

**Program Announcement  
To DOE National Laboratories  
LAB 10-04**

***Climate Uncertainties  
at Regional and Global Scales***

**SUMMARY:**

The Office of Biological and Environmental Research (BER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving peer-reviewable Field Work Proposals (FWPs) on the topic of *Climate Uncertainties at Regional and Global Scales under the Regional and Global Climate Modeling* (RGCM) program.

The development of climate models over the last two decades has enabled better representation of processes and simulation of many features of the mean climate and its variability. However, climate model simulations persistently show significant biases, especially at regional scales. In addition, biases in global model simulations have led to the identification of important uncertainties about the details of the underlying feedback processes in models. Accordingly, there are pressing needs to: 1) evaluate methods of climate modeling at regional scales and develop innovative concepts and modeling frameworks for integrating results across various spatial scales, and 2) develop insights on process feedbacks contained in both coupled-climate models and Earth System Models (ESMs) and characterize uncertainties associated with those processes.

High risk, high pay-off research ideas that explore innovative new directions to help quantify climate uncertainties at regional and global scales are encouraged; they should clearly describe how the proposed ideas have the potential to lead to breakthroughs in the modeling of climate at regional and global scales. BER's strategy for basic research in climate science is described in a recent strategic plan (<http://www.sc.doe.gov/ober/Climate%20Strategic%20Plan.pdf>). BER encourages potential researchers to review this plan to familiarize themselves with the program and its strategic goals.

**PREPROPOSALS:**

Potential researchers are **required** to submit a brief preproposal, referencing Program Announcement LAB 10-04 for receipt by DOE by 4:30 p.m., Eastern Time, **January 22, 2010**. Preproposals will be reviewed for conformance with the guidelines presented in this Announcement and suitability in the technical areas specified in this Announcement. The lead Principal Investigator will be notified via email by **February 1, 2010** if the submission of a formal proposal is encouraged. Researchers who have not received a response regarding the status of their preproposal by this date are responsible for contacting the program to confirm their status. Only those preproposals that receive notification from DOE encouraging submission of a proposal may submit full proposals.

Preproposals referencing Program Announcement LAB 10-04 should be sent as PDF file attachment via e-mail to: Renu.Joseph@science.doe.gov with "Preproposal 10-04: Climate Uncertainties at Regional and Global Scales" as the subject. No FAX or mail submission of preproposals will be accepted. The preproposal must not exceed three pages and it should contain a descriptive narrative of the research objectives, the technical approach(s), and the proposed team members and their expertise. The preproposal should identify, on the first page, the title of the project, principal investigator name(s), DOE national laboratory name, telephone number, fax number, and e-mail address and the amount of funding requested for each year for the project for each funded investigator. The intent in requesting a preproposal is to save the time and effort of applicants in preparing and submitting a formal proposal that may be inappropriate for the program. Preproposals will be reviewed relative to the scope and research needs as outlined in the SUMMARY and the SUPPLEMENTARY INFORMATION sections. No biographical data need be included, nor is an institutional endorsement necessary.

**DATES:**

Full proposals submitted in response to this Announcement must be received no later than **March 26, 2010**, 8:00 p.m., Eastern Time, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2010.

Please see the ADDRESSES section below for further instructions on the method of submission for the proposal.

**ADDRESSES and SUBMISSION INSTRUCTIONS:**

Have your LAB administrator submit the entire LAB proposal and FWP via Searchable FWP (<https://www.osti.gov/fwp>). If you have questions about who your LAB administrator is or how to use Searchable FWP, please contact the Searchable FWP Support Center.

Please submit, via Federal Express, a single PDF file of the entire LAB proposal and FWP on a CD along with two hard copies to the address below. This will assist in expediting the review process.

**Please send the CD and 2 hard copies via Federal Express to:**

Karen Carlson-Brown  
Climate and Environmental Sciences Division, SC-23.1  
Office of Biological and Environmental Research  
Office of Science  
19901 Germantown Road  
Germantown, MD 20874-1290  
ATTN: Program Announcement LAB 10-04

**For further information contact:**

Dr. Renu Joseph  
Program Manager  
Regional and Global Climate Modeling

Climate and Environmental Sciences Division

Tel: (301) 903-9237

Email: Renu.Joseph@science.doe.gov

## **SUPPLEMENTARY INFORMATION:**

BER's climate science activity has established the following Long Term Measure (LTM) for its programs: *Deliver improved scientific data and models about the potential response of the Earth's climate and terrestrial biosphere to increased greenhouse gas levels for policy makers to determine safe levels of greenhouse gases in the atmosphere.* The Regional and Global Climate Modeling (RGCM) program supports this LTM by undertaking scientific studies using state-of-the-science coupled-climate and earth system models, with a focus on analyzing climate variability and climate change projections and providing a pathway to improve the coupled models. The temporal scales of interest in the program range from decadal to centennial.

In FY 2010, BER will address the following topics in *Climate Uncertainties at Regional and Global Scales* under the RGCM Program:

### **1) Development of the Regional Modeling Framework for Systematic Evaluation and Characterization of Methods**

Currently climate variability and change at regional scales are studied using the following suite of modeling approaches: uniform high-resolution global modeling, variable resolution global modeling, dynamical downscaling using regional climate models, and statistical downscaling. The choice of a particular set of modeling techniques to obtain regional climate information depends to a large extent on the science question that is being addressed. This Announcement encourages proposals that develop a coordinated approach to evaluate and identify the methods/combination of modeling techniques that produce robust regional information, including quantification of uncertainties, for current and future climate. The aim of these proposals should be to develop a modeling framework that tests the veracity of the various techniques for a given science question. It is anticipated that such a framework will lead to a methodology for the creation of high resolution climate information for other science questions and regions. Possible science questions can be related to the ability of models and techniques to capture prolonged droughts and/or extreme events in the current and future climate scenarios.

### **2) Characterization of Climate Feedbacks and their Uncertainties**

Feedback processes play a crucial role in amplifying or dampening the climate response of the earth system to both anthropogenic forcing and natural variability. The feedback processes that will be considered as part of this Announcement are: 1) Cloud-Climate feedbacks, and 2) Carbon Cycle-Climate feedbacks. The aim of the proposed work should be to quantify the feedback processes and address the fidelity of the models that capture these processes. Sophisticated statistical tools can be used to highlight the sensitivities of the feedback processes and these can include the use of novel metrics tailored for the problem.

#### **a) Cloud-Climate Feedbacks**

Cloud feedback has been identified as a particularly important process responsible for the spread among projections in general circulation models. Inter-model differences in cloud feedbacks are largely attributable to short-wave cloud feedback components. Moreover responses to both deep convective and low-level clouds differ markedly among climate models with marine stratus clouds contributing the most to cloud feedbacks. This Announcement encourages studies that examine cloud-related feedback processes in coupled global and/or regional models: Use of the results of Coupled Model Intercomparison Project Phase 5 (CMIP5; <http://cmip-pcmdi.llnl.gov/cmip5>) models are encouraged, as are sensitivity experiments on a range of spatial scales. The use of Atmospheric Radiation Measurement (ARM) Climate Research Facility (ACRF; <http://www.arm.gov/>) ACRF data, Cloud Feedback Intercomparison Project (CFMIP) Observational Simulator Package (COSP; <http://cfmip.metoffice.com/COSP.html>) and other relevant data are also encouraged as part of this Announcement. Proposals should address physical processes in the current and future climate.

### **b) Carbon Cycle-Climate Feedbacks**

Carbon cycle-climate interactions are among the most significant feedback processes in the context of climate change projections. Recent research has highlighted the reduction in uptake of carbon both over the land and ocean thereby producing a positive feedback on climate change. In addition, the warming of the terrestrial biosphere triggers climate-relevant processes that also have feedbacks. Different models portray these processes with varying strengths. Studies to examine the carbon-climate feedback can either use ESMs for sensitivity analyses or results from the new suite of CMIP5 simulations, to characterize the feedback processes in detail. Studies that quantify the feedback on global scales, for latitudinal regions, and regional scales are invited as part of this Announcement. It is desirable for the results to provide the relative attribution of the different carbon-feedbacks. Use of Ameriflux data (<http://public.ornl.gov/ameriflux/>) or other relevant data for the evaluation of processes in models is particularly encouraged.

Proposed research is intended to fill critical knowledge gaps, including the exploration of some high-risk approaches. BER also encourages the submission of innovative "high-risk" proposals with potential for future high impact on climate uncertainties at regional and global scales. The probability of success and the risk-reward balance will be considered when making funding decisions.

**Data Sharing Policy:** Research data obtained through public funding are a public trust. As such, these data must be publicly accessible. To be in compliance with the data policy of the U.S. Global Change Research Program of full and open access to global change research data, proposals submitted in response to this Announcement must include a description of the researcher's data sharing plans if the proposed research involves the acquisition of data in the course of the research that would be of use to the climate change research and assessment communities. This includes data from extensive, long-term observations and experiments and from long-term model simulations of climate that would be costly to duplicate. The description must include plans for sharing the data that are to be acquired in the course of the proposed research, particularly how the acquired data will be preserved, documented, and quality assured,

and where it will be archived for access by others. Data of potentially broad use in climate change research and assessments should be archived, when possible, in data repositories for subsequent dissemination. Examples of DOE-funded data repositories may be found at <http://cdiac.ornl.gov/>, [http://www-pcmdi.llnl.gov/ipcc/about\\_ipcc.php](http://www-pcmdi.llnl.gov/ipcc/about_ipcc.php). The repository where the researcher intends to archive the data should be notified in advance of the intention, contingent on a successful outcome of the proposal review. If data are to be archived at the researcher's home institution or in some other location, the proposal must describe how, where, and for how long the data will be documented and archived for access by others. Researchers are allowed an initial period of exclusive use of the acquired data to quality assure it and to publish papers based on the data, but they are strongly encouraged to make the data openly available as soon as possible after this period. DOE's Office of Biological and Environmental Research defines the exclusive use period to be one year after the end of the data acquisition period for the proposed performance period of the award but exceptions to extend this period may be justified for unique or extenuating circumstances.

### **PROGRAM FUNDING:**

It is anticipated that up to \$5,000,000 will be available for awards in Fiscal Year 2010, contingent on the availability of appropriated funds. Proposals may request project support up to three years. Out-year support is contingent on the availability of funds and on the progress of research and programmatic needs. Multi-lab and/or multi-institutional proposals are particularly encouraged. Funding for this research will come from the RGCM program. DOE is under no obligation to pay for any costs associated with preparation or submission of proposals. DOE reserves the right to fund, in whole or in part, any, all, or none of the proposals submitted.

Contingent on satisfactory peer review, the approximate funding level of specific areas is indicated below:

- Development of the Regional Modeling framework for systematic evaluation and characterization of methods (\$3,000,000)
- Cloud-Climate Feedback (\$1,000,000)
- Carbon-cycle Climate Feedback (\$1,000,000)

Proposals should address only one of the specific areas listed above. However, there is no limitation to the number of proposals a LAB or a Principal Investigator can submit.

### **ELIGIBILITY:**

This is a DOE LAB-Only Announcement. Federally Funded Research and Development Centers (FFRDCs) from other agencies are not eligible to submit in response to this Announcement. Partnerships between DOE LABs and other researchers are encouraged, as appropriate. The lead DOE LAB should submit the proposal.

### **SUBMISSION INFORMATION FOR FORMAL PROPOSALS:**

The instructions and format described below must be followed. All submissions and inquiries about this Program Announcement must reference Program Announcement LAB 10-04.

The research project narrative must not exceed 20 pages exclusive of attachments. The proposals must include a one-page abstract of the proposed research. All collaborators should be listed with the abstract. Attachments should include curriculum vitae, 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 limited to no more than two pages per individual. All proposals submitted in response to this Announcement must explicitly state how the proposed project will support accomplishment of the BER climate science activity LTM.

The following is a list of essential items that a proposal must contain:

1) **Field Work Proposal (FWP) Format** - Complete and signed by appropriate officials

2) **Proposal Cover Page**

3) **Table of Contents**

4) **Budget Page(s) (Form DOE F 4620.1)** - Complete a separate Budget Page for the entire multi-year period for each separate participating institution. If more than one theme is being addressed in the proposal, a budget breakdown in terms of the themes is also required.

5) **Other Project Information**

a) **A one-page abstract (on a page by itself)**. The abstract should include: name of the laboratory; name of the principal investigator and the principal investigator's email address and phone number; name of the co-principal investigator(s) (if any) and their email address(es) and phone number(s); an abstract of the project narrative.

b) **Project Narrative: (limit 20 pages)** A detailed description of the proposed project (research plan), including the justification and objectives of the project, its relationship to the Office of Science program and the researcher's plan for carrying it out. The narrative should be limited to 20 pages maximum (8.5x11-inch pages of single-spaced, standard 11-point type with 1-inch margins), exclusive of attachments such as figures or references. i) Introduction - Should contain enough background material, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. ii) Research Plan - The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the method to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities. Include a plan that describes how the project results or resources will be disseminated in a timely manner and in an accessible and usable form to the broader scientific community. iii) Management Plan for multi-lab proposals - Should outline how the work will be coordinated among the participating institutions, the overall chain of command, the

communication plan, the leads for each area, the overall allocation of resources among the various partners, etc.

c) **Curriculum Vitae:** Detailed information about the background and experience of the principal investigator and co-principal investigator (if any). Biographical sketches are limited to two pages for the principal investigator, and two pages for the co-principal investigator (if any).

d) **Long Term Measure:** The proposal must explain how the proposed research will advance the BER climate science activity Long Term Measure detailed above.

e) **Facilities and Resources:** Include information on the experience of the proposer's organization, its facilities, and resources that would be relevant to successful operation of the project.

f) **Statement of all current and pending support** for the principal investigator and co-principal investigator (if any), including the time devoted to each project by the principal investigator and co-principal investigator (if any).

The instructions and format described should be followed. You must reference Program Announcement LAB 10-04 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**

After an initial screening for eligibility and responsiveness to this Announcement, proposals will be subjected to a formal scientific merit review (peer review). The proposals will be evaluated against the following criteria, which are listed in descending order of importance:

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

The evaluation process will include program policy factors such as the relevance of the proposed research to the terms of the Announcement and the agencies' programmatic needs. Note that external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and

submission of a proposal constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

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

- Field Work Proposal (FWP) Format (Reference DOE Order 412.1A) (DOE ONLY)
- Proposal Cover Page
- Table of Contents
- Budget (DOE Form 4620.1) and Budget Explanation
- Abstract (one page)
- Narrative (main technical portion of the proposal, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel - 20-page limit)
- Literature Cited
- Biographical Sketch(es)
- Description of Facilities and Resources
- Other Support of Investigator(s)
- Appendix (optional)

### **2.1 Submission Instructions**

Have your LAB administrator submit the entire LAB proposal and FWP via Searchable FWP (<https://www.osti.gov/fwp>). If you have questions about who your LAB administrator is or how to use Searchable FWP, please contact the Searchable FWP Support Center.

Please submit, via Federal Express, a single PDF file of the entire LAB proposal and FWP on a CD along with two hard copies to the address below. This will assist in expediting the review process.

#### **Please send the CD and 2 hard copies via Federal Express to:**

Karen Carlson-Brown  
Climate and Environmental Sciences Division, SC-23.1  
Office of Biological and Environmental Research  
Office of Science  
19901 Germantown Road  
Germantown, MD 20874-1290  
ATTN: Program Announcement LAB 10-04

#### **For further information contact:**

Dr. Renu Joseph  
Program Manager  
Regional and Global Climate Modeling  
Climate and Environmental Sciences Division  
Tel: (301) 903-9237  
Email: Renu.Joseph@science.doe.gov

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

Adherence to type size and line spacing requirements is necessary for several reasons. No researcher should have the advantage, or by using small type, of providing more text in his or her proposal. Small type may also make it difficult for reviewers to read the proposal. Proposals must have 1-inch margins at the top, bottom, and on each side. Type sizes must be at least 11 point. Line spacing is at the discretion of the researcher but there must be no more than 6 lines per vertical inch of text. Pages should be standard 8 1/2" x 11" (or metric A4, i.e., 210 mm x 297 mm).

### **3.1 Field Work Proposal Format (Reference DOE Order 412.1A) (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.

### **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 Budget and Budget Explanation**

A detailed budget is required for the entire project period 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.science.doe.gov/grants/budgetform.pdf>

### **3.5 Abstract**

Summarize the proposal in one page. Give the project objectives (in broad scientific terms), the approach to be used, and what the research is intended to accomplish. State the hypotheses to be tested (if any). At the top of the abstract give the lead DOE national Laboratory, project title, names of all the investigators and their institutions, and contact information for the principal investigator, including e-mail address.

**3.6 Narrative** (main technical portion of the proposal, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel).

The narrative comprises the research plan for the project and is limited to **20 pages (maximum)**. It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities. It is important that the 20-page technical information section

provide a complete description of the proposed work, because reviewers are not obliged to read the Appendices. Proposals exceeding these page limits may be rejected without review.

All proposals submitted in response to this LAB Announcement must explicitly state how the proposed project will support the accomplishment of the BER climate science Long Term Measure.

If any portion of the project is to be done in **collaboration** with another institution (or institutions), provide information on the institution(s) and what part of the project it will carry out. 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."

### **3.7 Literature Cited**

Give full bibliographic entries for each publication cited in the narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Principal investigators should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal.

### **3.8 Biographical Sketches**

This information is required for senior personnel at the institution submitting the proposal and at all subcontracting institutions (if any). The biographical sketch is limited to a maximum of two pages for each investigator and must include:

*Education and Training.* Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

*Research and Professional Experience.* Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

*Publications.* Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

*Synergistic Activities.* List no more than five professional and scholarly activities related to the effort proposed.

To assist in the identification of potential conflicts of interest or bias in the selection of reviewers, the following information must also be provided in each biographical sketch.

*Collaborators and Co-editors:* A list of all persons in alphabetical order (including their current organizational affiliations) who are currently, or who have been, collaborators or co-authors with the investigator on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of the proposal. Also, include those individuals who are currently or have been co-editors of a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of the proposal. Finally, list any individuals who are not listed in the previous categories with whom you are discussing future collaborations. If there are no collaborators or co-editors to report, this should be so indicated.

*Graduate and Postdoctoral Advisors and Advisees:* A list of the names of the individual's own graduate advisor(s) and principal postdoctoral sponsor(s), and their current organizational affiliations. A list of the names of the individual's graduate students and postdoctoral associates during the past five years, and their current organizational affiliations.

### **3.9 Description of Facilities and Resources**

Facilities to be used for the conduct of the proposed research should be briefly described. Indicate the pertinent capabilities of the institution, 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).

### **3.10 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 (months per year or percentage of the year) devoted to the project.

### **3.11 Appendix**

Information not easily accessible to a reviewer may be included in an appendix, but **do not use the appendix to circumvent the page limitations of the proposal**. Reviewers are not required to consider information in an appendix, and reviewers may not have time to read extensive appendix materials with the same care they would use with 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 \$50,000 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.