequence or timetable for the project.

**Subcontract or Consortium Arrangements:** If any portion of the project described under "Research Design and Methods" is to be done in collaboration with another institution, provide information on the institution and why it is to do the specific component of the project. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation", "Biographical Sketches", and "Description of Facilities and Resources".

### **3.6 Literature Cited**

List all references cited in the narrative. Limit citations to current literature relevant to the proposed research. Information about each reference should be sufficient for it to be located by a reviewer of the proposal.

### **3.7 Budget and Budget Explanation**

A detailed budget is required for the entire project period, which normally will be three years, and for each fiscal year. It is preferred that DOE's budget page, Form 4620.1 be used for providing budget information\*. Modifications of categories are permissible to comply with institutional practices, for example with regard to overhead costs.

A written justification of each budget item is to follow the budget pages. For personnel this should take the form of a one-sentence statement of the role of the person in the project. Provide a detailed justification of the need for each item of permanent equipment. Explain each of the other direct costs in sufficient detail for reviewers to be able to judge the appropriateness of the amount requested.

Further instructions regarding the budget are given in section 4 of this guide.

\* Form 4620.1 is available at web site: <http://www.sc.doe.gov/production/grants/forms.html>

### **3.8 Other Support of Investigators**

Other support is defined as all financial resources, whether Federal, non-Federal, commercial or institutional, available in direct support of an individual's research endeavors. Information on active and pending other support is required for all senior personnel, including investigators at collaborating institutions to be funded by a subcontract. For each item of other support, give the organization or agency, inclusive dates of the project or proposed project, annual funding, and level of effort devoted to the project.

### **3.9 Biographical Sketches**

This information is required for senior personnel at the laboratory submitting the proposal and at all subcontracting institutions. The biographical sketch is limited to a maximum of two pages for each investigator.

### **3.10 Description of Facilities and Resources**

Describe briefly the facilities to be used for the conduct of the proposed research. Indicate the performance sites and describe pertinent capabilities, including support facilities (such as machine shops) that will be used during the project. List the most important equipment items already available for the project and their pertinent capabilities. Include this information for each subcontracting institution, if any.

### **3.11 Appendix**

Include collated sets of all appendix materials with each copy of the proposal. Do not use the appendix to circumvent the page limitations of the proposal. Information should be included that may not be easily accessible to a reviewer.

Reviewers are not required to consider information in the Appendix, only that in the body of the proposal. Reviewers may not have time to read extensive appendix materials with the same care as they will read the proposal proper.

The appendix may contain the following items: up to five publications, manuscripts (accepted for publication), abstracts, patents, or other printed materials directly relevant to this project, but not generally available to the scientific community; and letters from investigators at other institutions stating their agreement to participate in the project (do not include letters of endorsement of the project).

#### **4. Detailed Instructions for the Budget**

(DOE Form 4620.1 "Budget Page" may be used)

##### **4.1 Salaries and Wages**

List the names of the principal investigator and other key personnel and the estimated number of person-months for which DOE funding is requested. Proposers should list the number of postdoctoral associates and other professional positions included in the proposal and indicate the number of full-time-equivalent (FTE) person-months and rate of pay (hourly, monthly or annually). For graduate and undergraduate students and all other personnel categories such as secretarial, clerical, technical, etc., show the total number of people needed in each job title and total salaries needed. Salaries requested must be consistent with the institution's regular practices. The budget explanation should define concisely the role of each position in the overall project.

##### **4.2 Equipment**

DOE defines equipment as "an item of tangible personal property that has a useful life of more than two years and an acquisition cost of \$5000 or more." Special purpose equipment means equipment which is used only for research, scientific or other technical activities. Items of needed equipment should be individually listed by description and estimated cost, including tax, and adequately justified. Allowable items ordinarily will be limited to scientific equipment that is not already available for the conduct of the work. General purpose office equipment normally will not be considered eligible for support.

##### **4.3 Domestic Travel**

The type and extent of travel and its relation to the research should be specified. Funds may be requested for attendance at meetings and conferences, other travel associated with the work and subsistence. In order to qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Consultant's travel costs also may be requested.

##### **4.4 Foreign Travel**

Foreign travel is any travel outside Canada and the United States and its territories and possessions. Foreign travel may be approved only if it is directly related to project objectives.

#### **4.5 Other Direct Costs**

The budget should itemize other anticipated direct costs not included under the headings above, including materials and supplies, publication costs, computer services, and consultant services (which are discussed below). Other examples are: aircraft rental, space rental at research establishments away from the institution, minor building alterations, service charges, and fabrication of equipment or systems not available off-the-shelf. Reference books and periodicals may be charged to the project only if they are specifically related to the research.

##### **a. Materials and Supplies**

The budget should indicate in general terms the type of required expendable materials and supplies with their estimated costs. The breakdown should be more detailed when the cost is substantial.

##### **b. Publication Costs/Page Charges**

The budget may request funds for the costs of preparing and publishing the results of research, including costs of reports, reprints page charges, or other journal costs (except costs for prior or early publication), and necessary illustrations.

##### **c. Consultant Services**

Anticipated consultant services should be justified and information furnished on each individual's expertise, primary organizational affiliation, daily compensation rate and number of days expected service. Consultant's travel costs should be listed separately under travel in the budget.

##### **d. Computer Services**

The cost of computer services, including computer-based retrieval of scientific and technical information, may be requested. A justification based on the established computer service rates should be included.

##### **e. Subcontracts**

Subcontracts should be listed so that they can be properly evaluated. There should be an anticipated cost and an explanation of that cost for each subcontract. The total amount of each subcontract should also appear as a budget item.

#### **4.6 Indirect Costs**

Explain the basis for each overhead and indirect cost. Include the current rates.