

March 16, 1999

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Cost Sharing at Basic Energy Sciences' User Facilities"

BACKGROUND

The Department of Energy's Office of Basic Energy Sciences (BES) funds the construction and operation of 17 designated user facilities that are recognized as being critical to scientific research. BES provides the base-operating budget for its user facilities and generally makes the facilities available on a no-charge basis to all qualified researchers. The objective of the audit was to determine whether the Department could enhance scientific research at BES user facilities by seeking more opportunities for cost sharing.

RESULTS OF AUDIT

Cost sharing could enhance scientific research at BES user facilities. Funding shortfalls have prevented BES's user facilities from operating at optimum levels. Both facility representatives and advisory panels have concluded that additional funding is needed to increase beam operating time and quality, to upgrade facilities, and to provide needed staff. Currently, users provide some contributions to facilities such as support of beam line construction, instrumentation, and detectors. However, BES needs to identify additional opportunities for users to provide contributions. We recommended that the Director, Office of Science seek opportunities for users to share in the cost of facility enhancements and periodically perform and document studies to evaluate the feasibility of cost sharing to supplement facility operating budgets.

MANAGEMENT REACTION

Management generally concurred with the finding and recommendations. Management agreed that cost sharing should be used to support user facility enhancements such as instrumentation, capital improvements, and staffing of experimental stations. However, management expressed concern that implementation of cost sharing or user fees to cover base operating costs could be seriously detrimental to the user facilities and science. Nevertheless, management agreed to incorporate studies to evaluate the feasibility of cost sharing into the relevant major reviews of its user facilities.

Attachment

cc: Acting Deputy Secretary
Under Secretary

DOE/IG-0441

AUDIT REPORT

COST SHARING AT BASIC ENERGY SCIENCES' USER FACILITIES



MARCH 1999

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

COST SHARING AT BASIC ENERGY SCIENCES' USER FACILITIES

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Overview

INTRODUCTION AND OBJECTIVE

BES supports fundamental research in the natural sciences and engineering leading to new and improved energy technologies. Consistent with its mission, BES funds the construction and operation of 17 designated user facilities located at the Department's national laboratories or at universities. These user facilities operate sophisticated scientific devices that are made available to researchers. About 77 percent of these researchers are from academia and other government-funded laboratories, about 12 percent are foreign users, and about 11 percent are from industry. At user facilities, researchers set up their equipment on beam lines and use the facilities' synchrotron or neutron source beams to conduct research experiments. Eight facilities (4 synchrotron light sources and 4 neutron sources) account for about 94 percent of BES's budget for user facilities.

BES's user facilities are generally recognized as being critical to scientific research. An advisory panel, commissioned by BES, reported in November 1997 that a shutdown of any of the synchrotron light source user facilities over the next decade would do significant harm to the nation's science research programs and would weaken our international competitive position in this field. Similarly, a neutron source advisory panel observed that user facilities play a unique role in neutron sciences and, therefore, must be a continuing part of the country's scientific armory.

Funding shortfalls have impeded BES's user facilities. For example, funding constraints prevented some user facilities from running their beams at maximum strength or caused beam quality to be sacrificed in order to increase beam-running time. Both facility representatives and the advisory panels have concluded that additional funding was needed to increase beam operating time and quality, to upgrade facilities, and to provide needed staff.¹

BES provides the base-operating budget for its user facilities. Generally, researchers contribute to the cost of setting up their experiments on beam lines and are not required to share in the operating costs of user facilities. The only exception to this practice is

¹ *Report of the Basic Energy Sciences Advisory Committee Panel on D.O.E. Synchrotron Radiation Sources and Science*, November 1997, and *Report of the Basic Energy Sciences Advisory Committee Panel on Neutron Source Facility Upgrades and the Technical Specifications for the Spallation Neutron Source*, March 1998

for proprietary users who are charged for their share of operating costs on a full-cost-recovery basis. These proprietary users are researchers who do not publish or make their research available to the rest of the scientific community. However, proprietary users represent an insignificant amount of total user time.

Cost sharing is the process by which those who receive some benefit from research activities are asked to share in some fraction of the cost. Under most cost-sharing arrangements, agencies pay for the majority of costs and establish guidelines on who should share cost and what portion of the costs should be contributed.

User facilities have been the subject of two Office of Inspector General audit reports, only one of which covered a BES user facility. That audit, *Management of the National Synchrotron Light Source at Brookhaven National Laboratory* (ER-OC-87-2), dated February 1987, reported several weaknesses in the facility's proprietary research program. The other audit, *Audit of Department of Energy's User Facilities* (DOE/IG-0395), dated August 1996, covered Defense Program user facilities. That audit reported that for user facilities categorized as "Technical Deployment Center/User Facilities," agreements were not always priced to ensure full cost recovery, and collections from users were not handled properly. The audit also reported that one designated user facility was inappropriately providing financial and housing assistance to users.

The objective of this audit is to determine whether the Department could enhance scientific research at BES user facilities by seeking more opportunities for cost sharing.

CONCLUSIONS AND OBSERVATIONS

BES should pursue opportunities to increase cost sharing by users. Cost sharing could be used to obtain additional funding for user facilities from industry and other agencies that benefit from the facilities. BES, while continuing to provide the base operating budgets for its user facilities, should identify additional ways in which cost sharing can be used to supplement funding. Although BES has followed a policy that makes the user facilities available on a no-charge basis to all qualified researchers, BES should periodically evaluate the feasibility of cost sharing to supplement its operating budget, especially in times of budget shortfalls when its facilities are not operating at optimum levels.

The audit did not identify any material internal control weaknesses that management should address when preparing its yearend assurance memorandum on internal controls. Rather, the audit identified an opportunity for the Department to enhance scientific research at its BES user facilities.

(Signed)
Office of Inspector General

COST SHARING WOULD ENHANCE RESEARCH OPPORTUNITIES

Funding Shortfalls Impede Research

Funding shortfalls have impeded user facilities from operating at optimum levels. Based on estimates provided by representatives of 7 BES user facilities, approximately \$21 million in additional Fiscal Year (FY) 1999 funding would be needed in order to maximize beam time and quality and to meet instrumentation and staffing needs. The estimates ranged from about \$1 million for Oak Ridge National Laboratory's High Flux Isotope Reactor (HFIR) to about \$8.5 million for Brookhaven National Laboratory's National Synchrotron Light Source (NSLS).

Funding shortfalls have limited the beam time available to researchers. For example, at Argonne National Laboratory's Intense Pulsed Neutron Source, funding limitations in FY 1997 prevented about 1,800 beam hours from being available to users. At the HFIR, recent funding reductions reduced available beam time from a satisfactory level in the 60-percent to 70-percent range to a level less than 50 percent. Also, representatives of the Los Alamos National Laboratory's Neutron Science Center (LANSCE) advised that additional funding could increase beam time by as much as three months, raising the beam availability level to about nine months per year.

A BES advisory panel and facility representatives identified a need for additional funding to provide for instrumentation upgrades, replacement of aging equipment, and staff increases to maintain and enhance beam quality. For example, the BES panel reported that the NSLS needed more staff to support research experiments performed by general users. NSLS representatives also cited deficiencies in the size of engineering and technical staffs. As another example, Lawrence Berkley National Laboratory's Advanced Light Source representatives indicated that their facility had a deficiency in the number of scientists and technicians. LANSCE representatives also advised that they were unable to hire various safety, scientific, and technical staff due to funding limitations.

Faced with the challenge of funding 17 facilities, BES strives to make optimum use of available funds. BES representatives stated that funding decisions for its user facilities are based on advisory panel recommendations, peer reviews, program balance, quality of research proposals, program integration issues, administration initiatives, and Congressional and Office of Management and Budget guidance. BES representatives also stated that funding constraints prohibit full funding of all new ideas, and facility needs are addressed in balance with other program considerations. However, BES representatives agreed that each of the facilities could spend more on instrumentation, operating

expenses, and general user support and that more productivity would result from such investments.

**Cost Sharing Would
Compensate for Funding
Shortfalls**

BES, while continuing to provide the base operating budgets for its user facilities, should seek opportunities to increase cost sharing at its user facilities. Currently, users provide some contribution to facilities such as support of beam line construction, instrumentation, and detectors and certain facility upgrades. BES needs to continue to evaluate whether there are additional opportunities for users to provide contributions. For example, facilities could seek arrangements with selected users, such as industrial users, for cost sharing in upgrades of the facility's equipment and instrumentation. Also, BES should evaluate whether users can supplement base operating funds to maximize beam time. For example, researchers who are prevented from performing their experiments due to lack of available beam time caused by funding shortages could be given the opportunity to fund the additional beam time they require. As another alternative, a facility could evaluate whether users, who do not provide general users with ample time on their beam lines, can provide a compensatory contribution to overall user support.

**Cost Sharing is an
Accepted Practice for
Research and
Development**

It is the policy of the Federal Government and the Department, as described in 48 CFR 355, *Research and Development Contracting*, to encourage organizations to contribute to the cost of performing research where there is a probability that the organization will receive present or future benefits. For example, the Department's grants and cooperative agreements for research and development often require the benefiting recipient to share some fraction of the costs. As pressure mounts to rein in spending, requiring users to share cost has become an increasingly attractive option for Federal agencies.

Federal policy provides flexibility in determining when and how much cost sharing is appropriate. For example, contracting officers can waive cost sharing in certain circumstances such as when the user has little or no non-Federal sources or funds from which to make a contribution. This flexibility distinguishes cost sharing from a "user fee" arrangement by which every user is charged at published rates in order to recover all the operating costs of a facility and, in some cases, generate a profit.

Opposition to User Fees

The Department has generally opposed user fees and followed a policy that makes the user facilities available on a no-charge basis to all qualified researchers whose intention is to publish research results. The Department's policy advocates that scientific merit, as measured by peer review, must be the primary basis for access to these national resources. However, in its opposition to user fees, the Department has not always distinguished between "cost sharing" whereby certain users contribute a portion of costs to supplement the operating budget and "user fees" whereby user fees are assessed to all users and serve as the principal funding source.

In 1991, Congress raised the issue of whether revenues can be generated through user fees. The Department responded that there was no clear evidence to indicate that it was feasible to generate revenue through user fees. At that time, the Department also responded that it did not have sufficient time to address the topic fully and further studies would be done to examine the potential for cost sharing with industry, academia, other Federal agencies, and international entities. However, the Department has not provided any subsequent data or analytical studies that addressed the feasibility of user contributions.

Cost Sharing Would Benefit BES User Facilities

Increased cost sharing would provide the Department with a funding option to help ensure that user facilities continue to provide safe, state-of-the-art science even in times of funding shortfalls. For example, cost sharing could help user facilities obtain needed equipment and instrumentation upgrades and facility enhancements. Furthermore, cost sharing could provide supplemental funding especially when budget shortfalls prevent facilities from operating at optimum levels.

BES representatives stated that they were meeting with other Federal agencies to look into the feasibility of sharing in future user facility construction costs. We believe this is a positive step and BES should continue efforts to expand cost sharing.

We recommend that the Director, Office of Science, while continuing to

RECOMMENDATIONS

provide the base operating budgets for user facilities:

1. Seek opportunities for sharing the cost of enhancements to the capability of the facilities, such as instrumentation, capital improvements, and staffing of experimental stations, and
2. Periodically perform and document studies to evaluate the feasibility of cost sharing to supplement its operating budget.

MANAGEMENT REACTION

Management generally concurred with the finding and recommendations. Management agreed that cost sharing should be sought from users to support enhancements of facilities such as instrumentation, capital improvements, and staffing of experimental stations. However, management expressed concern that implementation of cost sharing or user fees to cover base operating costs could be seriously detrimental to the user facilities and science. Management stated that its current no-charge policy for base operating costs recognizes that scientific merit, as measured by peer review, must be the primary basis for access to these national resources. Management also stated that requiring facility users to share in operating costs could significantly undermine this basis and detract from the primary mission of the facilities, which is enabling world-class science for the Nation. Management commented that its current no-charge policy for operating costs is an important component to the success of these science investments. Nevertheless, management agreed to incorporate studies to evaluate the feasibility of cost sharing into the relevant major reviews of its user facilities.

We consider management's comments to be responsive to the recommendations.

AUDITOR COMMENTS

Appendix

SCOPE

The audit was performed from March to December 1998. The audit was performed at BES Headquarters in Germantown, Maryland; Brookhaven National Laboratory in Upton, New York; and Argonne National Laboratory in Argonne, Illinois. The following table shows the eight user facilities from which data were obtained.

Synchrotron Light Sources	Location
Advanced Light Source (ALS) Advance Photon Source (APS) National Synchrotron Light Source (NSLS) Stanford Synchrotron Radiation Laboratory (SSRL)	Lawrence Berkley National Laboratory Argonne National Laboratory Brookhaven National Laboratory Stanford Linear Accelerator Center
Neutron Sources	
High Flux Beam Reactor (HFBR) High Flux Isotope Reactor (HFIR) Intense Pulsed Neutron Source (IPNS) Manual J. Lujan, Jr. Neutron Scattering Center (LANSCE)	Brookhaven National Laboratory Oak Ridge National Laboratory Argonne National Laboratory Los Alamos National Laboratory

METHODOLOGY

To accomplish the audit objective, we reviewed applicable Federal and Departmental regulations, advisory panel reports, and other documentation relevant to BES's user facilities. We also held discussions with BES personnel and Department and contractor personnel at user facilities. In addition, we reviewed data provided by BES and user facilities concerning users, experiments, budgets, costs, and funding shortfalls at user facilities.

The audit was performed in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We did not rely on computer-processed data to accomplish our audit objective.

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