Office of Science
Notice 03-01

Annual Notice
Continuation of Availability of Grants and Cooperative Agreements

U.S. Department of Energy

Continuation of Solicitation for the Office of Science Financial Assistance Program - Notice 03-01

AGENCY: U.S. Department of Energy

ACTION: Annual Notice of Continuation of Availability of Grants and Cooperative Agreements

SUMMARY: The Office of Science (SC) of the Department of Energy (DOE) hereby announces its continuing interest in receiving grant applications for support of work in the following program areas: Basic Energy Sciences, High Energy Physics, Nuclear Physics, Advanced Scientific Computing, Fusion Energy Sciences, Biological and Environmental Research, and Energy Research Analyses. On September 3, 1992, DOE published in the Federal Register the Office of Energy Research Financial Assistance Program (now called the Office of Science Financial Assistance Program), 10 CFR Part 605, Final Rule, which contained a solicitation for this program. Information about submission of applications, eligibility, limitations, evaluation and selection processes and other policies and procedures are specified in 10 CFR Part 605.

DATES: Applications may be submitted until September 30, 2003, in response to this Notice of Availability.

ADDRESSES: Formal applications in response to this solicitation are to be electronically submitted by an authorized institutional business official through DOE's Industry Interactive Procurement System (IIPS) at: http://e-center.doe.gov/. IIPS provides for the posting of solicitations and receipt of applications in a paperless environment via the Internet. In order to submit applications through IIPS your business official will need to register at the IIPS website. The Office of Science will include attachments as part of this notice that provide the appropriate forms in PDF fillable format that are to be submitted through IIPS. Color images should be submitted in IIPS as a separate file in PDF format and identified as such. These images should be kept to a minimum due to the limitations of reproducing them. They should be numbered and referred to in the body of the technical scientific application as Color image 1, Color image 2, etc. Questions regarding the operation of IIPS may be e-mailed to the IIPS Help Desk at: HelpDesk@pr.doe.gov or you may call the help desk at: (800) 683-0751. Further information on

the use of IIPS by the Office of Science is available at: http://www.sc.doe.gov/production/grants/grants.html.

If you are unable to submit an application through IIPS please contact the Office of the Director, Grants and Contracts Division, Office of Science, DOE at (301) 903-5212 in order to gain assistance for submission through IIPS or to receive special approval and instructions on how to submit printed applications.

SUPPLEMENTARY INFORMATION: This Notice is published annually and remains in effect until it is succeeded by another issuance by the Office of Science, usually published after the beginning of the fiscal year. This annual Notice 03-01 succeeds Notice 02-01, which was published December 20, 2001.

It is anticipated that approximately $400 million will be available for grant and cooperative agreement awards in Fiscal Year 2003. The DOE is under no obligation to pay for any costs associated with the preparation or submission of an application. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this Notice.

The following program descriptions are offered to provide more in-depth information on scientific and technical areas of interest to the Office of Science:

1. Basic Energy Sciences

The Basic Energy Sciences (BES) program supports fundamental research in the natural sciences and engineering leading to new and improved energy technologies and to understanding and mitigating the environmental impacts of energy technologies. The science areas and their objectives are as follows:

(a) Materials Sciences and Engineering

The objective of this program is to increase the fundamental understanding of phenomena, properties, and behavior important to materials that will contribute to improving current energy technologies and developing new energy technologies. This program is comprised of the subfields materials physics, condensed matter physics, materials chemistry, engineering physics, and related disciplines where the emphasis is on the science of materials.

Program Contact: (301) 903-3427

(b) Chemical Sciences

The objective of this program is to expand, through support of basic research, knowledge of various areas of chemistry, chemical engineering and atomic molecular and optical physics with a goal of contributing to new or improved processes for developing and using domestic energy resources in an efficient and environmentally sound manner. Disciplinary areas where research is supported include atomic molecular and optical physics; physical, inorganic and organic chemistry; chemical physics; photochemistry; radiation chemistry; analytical chemistry; separations science; actinide chemistry; and chemical engineering sciences.

Program Contact: (301) 903-5804

(c) Geosciences

The goal of this program is to develop a quantitative and predictive understanding of geologic processes related to energy and environmental quality. The program emphasizes cross-cutting basic research that will improve understanding of reactive geochemical transport and other subsurface processes and properties and how to image them using techniques ranging from electrons, x-rays or neutrons to electromagnetic and seismic waves. Applications of this fundamental understanding might include transport of contaminant fluids, hydrocarbons, sequestered CO2 or performance prediction for repository sites. The emphasis is on the disciplinary areas of geochemistry, geophysics, geomechanics, and hydrogeology with a focus on the upper levels of the earth's crust. Particular emphasis is on processes taking place at the atomic and molecular scale. Specific topical areas receiving emphasis include: high resolution geophysical imaging; rock physics, physics of fluid transport, and fundamental properties and interactions of rocks, minerals, and fluids.

Program Contact: (301) 903-4061

(d) Energy Biosciences

The primary objective of this program is to generate an understanding of fundamental biological mechanisms in plants and microorganisms that will support future technological developments related to DOE's mission. The research serves to provide the basic information foundation for environmentally responsible production and conversion of renewable resources for fuels, chemicals, and the conservation of energy. This program has special requirements for the submission of preapplications, when to submit, and the length of the applications. Applicants are encouraged to contact the program regarding these requirements.

Program Contact: (301) 903-2873

2. High Energy and Nuclear Physics

This program supports about 90% of the U.S. efforts in high energy and nuclear physics. The objectives of these programs are indicated below:

(a) High Energy Physics

The primary objectives of this program are to understand the ultimate structure of matter in terms of the properties and interrelations of its basic constituents, and to understand the nature and relationships among the fundamental forces of nature. The research falls into three broad categories: experimental research, theoretical research, and technology R&D in support of the high energy physics program.

Program Contact: (301) 903-3624

(b) Nuclear Physics (Including Nuclear Data Program)

The primary objectives of this program are a fundamental understanding of the interactions and structures of atomic nuclei and nuclear matter, and an understanding of the forces of nature as manifested in nuclear matter.

Program Contact: (301) 903-3613

3. Advanced Scientific Computing Research

This program fosters and supports fundamental research in advanced computing research (applied mathematics, computer science and networking), and operates supercomputer,

networking, and related facilities to enable the analysis, modeling, simulation, and prediction of complex phenomena important to the Department of Energy.

(a) Mathematical, Information, and Computational Sciences

This subprogram is responsible for carrying out the primary mission of the ASCR program: discovering, developing, and deploying advanced scientific computing and communications tools and operating the high performance computing and network facilities that researchers need to analyze, model, simulate, and -- most importantly -- predict the behavior of complex natural and engineered systems of importance to the Office of Science and to the Department of Energy.

The computing and the networking required to meet Office of Science needs exceed the state-of-the-art by a wide margin. Furthermore, the algorithms, software tools, the software libraries and the software environments needed to accelerate scientific discovery through modeling and simulation are beyond the realm of commercial interest. To establish and maintain DOE's modeling and simulation leadership in scientific areas that are important to its mission, the MICS subprogram employs a broad, but integrated research strategy. The basic research portfolio in applied mathematics and computer science provides the foundation for enabling research activities, which includes efforts to advance networking, to develop software tools, software libraries and software environments. Results from enabling research supported by the MICS subprogram are used by computational scientists supported by other Office of Science and other DOE programs. Research areas include:

(b) Applied Mathematics

Research on the underlying mathematical understanding and numerical algorithms to enable effective description and prediction of physical systems such as fluids, magnetized plasmas, or protein molecules. This includes, for example, methods for solving large systems of partial differential equations on parallel computers, techniques for choosing optimal values for parameters in large systems with hundreds to hundreds of thousands of parameters, improving our understanding of fluid turbulence, and developing techniques for reliably estimating the errors in simulations of complex physical phenomena.

(c) Computer Science

Research in computer science to enable large scientific applications through advances in massively parallel computing such as very lightweight operating systems for parallel computers, distributed computing such as development of the Parallel Virtual Machine (PVM) software package which has become an industry standard, and large scale data management and visualization. The development of new computer and computational science techniques will allow scientists to use the most advanced computers without being overwhelmed by the complexity of rewriting their codes every 18 months.

(d) Networking

Research in high performance networks and information surety required to support high performance applications - protocols for high performance networks, methods for measuring the performance of high performance networks, and software to enable high speed connections between high performance computers and networks. The development of high speed communications and collaboration technologies will allow scientists to view, compare, and

integrate data from multiple sources remotely.
Program Contact: (301) 903-5800

4. Fusion Energy Sciences

The mission of the Fusion Energy Sciences program is to advance plasma science, fusion science, and fusion technology -- the knowledge base needed for an economically and environmentally attractive fusion energy source. The Office of Fusion Energy Sciences (OFES) supports basic and applied research, encourages technical connectivity with the broader U.S. science community, and uses international collaboration to accomplish this mission.

(a) Research Division

This Division seeks to develop the physics knowledge base needed to advance the Fusion Energy Sciences program. Research is conducted on medium to large-scale confinement devices to study physics issues relevant to basic plasmas and to the production of fusion energy. Experiments on this scale of devices are used to explore the limits of specific confinement concepts, as well as study associated physical phenomena. Specific areas of interest include: (1) reducing plasma energy and particle transport at high densities and temperatures, (2) understanding the physical laws governing stability of high pressure plasmas, (3) investigating plasma wave interactions, (4) studying and controlling impurity particle transport and exhaust in plasmas, and (5) interaction and coupling among these four issues in a fusion experiment.

Research is also carried out in the following areas: (1) basic plasma science research directed at furthering the understanding of fundamental processes in plasmas; (2) theoretical research to provide the understanding of fusion plasmas necessary for interpreting results from present experiments, planning future experiments, and designing future confinement devices; (3) critical data on plasma properties, atomic physics and new diagnostic techniques for support of confinement experiments; (4) supporting research on innovative confinement concepts; and (5) research on issues that support the development of Inertial Fusion Energy, for which high energy density physics necessary for target development is carried out by the Office of Defense Programs in the Department of Energy's National Nuclear Security Agency.
Program Contact: (301) 903-4095

(b) Facilities and Enabling Technologies Division

This Division is responsible for overseeing the facility operations and enabling research and development activity budgets within the OFES. Grant program opportunities are in the enabling research and development activity. (Grants for scientific use of the facilities operated/maintained by this Division should be addressed to the Research Division.) The enabling technologies program supports the advancement of fusion science in the nearer-term by carrying out research on technological topics that: (1) enable domestic experiments to achieve their full performance potential and scientific research goals; (2) permit scientific exploitation of the performance gains being sought from physics concept improvements; (3) allow the U.S. to enter into international collaborations gaining access to experimental conditions not available domestically; and (4) explore the science underlying these technological advances.

The enabling technologies program supports pursuit of fusion energy science for the longer-term by conducting research aimed at innovative technologies, designs and materials to point toward

an attractive fusion energy vision and affordable pathways for optimized fusion development.
Program Contact: (301) 903-3068

5. Biological and Environmental Research Program

For over 50 years the Biological and Environmental Research (BER) Program has been investing to advance environmental and biomedical knowledge connected to energy. The BER program provides fundamental science to underpin the business thrusts of the Department's strategic plan. Through its support of peer-reviewed research at national laboratories, universities, and private institutions, the program develops the knowledge needed (1) to identify, understand, and anticipate the long-term health and environmental consequences of energy production, development, and use, and (2) to develop biology based solutions that address DOE and National needs.

(a) Life Sciences Research

Research is focused on using DOE's unique resources and facilities to develop fundamental knowledge of biological systems that can be used to address DOE needs in clean energy, carbon sequestration, and environmental cleanup and that will underpin biotechnology based solutions to energy challenges. The objectives are: (1) to develop the experimental and, together with the Advanced Scientific Computing Research program, the computational resources, tools, and technologies needed to understand and predict the complex behavior of complete biological systems, principally microbes and microbial communities; (2) to take advantage of the remarkable high throughput and cost-effective DNA sequencing capacity at the Joint Genome Institute to meet the DNA sequencing needs of the scientific community through competitive, peer-reviewed nominations for DNA sequencing; (3) to develop and support DOE national user facilities for use in fundamental structural biology at synchrotron and neutron sources; (4) to use model organisms to understand human genome organization, human gene function and control, and the functional relationships between human genes and proteins at a genomic scale; (5) to understand and characterize the risks to human health from exposures to low levels of radiation; and (6) to anticipate and address ethical, legal, and social implications arising from genome research.
Program Contact: (301) 903-5468

(b) Medical Applications and Measurement Sciences

The research is designed to develop the beneficial applications of nuclear and energy-related technologies for bio-medical research, medical diagnosis and treatment. The objectives are: (1) to utilize innovative radiochemistry to develop new radiotracers for medical research, clinical diagnosis and treatment, (2) To develop the next generation of non-invasive nuclear medicine technologies, such as positron emission tomography, (3) To develop advanced imaging detection instrumentation capable of high resolution from the sub-cellular to the clinical level, (4) To utilize the unique resources of the DOE in engineering, physics, chemistry and computer sciences to develop the fundamental tools to be used in biology and medicine, particularly in imaging sciences, photo-optics and biosensors.
Program Contact: (301) 903-3213

(c) Environmental Remediation

This research delivers the scientific knowledge, tools, and enabling discoveries in biological and environmental research to reduce the costs, risks, and schedules associated with the cleanup of

the DOE nuclear weapons complex; to extend the frontiers of biological and chemical methods for remediation; to discover the fundamental mechanisms of contaminant transport in the environment; to develop cutting edge molecular tools for investigating environmental processes; and to develop an understanding of the ecological impacts of remediation activities. Research priorities include bioremediation, contaminant fate and transport, nuclear waste chemistry and advanced treatment options, and the operation of the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) and the Savannah River Ecology Laboratory (SREL). The research performed for this program will provide fundamental knowledge on a broad range of remediation problems.

Program Contact: (301) 903-4902

(d) Climate Change Research

The program seeks to understand the basic physical, chemical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use. The research is designed to provide data that will enable an objective assessment of the potential for and the consequences of human-induced climate change at global and regional scales. It also provides data to enable assessments of mitigation options to prevent such a change. The program is comprehensive with an emphasis on understanding and simulating the radiation balance from the surface of the Earth to the top of the atmosphere (including the effect of clouds, water vapor, trace gases, and aerosols), on enhancing the quantitative models necessary to predict possible climate change at global and regional scales, and on understanding ecological effects of climate change. The carbon sequestration research seeks the understanding necessary to exploit the biosphere's natural carbon cycling processes to enhance the sequestration of carbon dioxide in terrestrial systems and the ocean, and to understand its potential environmental implications. The program includes research that can lead to the development of approaches to reduce or overcome the environmental and biological factors or processes that limit the sequestration of carbon in these systems to enhance the net sequestration of carbon. The research includes studies on terrestrial and ocean carbon sequestration and disposal, including research to modify the carbon sequestration capacity and rate by marine and terrestrial organisms and to understand the potential environmental implications.

Program Contact: (301) 903-3281

6. Energy Research Analyses

This program supports energy research analyses of the Department's basic and applied research activities. Specific objectives include assessments to identify any duplication or gaps in scientific research activities, and impartial and independent evaluations of scientific and technical research efforts. Consistent with these overall objectives, this program conducts numerous research studies to assess directions in science and to identify and assess new and improved approaches to science management.

Program Contact: (202) 586-9942

7. Experimental Program to Stimulate Competitive Research (EPSCoR)

The objective of the EPSCoR program is to enhance the capabilities of EPSCoR states to conduct nationally competitive energy-related research and to develop science and engineering manpower to meet current and future needs in energy-related fields. This program addresses

basic research needs across all of the Department of Energy research interests. Research supported by the EPSCoR program is concerned with the same broad research areas addressed by the Office of Science programs that are described in this notice. The EPSCoR program is restricted to applications, which originate in twenty-one states (Alabama, Alaska, Arkansas, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Vermont, West Virginia, and Wyoming) and the commonwealth of Puerto Rico. It is anticipated that only a limited number of new competitive research grants will be awarded under this program subject to the availability of funds.

Program Contact: (301) 903-3427

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Published in the Federal Register October 17, 2002, Volume 67, Number 201, Pages 64103-64106.