



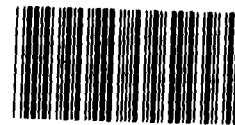
UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

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JANUARY 16, 1984

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-213704



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The Honorable Donald P. Hodel
The Secretary of Energy

Dear Mr. Secretary:

Subject: A Long-Term Plan Is Needed to Guide DOE and
Multiprogram Laboratory Research and Develop-
ment Activities (GAO/RCED-84-30)

We have completed a review of energy research and development planning activities of the Department of Energy (DOE) and its nine multiprogram laboratories, which are identified in enclosure I. The multiprogram laboratories are government-owned facilities operated by contractors to carry out DOE's research and development programs. During fiscal year 1983, DOE's expenditures for research and development activities performed by these laboratories totaled approximately \$2.6 billion, or about half of the estimated \$5.2 billion that DOE spent for research and development work.

The objectives of our review were to determine whether DOE provided sufficient planning direction to the work of the laboratories and whether this direction was based on DOE's long-term research and development goals, objectives, and priorities. Enclosure I provides a brief background on the multiprogram laboratories; provides details on our review objectives, scope, and methodology; and discusses our audit findings, which are summarized below.

In March 1982 DOE initiated efforts to develop a 5-year research and development plan for fiscal years 1984-88. DOE's Office of Policy, Planning and Analysis was given primary responsibility for developing the plan. The plan was to identify DOE's long-term goals for research and development; include products to be delivered; and estimate funding requirements over a 5-year period, including estimated funding allocations for each multiprogram laboratory.

The plan for fiscal years 1984-88 was not completed because, in mid-1982, the DOE staff that was working on the plan was re-assigned to higher priority work on DOE's annual budget process. The Office of Policy, Planning and Analysis decided to defer

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developing the plan until the budget process was completed and a new 5-year planning process for fiscal years 1985-89 could be implemented in early 1983.

In September 1983 we discussed DOE's planning efforts conducted during 1983 with DOE's Director of Policy Integration, Office of Policy, Planning and Analysis. She told us that a 5-year research and development plan had not been developed because DOE redirected its planning efforts from developing such a plan to identifying activities that could be funded through its annual budget. She said that the planning efforts were redirected because the multiyear funding estimates that DOE would have had to develop for a 5-year plan would have been too conjectural to provide a basis for effective planning.

We recognize that any long-term plan is, to some degree, speculative and can be affected by changes in objectives, priorities, available funding, and other factors. Nonetheless, a long-term plan can be flexible enough to incorporate changes while providing the overall stability necessary for effective long-term decisionmaking. Such a plan is particularly important for DOE's energy research and development activities because DOE must both (1) maintain support for ongoing projects if they are to achieve desired results and (2) initiate work on new issues and potential technologies as they emerge and affect planned work.

A long-term research and development plan is also needed to guide the work of DOE's multiprogram laboratories. Our review shows that, in the absence of a DOE long-term plan, each laboratory prepares the multiyear plans that are primarily based on DOE's annual budget process and ongoing work, rather than on work that will be needed to meet DOE's long-term research and development goals and objectives.

CONCLUSIONS

We believe that a long-term plan is needed for DOE's energy research and development work because new energy technologies often extend over several years, and facilities and other resources must be planned and acquired before work can begin. In addition, congressional and executive branch decisionmakers need planning details on the anticipated results and potential impact of funding for future energy technologies. Likewise, the multiprogram laboratories must know what DOE intends to accomplish over time because DOE relies on these laboratories to identify and carry out its research and development projects.

RECOMMENDATION TO THE SECRETARY OF ENERGY

We recommend that DOE develop a long-term research and development plan to guide and facilitate decisions on developing future energy technologies.

AGENCY COMMENTS AND OUR EVALUATION

DOE commented on a draft of this report on December 6, 1983, and agreed with its contents. DOE stated that, on November 17, 1983, the Secretary of Energy directed DOE assistant secretaries having research and development program responsibilities to develop 5-year research and development program plans on a continuing basis. The Secretary also directed that the research and development planning efforts of the multiprogram laboratories be integrated with DOE's planning efforts. According to DOE, the plans developed by the assistant secretaries, when approved by the Secretary of Energy, will represent an overall DOE long-term plan for research and development. We believe that the planning direction that the Secretary of Energy provided is consistent with our recommendation.

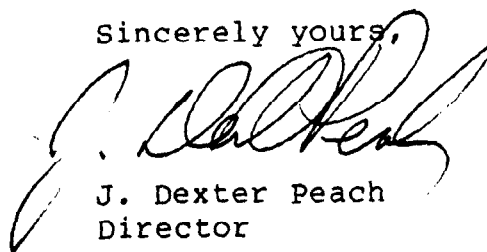
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As you know, 31 U.S.C. 5720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs within 60 days after the date of the report; a like statement to the House and Senate Committees on Appropriations should accompany the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this letter to the Director, Office of Management and Budget; the congressional committees identified above; and other interested congressional committees.

We appreciate the courtesies and cooperation that DOE and multiprogram laboratory personnel extended to us during our review.

Sincerely yours,



J. Dexter Peach
Director

Enclosure

C o n t e n t s

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ENCLOSURE

I

A LONG-TERM PLAN IS NEEDED TO GUIDE DOE AND
MULTIPROGRAM LABORATORY RESEARCH AND
DEVELOPMENT ACTIVITIES

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ABBREVIATION

DOE

Department of Energy

A LONG-TERM PLAN IS NEEDED TO GUIDE DOE
AND MULTIPROGRAM LABORATORY RESEARCH AND
DEVELOPMENT ACTIVITIES

BACKGROUND

DOE's estimated fiscal year 1983 expenditures for research and development activities totaled \$5.2 billion. Numerous organizations, including DOE's nine multiprogram laboratories, universities, and private industry carry out these activities. DOE-funded research and development activities that these organizations carry out include, in part, projects in nuclear energy, fossil energy, energy conservation and renewable energy, and basic sciences.

DOE's nine multiprogram laboratories are government-owned facilities operated by contractors to perform diverse energy research and development activities. The laboratories and their locations are as follows:

- Argonne National Laboratory, Argonne, Illinois.
- Brookhaven National Laboratory, Upton, New York.
- Los Alamos National Laboratory, Los Alamos, New Mexico.
- Idaho National Engineering Laboratory, Idaho Falls, Idaho.
- Lawrence Berkeley Laboratory, Berkeley, California.
- Lawrence Livermore National Laboratory, Livermore, California.
- Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Pacific Northwest Laboratory, Richland, Washington.
- Sandia Laboratories, Albuquerque, New Mexico; Livermore, California.

The laboratories evolved during the early years of the former Atomic Energy Commission which, in beginning operations in 1946, assumed responsibility for the laboratories and facilities involved in developing the atomic bomb. During federal energy reorganizations in the 1970's, responsibility for the laboratories was assigned to the Energy Research and Development Administration (DOE's predecessor agency) in 1975 and to DOE in 1977.

The laboratories conduct research and development for DOE in basic sciences, a variety of energy technologies, and military

applications. To perform this work, the laboratories employ approximately 35,000 people and use facilities that represent a capital investment of about \$4.6 billion. About half of DOE's fiscal year 1983 research and development budget, or about \$2.6 billion, will be used to support the work conducted at the multi-program laboratories.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of our review were to determine whether DOE provided sufficient planning direction to its laboratories and whether that direction was based on its long-term research and development goals, objectives, and priorities. We performed our work at DOE's Office of Policy, Planning and Analysis and the Offices of the Assistant Secretaries for Energy Research, Nuclear Energy, Defense Programs, Fossil Energy, and Conservation and Renewable Energy. We also visited two of the nine multiprogram laboratories: the Argonne National Laboratory in Argonne, Illinois, and the Brookhaven National Laboratory in Upton, New York. We selected these laboratories because of differences in their program emphasis. Argonne is primarily oriented to energy technology and Brookhaven to basic energy research.

Our review focused on DOE's planning activities for fiscal years 1984-88. In performing our review, which was conducted in accordance with generally accepted government auditing standards, we evaluated DOE's policies, procedures, and guidelines for planning research and development activities at DOE headquarters offices and the multiprogram laboratories. We interviewed DOE headquarters and field office officials responsible for planning long-term research and development activities and laboratory officials responsible for planning and implementing such activities. We also met with officials of DOE's Energy Research Advisory Board to discuss its September 1982 report concerning the roles, mission, and future of the national laboratories.

LONG-TERM RESEARCH AND DEVELOPMENT PLANNING

Effective planning is needed to guide decisionmaking in any large and complex program that expends billions of dollars each year, offers uncertain results, and must choose among alternatives that compete for limited federal funding. As we stated in a June 1981 report,¹ such planning should be of a long-term nature in many research and development areas--like energy--where the time needed to complete the work often extends several years. In these areas, facilities must be built, equipment purchased, and skilled staff hired even before the work can begin.

¹Multiyear Authorizations for Research and Development, PAD-81-61, June 3, 1981.

Long-term planning also is needed to prepare and justify comprehensive budgetary information that, after being deliberated and adjusted by executive branch and congressional decisionmakers, will determine the future direction of energy research and development activities. In this regard, the results of DOE's research and development proposals may not be apparent until years after they are initially funded, and information on the long-term aspects of the proposals is needed to help federal decisionmakers analyze the impact of budgetary decisions on potential future technologies.

In March 1982 DOE initiated a major effort to develop a 5-year plan for carrying out research and development activities in fiscal years 1984-88. This plan was to address DOE's long-term goals for research and development programs, and it was to be completed in three distinct program phases--formulation, review, and decisionmaking. DOE's Office of Policy, Planning and Analysis was responsible for developing the plan; participants in the planning process included DOE program offices, the Office of the Assistant Secretary for Management and Administration, and the Office of the Secretary.

The plan was to

- resolve issues raised during the planning process;
- estimate funding level needs over a 5-year period;
- establish specific milestones, products to be delivered, and critical decision dates for reviewing and approving major research and development programs; and
- determine the impact that approved funding decisions would have on the multiprogram laboratories.

DOE offices responsible for research and development work submitted draft plans in accordance with guidelines the Deputy Secretary of DOE approved. These submissions proposed numerous goals and objectives, set priorities for each program area, and raised a total of 13 major issues that needed to be resolved. The submissions also included proposed milestones, products to be delivered, and critical decision dates for top management review and approval.

The research and development plan for fiscal years 1984-88 was not completed because, in mid-1982, DOE staff was reassigned to work on DOE's annual budget process. In the formulation phase of the plan, each DOE program office had submitted its aggregated information on future funding estimates to the Office of Policy, Planning and Analysis. This information provided a general view of DOE funding requirements, but it was not refined enough to

provide a basis for allocating DOE resources among competing programs.

The Director of Policy Integration, Office of Policy, Planning and Analysis, told us that, at the time refinements to the funding estimates were needed, the DOE program offices were involved in an intensive effort to develop information needed for DOE's annual budget process and could not realistically be expected to develop detailed future year funding information as well. The Office of Policy, Planning and Analysis decided, therefore, to defer developing the 5-year plan until the planning cycle for fiscal years 1985-89 could be initiated in early 1983.

In September 1983 we discussed DOE's planning process conducted during 1983 with DOE's Director of Policy Integration. She told us that a 5-year research and development plan was not developed because DOE had redirected its planning efforts from developing such a plan to identifying activities that could be funded through its annual budget. She said that DOE redirected its planning efforts because the projected funding requirements necessary to develop a 5-year plan would have been too conjectural to provide a basis for effective planning.

LABORATORIES' ROLE IN RESEARCH AND DEVELOPMENT PLANNING

Because of their extensive involvement in carrying out DOE's research and development programs, the multiprogram laboratories also need effective long-term plans that identify specific research and development projects that must be accomplished to meet DOE's requirements. Each year the laboratories prepare their institutional plans under the broad guidance of DOE's Under Secretary. In carrying out the process, laboratories develop proposed 5-year work plans, including estimated funding levels needed to accomplish the work. The laboratories then submit their plans to DOE's headquarters where the individual laboratory plans are aggregated. Following the submission of the laboratory plans, DOE headquarters officials conduct on-site reviews of the plans at each laboratory. The on-site reviews provide for direct interchange between laboratory and DOE officials and result in tentative agreements on programs and funding levels to be used in preparing the laboratories' final plans.

In reviewing the laboratories' planning process, we held discussions with DOE's Director of Energy Research and senior officials of the Argonne and Brookhaven laboratories. Although the laboratories' plans are intended to provide a 5-year approach for research and development work at the laboratories, in general, the officials believed that the plans are of limited usefulness for this purpose and are primarily annual budgetary documents that reflect projections of ongoing work.

The budgetary aspects of the laboratories' plans were also noted in DOE's Energy Research Advisory Board's September 1982 report on the future of the laboratories. The report, which was prepared at the request of the Deputy Secretary of Energy, pointed out that, while there is some degree of long-term planning at the laboratories, the plans that are developed are used as budgetary information, rather than as the long-term plans that they are intended to be.

DOE's Director of Energy Research and the senior laboratory officials told us that, for the laboratories to develop plans that reflect realistic long-term approaches to research and development problems, an overall DOE plan is needed to provide direction on specific DOE goals and objectives, how they are to be met, and the role of each laboratory in meeting the goals. The need for such a plan was also a major issue raised by the Lawrence Livermore Laboratory in June 1982 when the laboratory submitted its planning information to DOE. Senior laboratory officials said:

"As we prepare the laboratory institutional plan we note the absence of similar planning and documentation on the part of our parent organization. It seems to us that the planning function would be much more realistic and effective if DOE headquarters would publish, on compatible time scales, an overall DOE plan which would reflect and coordinate the many plans of the laboratories."

The Lawrence Livermore Laboratory officials also questioned whether their laboratory plan was meeting the needs of DOE headquarters. They pointed out that for programs other than defense, little feedback was provided on the plan from other DOE assistant secretaries and that the level of detail requested in the plan was of little value.

Our review also shows that the Director of Energy Research, in commenting on the Argonne Laboratory's 5-year plan in March 1982, said that the Under Secretary of Energy believed it especially important that DOE improve laboratory planning by including more realistic long-term program projections in DOE's guidance to the laboratories. Toward this end, 5-year projections on the work of each laboratory were to be included in the departmental long-term plan for fiscal years 1984-88. Before these projections could be made, however, information on DOE's future year funding needs had to be determined to provide a basis for allocating DOE resources to the laboratories. As discussed on pages 3 and 4, however, the needed information was not developed, and DOE re-directed its planning activities to focus on short-term activities and funding requirements.