

Program Announcement To DOE National Laboratories

LAB 00-11

Atmospheric Chemistry Program

The Office of Biological and Environmental Research (OBER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving proposals for participation in the Atmospheric Chemistry Program (ACP) Science Team. The research program supports the Department's Global Change Research Program, the U.S. Global Change Research Program, and the Administration's goals to understand atmospheric chemistry associated with air quality and climate change. Of particular interest are experimental and theoretical studies of atmospheric chemistry processes affected by energy-related air pollutants, e.g., sulfur oxides, nitrogen oxides, organic aerosols, and tropospheric ozone.

Background: The goal of the overall Atmospheric Science Program of the Department of Energy (DOE) is to develop a comprehensive understanding of the atmospheric processes that control the transport, transformation, and fate of energy related chemicals and particulate matter. The drivers for the program include urban, regional, national, and global concerns for air quality, climate change (global warming), and other atmospheric issues related to energy policy. The current emphasis is upon urban and regional scales.

The objectives of the program are (1) to improve understanding of the chemical and physical processes affecting energy related air pollutants such as sulfur and nitrogen oxides, and tropospheric ozone, including gas-to-particle conversion processes, and the deposition and resuspension of aerosols; (2) to improve understanding of the meteorological processes that control the dispersion and air chemistry of energy-related trace gases and particulate matter in or released to the atmosphere; and (3) to develop predictive models for the above processes and acquire the data to test them.

The overall Atmospheric Science Program consists of several closely-related science programs and facilities. Each program or activity includes scientist-participants from DOE laboratories, other federal laboratories, colleges and universities, and private industry. All research projects are fully-peer reviewed.

The Atmospheric Chemistry Program (ACP): This program focuses on regional, continental, and global scale research on energy related air pollutants, including, a) chemical transformations relating to tropospheric energy-related materials in the troposphere, b) aerosol influences on air quality and climate forcing, and c) origin, fate, and characterization of fine particles in the atmosphere. Activities include field measurement campaigns, laboratory studies, modeling, and instrument development. More information can be obtained via the ACP web site at <http://www.atmos.anl.gov/ACP/>.

The Environmental Meteorology Program (EMP): This program focuses on the atmospheric transport of energy-related materials through specific and timely program components. Previous components include the Atmospheric Studies of COMplex Terrain (ASCOT), the Mexico City Air Quality Study (MCAQS), and the Atmospheric Boundary Layer Experiment (ABLE). The

current component and focus of EMP is the Vertical Transport and Mixing Program (VTMX). More information can be obtained via the VTMX web site at <http://www.pnl.gov/VTMX/>.

The NARSTO Program Office: The Atmospheric Science Program supports NARSTO (formerly known as the North American Research Strategy for Tropospheric Ozone). NARSTO is a public/private partnership, whose membership spans government, the utilities, industry, and academe throughout Mexico, the United States, and Canada. Recently the scope of interest has been broadened to include aerosols. More information can be obtained via the NARSTO web site at <http://www.cgenv.com/Narsto>.

The Research Aircraft Facility (RAF): The Research Aircraft Facility consists of a Gulfstream 1 (G1) twin turboprop aircraft research facility, equipped by participating scientists for measurements in atmospheric chemistry, aerosols, turbulence, and radiant energy. The G-1 is available to support ACP and EMP projects as well as related research endeavors by other agencies. More information can be obtained via the RAF web site at http://www.pnl.gov/atmos_sciences/as_g1.html.

The Tropospheric Aerosol Program (TAP): This program is under development. More information can be obtained via the TAP web site at <http://www.tap.bnl.gov>.

This Announcement is specific to the Atmospheric Chemistry Program (ACP). ACP is concerned primarily with the atmospheric chemistry of energy related pollutants. Collaborations are maintained with counterparts in other agencies, e.g., EPA, NOAA, NSF, and NASA, as well as with other parts of DOE, i.e., and programs concerned with environmental issues related to energy consumption and/or energy production.

Research proposals are encouraged that demonstrate the continuity and progress of the DOE ACP during the 1997-2000 period (see research abstracts in <http://www.atmos.anl.gov/ACP>), i.e., new work that builds upon or complements previous ACP activities.

The objective of the ACP is to identify and understand the atmospheric processes that are key to anticipating and predicting the effects of energy-related emissions on air quality. This capability is needed by DOE for both short-range and long-range energy planning. Although ACP activities do not include research in human health or other biological sciences, those air quality issues that are related to human health and effects on ecosystems in the United States are currently of direct concern. Tropospheric processes are addressed that affect the amounts and geographic distribution of ozone, particulate matter, air toxics, and the associated precursors compounds near the surface of the Earth. Research is conducted by modeling, laboratory, and field studies. Analysis and publication of results, including those from past ACP field experiments, are an integral part of the ACP program.

Information on national issues that the DOE is addressing in coordination with other federal agencies can be found in several publications:

1. "Rethinking the Ozone Problem in Urban and Regional Air Pollution" by the Committee on Tropospheric Ozone Formation and Measurement of the National Research Council; "Air

Quality Research Subcommittee Strategic Plan" by the Committee on Environment and Natural Resources of the National Science and Technology Council.

http://www.nmic.noaa.gov/CENR/AQRS/Aqrs_sp.pdf.

2. "Research Priorities for Airborne Particulate Matter: I. Immediate Priorities and a Long-Range Research Portfolio" by the Committee on Research Priorities for Airborne Particulate Matter of the National Research Council.

3. "Research Priorities for Airborne Particulate Matter: II. Evaluating Research Progress and Updating the Portfolio" by the Committee on Research Priorities for Airborne Particulate Matter of the National Research Council.

4. "Global Environmental Change, Research Pathways for the Next Decade" by the Committee on Global Change Research of the National Research Council.

5. In addition, considerable information on current air quality issues involving ozone, aerosols, and volatile organic compounds can be found on the NARSTO web site

<http://www.cgenv.com/Narsto/>.

Categories

This ACP Program Announcement consists of three categories. Prospective investigators should explicitly specify in the abstract what category or categories are addressed by the proposed research. Individuals or groups intending to participate in field experiments should describe what measurements they intend to make and what instruments will be used to make them, and what process information the measurements are intended to provide. Those intending to analyze data from one or more instruments or who will use data in numerical or conceptual modeling should specify what data are required for their purposes.

Category 1. Oxidant Studies. Research to evaluate the causes of spatial and temporal variations in tropospheric concentrations of ozone and other oxidants, especially for areas that experience non-attainment of U.S. ozone standards. Modeling, theoretical, and experimental efforts to address geographic regions having different mixes of atmospheric trace chemicals and atmospheric transport conditions are encouraged. Studies of nighttime as well as daytime chemistry involving oxidants are encouraged. Research may include the application and testing of numerical models to evaluate the causes of high ozone concentrations over regional and urban scales and to generalize findings.

Category 2. Aerosol Studies. Research, in conjunction with ACP oxidant studies, to evaluate causes of spatial and temporal variations of tropospheric aerosol chemical composition and concentrations, particularly with regard to national standards on particulate matter and visibility (and issues of concern to human health). Topics of interest include particle nucleation and growth, processes affecting chemical composition, interactions with water, and aerosol characterization emphasizing particle chemical composition as a function of particle size. Numerical models may be used to develop methods of estimating aerosol composition over regional and urban scales.

Category 3. Heterogeneous Chemistry. Research on heterogeneous processes that affect chemical rates of reactions involving oxidants, nitrogen oxides, volatile organic compounds, and sulfur oxides, and precursors in the troposphere and planetary boundary layer. Studies that lead to information important for evaluating, simulating, and predicting oxidant and particle concentrations and composition are particularly encouraged. Topics of interest include reactions of nitrogen oxides on organic aerosol surfaces, halogen atom-releasing surface reactions, interactions of gas-phase organic gases with aerosol surfaces, interactions of inorganic gases with organic surfaces, photochemistry at the surface and aqueous phase reactions.

Programmatic Issues

Experimental field campaigns may be carried out in collaboration with the DOE Atmospheric Radiation Measurement Program, the DOE Environmental Meteorology Program, and with other relevant programs supported by federal, state, and private agencies. Collaborative efforts contributing to NARSTO are encouraged. Collaborative use of the DOE Research Aircraft Facility is also encouraged.

Possible future field studies are listed at the ACP web site. A diversity of atmospheric conditions, some of which might exist outside the United States, needs to be addressed by ACP. In such studies, the dynamic atmospheric conditions that affect chemical reactions need to be considered. Air-surface exchange rates of gases and particles are sometimes an important component of the atmospheric budget of chemicals.

Modeling and laboratory experiments are important aspects of this research. Modeling studies devoted to interpretation and generalization of the experimental findings are particularly encouraged. Laboratory studies may include studies of the reactions of oxidant precursors, formation and distribution of product species, aerosol formation, and heterogeneous processes relevant to oxidant formation and loss in the atmosphere. Development and deployment of advanced field instrumentation to make surface and aircraft-based observations necessary for ACP field studies are encouraged.

Educational Opportunities

Opportunities exist for the financial support of undergraduate and graduate students wishing to participate in this program through the Department of Energy's Global Change Education Program. Information can be obtained at <http://www.atmos.anl.gov/GCEP/>.

Program Funding

It is anticipated that up to \$4 million in first-year funding will be available to scientists in the DOE laboratories for participation in the Atmospheric Chemistry Program. Multiple awards are expected to be made in FY 2001 in the categories described above, contingent upon availability of appropriated funds. Proposers may request project support up to four years, with out-year support contingent on availability of appropriated funds, progress of the research, and programmatic needs. The number of awards and range of funding will depend on the number of

proposals received and selected for award. Typical annual budgets range from \$60,000 to \$200,000 in total costs. Some studies involving field measurements may have larger budgets.

DATES: Formal proposals in response to this Announcement must be received by 4:30 p.m., E.D.T., May 3, 2000 to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2001. Proposals that are collaborative with or complementary to DOE laboratory proposals are strongly encouraged.

ADDRESSES: Formal proposals referencing Program Announcement LAB 00-11 should be sent to: U.S. Department of Energy, Office of Science, Office of Biological and Environmental Research, Environmental Sciences Division, SC-74, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 00-11. 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. An original and seven copies of the proposal must be submitted.

FOR FURTHER INFORMATION CONTACT: Peter Lunn, 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) 903-4819, E-mail: peter.lunn@oer.doe.gov, fax: (301) 903-8519.

The research project description must be 20 pages or less, exclusive of attachments and must contain a 1 or 2-page abstract or summary of the proposed research and a 1 or 2-page statement of relevance to the DOE and national interest. On the SC grant face page, form DOE F 4650.2, in block 15, also provide the PI's phone number, fax number, and E-mail address. Attachments must include curriculum vitae, a listing of all current and pending federal support, and letters of intent when collaborations are part of the proposed research. Proposals should include detailed and justified budgets for each year of support requested. Lengthy proposal appendices are discouraged. 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>.

Although the required original and seven copies of the proposal must be submitted, researchers are asked to submit an electronic version of their abstract of the proposed research in ASCII format and their E-mail address to the Program Director for Atmospheric Sciences, Peter Lunn, by E-mail to peter.lunn@science.doe.gov.

The instructions and format described below should be followed. Reference Program Announcement LAB 00-11 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.