

April 7, 1995

IG-1

INFORMATION: "Audit of the Department of Energy's Environmental Molecular Sciences Laboratory"

The Secretary

BACKGROUND:

The Office of Energy Research (Energy Research) is in the process of constructing an Environmental Molecular Sciences Laboratory at Richland, Washington. This laboratory will conduct mostly basic research to help solve the Department's environmental restoration and waste management problems. The total cost of this facility, including equipment, is estimated at \$230 million with annual operating costs of about \$70 million.

Recently, there have been changes in activities of the Department's laboratories caused by the end of the cold war. Defense related research, for example, has decreased dramatically at the Department's key laboratories such as Los Alamos and Lawrence Livermore. Although research at the Department's laboratories has been declining, Energy Research did not consider using them as an alternative to constructing a new laboratory and procuring equipment for it.

On May 16, 1994, the Office of Inspector General issued a Management Alert recommending that Energy Research evaluate the full range of available alternatives to find the most cost effective facility. However, Energy Research disagreed with our recommendations and on July 21, 1994, resumed construction at a site adjacent to Battelle-Pacific Northwest Laboratories (Battelle) in Richland, Washington.

DISCUSSION:

The audit showed that all practical alternatives were not evaluated as required by Department Order 4700.1 before Energy Research decided to proceed with the construction of the new laboratory in Richland, Washington. Although Battelle had conducted a site study in 1987, the study only considered sites located in Richland. The proposal, and the Department's decision to proceed with construction at Richland, was based on the new laboratory's proximity to the Hanford site where about 50 percent of the Nation's nuclear waste is stored. In addition, the Department believed that since Battelle had submitted the proposal, it should manage and operate the facility.

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However, our audit showed that Energy Research should have considered other alternatives. We found that actual material from the waste stored at Hanford will not be used in the

research. Surrogate samples will be used instead. In addition, the primary focus of the new laboratory will be basic research, which will have multi-site application. Thus, the research will not be site specific and directed only towards the problems at Hanford. Further, other Department laboratories were performing related research and had excess space which might have met the proposed Research Laboratory's requirements.

Energy Research did not concur with the finding and recommendations. Energy Research's response stated that the Research Laboratory is to be a national user facility equipped with state-of-the-art and first-of-a-kind equipment. The response added that the use of existing facilities and equipment would obviate the unique interactive and synergistic scientific exploration capabilities of the proposed Research Laboratory.

We do not believe that the position taken by Energy Research relieves the Department's program managers from their responsibility to evaluate all available options before proceeding with multi-million dollar construction projects. Accordingly, Energy Research should determine whether existing assets, other Department facilities, and National Laboratories, could fulfill the mission of the proposed Research Laboratory. Such an evaluation would be consistent with the Department's commitment to deficit reduction and prudent spending, and would maximize utilization of available resources.

/s/

John C. Layton  
Inspector General

Attachment

cc: Deputy Secretary  
Under Secretary  
Director, Office of Energy Research

U.S. DEPARTMENT OF ENERGY  
OFFICE OF INSPECTOR GENERAL

AUDIT OF THE  
DEPARTMENT OF ENERGY'S  
ENVIRONMENTAL MOLECULAR SCIENCES LABORATORY

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Report Number: DOE/IG-0371                    Western Regional Audit Office  
Date of Issue: April 7, 1995                Albuquerque, NM 87185D5400

AUDIT OF THE  
DEPARTMENT OF ENERGY'S  
ENVIRONMENTAL MOLECULAR SCIENCES LABORATORY

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

AUDIT OF THE  
DEPARTMENT OF ENERGY'S  
ENVIRONMENTAL MOLECULAR SCIENCES LABORATORY

Audit Report Number: DOE/IG-0371

SUMMARY

The Department of Energy (Department) is responsible for examining all options in acquiring major systems to ensure that funds and existing facilities and equipment are used effectively. The objective of the audit was to determine whether the Office of Energy Research (Energy Research) had evaluated all practical alternatives in building and equipping the proposed Environmental Molecular Sciences Laboratory (Research Laboratory) which is estimated to cost about \$230 million.

The audit showed that all practical alternatives were not evaluated as required by Department Order 4700.1 before deciding to proceed with the construction of a new Research Laboratory in Richland, Washington. In 1988, Battelle-Pacific Northwest Laboratories (Battelle) submitted an unsolicited proposal to the Department for the construction of a new laboratory. Although a site study had been conducted by Battelle in 1987, the study only considered sites located in Richland. The proposal, and the Department's decision to proceed with construction at Richland, was based on the new laboratory's proximity to the Hanford site where about 50 percent of the Nation's nuclear waste is stored. In addition, the Department believed that since Battelle had submitted the proposal, they should manage and operate the facility.

However, the audit indicated that other alternatives should have been considered. We found that actual material from the waste stored at Hanford will not be used in the research. Surrogate samples will be used instead. In addition, the primary focus of research at the new facility was changed from applied to basic research, which will have multi-site application. Thus, the research will not be site specific and directed only towards the problems at Hanford. Further, other Department laboratories were currently performing related research and had excess space which might have met the proposed Research Laboratory's mission.

By not evaluating alternatives, the Department may have missed an opportunity to not only avoid spending a significant amount of the \$230 million, but also an opportunity to more effectively utilize existing national laboratories and equipment. We recommended, therefore, that Energy Research reevaluate the project to determine if there are less costly but equally effective alternatives to new construction and new equipment.

The Office of Energy Research did not concur with the finding and recommendations. Energy Research's response to our finding and recommendations stated that the Research Laboratory is to be a national user facility equipped with state-of-the-art and first-of-a-kind equipment. The response added that the use of existing facilities and equipment would obviate the unique interactive and synergistic scientific exploration capabilities of the proposed Research Laboratory.

With the current concern about budget constraints, we, however, believe it is imperative that the Department fully evaluate all available options before proceeding with multi-million dollar construction projects. Accordingly, Energy Research should determine whether existing assets, other Department facilities, and national laboratories, could fulfill

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the mission of the proposed Research Laboratory. Such an evaluation would be consistent with the Department's commitment to deficit reduction and prudent spending, and would maximize utilization of available resources.

(Authenticated)

Office of Inspector General

PART I

## APPROACH AND OVERVIEW

### INTRODUCTION

A project can be designated a Major System Acquisition because of its importance, size, complexity, or because its dollar value exceeds \$100 million. The Department of Energy (Department) is responsible for evaluating all practical alternatives in acquiring major systems to ensure that funds and existing facilities and equipment are used effectively.

The objective of the audit was to determine whether Energy Research had evaluated all practical alternatives in building and equipping the proposed Environmental Molecular Sciences Laboratory (Research Laboratory) which is estimated to cost about \$230 million.

### SCOPE AND METHODOLOGY

The audit was conducted from January through August 1994 at the Richland Operations Office and its management and operating contractor Battelle-Pacific Northwest Laboratory (Battelle), Richland, Washington; Lawrence Livermore National Laboratory, Livermore, California; Sandia National Laboratory, Livermore, California (Sandia-Livermore); Sandia National Laboratory, Albuquerque, New Mexico; and, Los Alamos National Laboratory, Los Alamos, New Mexico. Meetings were also held with the Department's Office of Energy Research and Office of Environmental Management in Germantown, Maryland, and Washington, D.C.

To accomplish the audit objective, we:

- o Reviewed Federal laws, Department Orders, and an Office of Management and Budget Circular, and compared them to the acquisition strategy used for the Research Laboratory;
- o Obtained and evaluated project management and engineering plans for building, equipping, and staffing the Research Laboratory;
- o Interviewed key Department and contractor officials;
- o Identified existing laboratories at other sites and evaluated their potential use for meeting the proposed Research Laboratory's mission; and,
- o Reviewed the primary documents applicable to the acquisition of a major system: The Justification of Mission Need, the Project Management Plan, and the Project Plan.

The audit was performed according to 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. We limited the review of internal controls to the acquisition of a major system because operating controls for the Research Laboratory had not yet been implemented. We did not rely on any computer generated data to develop this report. Since the review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. An exit conference was held with the Deputy Director, Office of Energy Research on February 10, 1995.

#### BACKGROUND

The Department is in the process of constructing a new facility to house the proposed Research Laboratory. This laboratory will conduct mostly basic research but will also perform some applied research to help solve the Department's environmental restoration and waste management problems. The plan for the laboratory calls for a 201,044 square foot facility; this footage will include 61,610 net square feet of laboratory space and about 10,000 square feet of computer space. The remaining footage consists of corridors, office space, rest rooms, mechanical space, a library, and an auditorium. The facility will house about \$140 million of research and computer equipment. The total cost of this facility, including equipment, is estimated at \$230 million with annual operating costs of about \$70 million.

On May 16, 1994, the Office of Inspector General issued a Management Alert recommending that Energy Research evaluate the full range of available alternatives to find the most cost effective facility. However, Energy Research disagreed with our recommendations and on July 21, 1994, resumed construction at a

site adjacent to Battelle in Richland, Washington.

The mission of the new laboratory is to conduct basic research to gain scientific knowledge and understanding of the makeup of the wastes stored at Hanford and other Department sites. Responsibility for project management initially came under the Department's Office of Energy Research. In 1990, the Secretary designated the project a Major System Acquisition and gave the responsibility to the Department's Office of Environmental Management. The transfer in management responsibility was appropriate because 80 percent of the laboratory's research would be applied to environmental cleanup. In 1993, however, management responsibility was returned to Energy Research because the laboratory's research emphasis had returned to basic rather than applied research.

On June 6, 1994, the Office of Environmental Management signed a Memorandum of Understanding with the Office of Energy Research. The Office of Energy Research will fund the construction and operation of the Research Laboratory. The Office of Environmental Management agreed to fund research and equipment related to its mission. However, at the time of our audit, the level of funding by the Office of Environmental Management had not been determined.

#### OBSERVATIONS AND CONCLUSIONS

Recently, there have been rapid changes in activities of the Department's laboratories caused by the end of the cold war. Defense related research, for example, has decreased dramatically at three of the Department's key laboratories, Los Alamos National Laboratory (Los Alamos), Sandia National Laboratories (Sandia), and Lawrence Livermore National Laboratory (Livermore). In response to these changes, the Secretary of Energy's Advisory Board Task Force was established to examine the future utilization of the laboratories for meeting national missions in areas including energy and environmental research. The affected laboratories, in turn, have been trying to replace their reduced defense work.

Although research at the Department's laboratories has been declining, Energy Research did not consider using them as an alternative to constructing a new laboratory and procuring equipment for it. The Department believed that since the new laboratory was based on a proposal by Battelle, and located close to where most of the Department's high-level radioactive waste was stored, its decision to locate the laboratory at Richland was justified. Energy Research also supported the construction because a new laboratory and equipment would provide an interactive, synergistic, and campus-like research environment for scientists.

However, according to Battelle researchers, actual material from the waste stored at Hanford will not be used in the research. To conduct the research, scientists will produce surrogate material, which can be studied at other laboratories. Because scientists will not use the high-level waste at Hanford,



there is no unique or compelling reason to locate the laboratory at Hanford. Therefore, Energy Research should have followed the requirements of Department Order 4700.1 and evaluated all alternatives to accomplish the research mission. Although we did not perform a formal technical evaluation, our audit showed that other laboratories, such as Livermore and Los Alamos, were already performing related research. If Energy Research had fully evaluated existing alternatives within the Department's complex, it might have identified available, unused facilities appropriate for its research mission. While structural modifications might be necessary, the available alternatives may cost less than the estimated \$230 million for the Research Laboratory. Further, such action could result in better utilization of existing laboratories and equipment.

We consider our finding on the lack of an evaluation of alternatives to constructing the \$230 million Research Laboratory to be a material internal control weakness. The Department should consider this matter when preparing the yearend assurance memorandum on internal controls.

## PART II

### FINDING AND RECOMMENDATIONS

#### Environmental Molecular Sciences Laboratory

##### FINDING

Department officials are responsible for adhering to Department Order 4700.1 which requires an evaluation of all practical acquisition alternatives that will satisfy mission needs. Instead of evaluating all practical alternatives, however, management only considered constructing a new laboratory in Richland, Washington. In addition, Energy Research officials selected an unsolicited design concept from Battelle as the sole concept for the new laboratory. According to Energy Research officials, this occurred because they determined the laboratory had to be in Richland, near the large quantities of stored high-level radioactive waste. The Department cannot be certain that a new laboratory in Richland is the most cost effective alternative because Energy Research's acquisition strategy did not include an evaluation of other alternatives. As a consequence, the Department may have missed an opportunity to more effectively utilize existing national laboratories and equipment.

##### RECOMMENDATIONS

We recommend that the Director, Office of Energy Research, immediately:

1. Assess all practical alternatives to determine if there are less costly but effective alternatives to constructing a new laboratory and procuring new equipment and document the results of their final

decision.

2. Ensure that the requirements of Department Order 4700.1 are followed on all future projects.

#### MANAGEMENT REACTION

Management did not concur with the finding and did not agree to implement the recommendations. Part III of this report contains management and auditor comments.

#### DETAILS OF FINDING

On August 15, 1990, the Secretary strengthened the Project Management System by making all projects at or exceeding \$100 million Major System Acquisitions. Subsequently, on March 18, 1991, the Research Laboratory was designated a Major System Acquisition. As a Major System Acquisition, managers of the Research Laboratory were required to follow the project management policies in Department Order 4700.1 (Order).

Attachment I-3 of the Order states that project managers are required to explore alternatives to accomplish mission needs. To ensure intended project benefits are achieved, project managers must optimize competitive exploration of alternatives. The Order further states that managers are not to conform mission needs or goals to known systems that would foreclose consideration of alternatives. Finally, the Order provides that project managers should consider a broad base of firms and Federal laboratories for potential sources of competitive system designs.

Documentation of the project manager's consideration of alternatives and support for the selection of the best system to meet project needs is contained in the Justification of Mission Need. This document is required by the Order before the start of construction for any major system. Instructions on the preparation of a Justification of Mission Need are contained in Attachment II-1 of the Order which states that project management must include information about the project alternatives, such as:

- o The programmatic impact of not doing the project at all;
- o The most appropriate alternatives;
- o Reasons the options are being considered; and,
- o Support justifying the selected option.

#### Justification of Mission Need and Alternatives

Energy Research determined there was a need to provide basic and applied research to solve the Department's environmental restoration and waste management problems. However, it did not evaluate all practical alternatives to accomplish the research. Although there were existing capabilities to perform at least portions of the proposed work, Energy Research determined that to

continue using decentralized staff and equipment would delay the Department's ability to address its environmental and health issues. Therefore, Energy Research determined the best method to accomplish the mission need was through the consolidation of research staff, equipment, and interdisciplinary science programs in a single facility. This facility was to include laboratories that met stringent vibration criteria; laboratories that provided environmental conditions for sophisticated research equipment; and, centrally located computers. Based on this determination, Energy Research proposed to construct and equip the \$230 million Research Laboratory at Hanford based on an unsolicited design concept submitted by Battelle. Energy Research did not evaluate alternatives, such as whether there were existing resources at other national laboratories.

Although Energy Research prepared justifications for the project, it did not explore the possibility of using alternatives as required by the Order. In its May 23, 1989, Justification for a New Start, Energy Research's required analysis of project alternatives was limited to the following narrative, which we are quoting in its entirety:

"Failure to approve this project in a timely fashion will decisively inhibit DOE's ability to address pressing national issues in the areas of environment and health in a timely and cost effective manner. The country simply cannot afford the \$53 D \$150 billion estimated for cleanup. The most cost effective approach is to invest in strategic scientific facilities that can, through research and development, reduce the cost of DOE hazardous and mixed waste site remediation to achieve the desired goals. Five or six years ago, most of the sophisticated instruments, supercomputers, and techniques necessary to solve such scientific problems at the molecular level were not available. Today, however, a laboratory for collaborative research in the molecular sciences is not only possible, but is a necessity for the advancement of molecular science at an internationally competitive level and for the development of verifiable models of environmental phenomena.

Consolidation of research staff, equipment, and interdisciplinary basic science programs in a single laboratory facility is the most cost effective option and will also meet DOE requirements for improved building use, efficiency, and energy conservation. Key features that can best be provided by new facilities and equipment include: (1) laboratories that meet stringent vibration criteria, (2) laboratories that provide proper environmental conditions for sophisticated research equipment, (3) centrally located computers that provide the computational power to meet interactive computer experimental requirements, and (4) proper facility configuration to function as a DOE user facility."

This same conclusion was repeated in a July 1992

Justification of Mission Need. In this document, the alternatives section simply stated:

"The most cost effective approach is to invest in strategic scientific facilities that can, through research and development, reduce the cost of remediation to achieve the desired goals. The alternative is the continued use of decentralized research staff, equipment and research programs among the various laboratories throughout the country."

From the outset of the project, the Department established as a basic criteria that the laboratory would be located at Richland. Documentation gathered during our audit indicates that prior to the 1989 need justification, a decision had been made to site the facility at Richland. This was reflected in a December 1987 study that showed that Richland was the only area being considered for the facility. The study looked at only four sites, all located in Richland. In addition, the original need justification for the project clearly indicated that the decision had been made to site the facility at Richland. The decision was based on the need for a single facility to house the research, as opposed to a fragmented research effort. In fact, the alternatives section of the 1989 and 1992 need justification identified the fragmented approach as an unacceptable alternative. There was no discussion, in the alternatives section, of the option to locate the single facility at other sites or laboratories.

Since 1989, significant changes have occurred at the Department's major laboratories. The emphasis on weapons production decreased and resolution of environmental problems became a top priority. As a result, construction projects for programs such as the Strategic Defense Initiative and other defense related programs at Department laboratories were caught in mid-stream and left without a mission. Despite these events, the Department has not reevaluated its original decision to site the facility at Richland, and has not considered existing facilities at other laboratories as possible alternatives.

In both justification documents cited above, the Department stated that the only alternative to continuing with decentralized staff and equipment was to construct a new laboratory at Richland. The documents also listed Battelle's concept for construction of a new laboratory at Richland as the best and only alternative. As a result, no other sites or laboratories were considered for the project in 1989, nor have any been considered in the intervening period, as required by DOE Order 4700.1.

#### Reasons for Not Considering Alternatives

Energy Research justified its limited evaluation of alternatives by concluding that the Research Laboratory had to be located near Richland because 50 percent of the nation's radioactive and mixed waste is stored at Hanford. We did not validate Energy Research's basic contention regarding the location of radioactive and mixed waste. However, the results of

the audit disclosed that the Richland location was not critical to the mission of the new laboratory. In fact, we determined that the Research Laboratory's mission, conducting basic and applied research to support the Department's cleanup effort, could be met at locations other than Richland. Our conclusion was based on the following:

First, according to Battelle, the research will be done in a laboratory environment using surrogate samples to simulate radioactive materials, radioactive tracer materials, and actual materials in dilute or small quantities. The highly radioactive material stored in tanks at Hanford will not be introduced and studied in the Research Laboratory. Since researchers will use surrogate samples for radioactive waste research, the criticality of locating the laboratory on or near the Hanford site was questionable.

Second, the project was originally approved as a Major System Acquisition under the cognizance of the Office of Environmental Management. The Office of Environmental Management, in conjunction with Energy Research, justified the Research Laboratory on the basis that its applied research emphasis will benefit the cleanup of Hanford and other Department sites. According to the Office of Environmental Management, applied research needed to meet its environmental requirements can be performed at any of the Department's laboratories. In fact, when the need for the Research Laboratory was being developed, the Office of Environmental Management suggested that the research be performed at other Department laboratories.

#### Effect of Not Considering Alternatives

By not evaluating alternatives, the Department may have missed an opportunity to identify the most cost effective means of achieving the goals of the project. Further, the possibility of making more effective use of existing laboratories and equipment may have been lost. Our review showed that the Department had at least three unused facilities that were not evaluated as potential alternatives to constructing the new laboratory. Furthermore, our review showed that three national laboratories were already performing molecular science research. Details on the available alternatives that we identified follow.

Unused Facilities. Although our audit was limited to four locations, we identified three unused facilities that were not considered as alternatives to constructing the new laboratory:

- o Integrated Manufacturing Technology Laboratory. This laboratory located at Sandia-Livermore contains 90,000 square feet of unused space. The laboratory was built to accommodate a Strategic Defense Initiative project which was cancelled. It contains vibration isolation facilities, video conferencing, and an analytical chemistry laboratory. It is also equipped with X-ray diffraction and X-ray fluorescence instruments which are used in molecular science research; the same research planned for the new laboratory at Richland.

- o "Star Wars" Complex. This facility located at Livermore contains 377,600 square feet of unused space. It was also built to accommodate a Strategic Defense Initiative project which was cancelled. It contains over 600 laboratories, 100 offices, a 2 1/2 story open bay, and was built at a cost of \$137 million.

- o Fuels and Materials Examination Facility. This facility located at Richland contains about 123,000 square feet of unused space. Construction of the facility was cancelled at about 70 percent completion and a cost of \$300 million. It contains analytical and metallography laboratories, equipment for remote handling of radioactive materials, and maintenance and decontamination cells.

We discussed the use of existing facilities with Energy Research officials who believed that the facilities cannot be used because the Research Laboratory requires over 61,000 square feet of vibration free floor space. They stated that the laboratory requires a specially designed floor that would have to be retrofitted in an existing facility. According to Energy Research officials, retrofitting such a large area would be almost as expensive as building a new facility. In response to our Management Alert, Richland and contractor personnel estimated that \$100 million was needed to retrofit the Fuels and Materials Examination Facility. However, the audit disclosed that much of the research equipment identified by Battelle as vibration sensitive could be obtained with built-in vibration control capability, thus negating the need for vibration free floors. The use of this type of equipment had not been evaluated as an alternative in any of the existing facilities.

Ongoing and Planned Research. Lawrence Livermore, Los Alamos and Sandia are all conducting molecular research directed towards environmental restoration and waste management technologies. For example:

- o Livermore is conducting research in molecular spectroscopy, surface reaction measurements, molecular cluster, atomic force microscopy, and surface analysis and mapping.

- o Los Alamos is conducting research involving the characterization of Hanford's high-level radioactive waste, the synthesis of new compounds to cleanup contaminated waste streams, and the structural analysis of inorganic and organic compounds.

- o Sandia is conducting research in radiation separation for the treatment of waste which involves designing molecular structures to help separate unstable elements from radioactive waste and molecules nanocluster, molecules which improve catalysis and speed up chemical reactions.

We made no scientific or technical judgment as to the

similarity of this work and the planned project. However, scientists at the above facilities stated that the research they were conducting was similar and in some cases may be duplicative to that planned for the new Research Laboratory. As such, Energy Research should have evaluated, as part of its selection process, the benefit of participating in or supplementing existing research programs.

Available Equipment. While we found that some of the research equipment planned for the new Research Laboratory was available at some of the sites visited, most of the equipment will have to be purchased regardless of location. Therefore, the first-of-a-kind and one-of-a-kind equipment planned for the Research Laboratory is not unique to Hanford, but could be acquired by any site or location. However, plans for the new Research Laboratory did include one expensive acquisition -- a \$13 million high performance computer system. We noted during our audit that Los Alamos, Sandia-Livermore, and Livermore already had the computer systems that could fulfill the needs of the new Research Laboratory. However, since these sites were not evaluated, neither was the possible use or benefits of the existing computer system.

In summary, unused facilities, ongoing research, and available equipment, as discussed above, should have been evaluated by the Department in planning this new facility. With the current concern about budget constraints, we believe it is imperative that the Department fully evaluate all available options before proceeding with multi-million dollar construction projects. Accordingly, Energy Research should determine whether existing facilities at other national laboratories, could fulfill the mission of the proposed Research Laboratory. Such an evaluation would be consistent with the Department's commitment to deficit reduction and prudent spending, and would maximize utilization of available resources.

#### PART III

#### MANAGEMENT AND AUDITOR COMMENTS

The Department of Energy, Office of Energy Research, did not concur with our finding and recommendations in our May 16, 1994, Management Alert or in our subsequent Official Draft Report regarding the construction of the Environmental Molecular Sciences Laboratory. Management's comments and our responses follow.

Recommendation 1. Immediately assess all practical alternatives to determine if there are less costly but equally effective alternatives to new construction and procuring new equipment and to document their final decision.

Management Comments. The Director, Office of Energy Research nonconcurrent with our recommendation to assess alternatives and stated that the Research Laboratory is needed for its unique capability for interactive and synergistic scientific exploration.

Auditor Comments. Although selecting another alternative could result in a reduction in interactive and synergistic scientific exploration, environmental and molecular research could be conducted at existing laboratories. The real question is how much is such a capability worth and is this an appropriate use of taxpayer funds given the budget crisis facing the Government. Therefore, a full evaluation of the costs and benefits of the various alternatives is needed.

Recommendation 2. Ensure that the requirements of Department Order 4700.1 are followed on all future projects.

Management Comments. Management stated that Energy Research had always followed the requirements of the Order. Energy Research further stated that the Office of Inspector General concerns may be a problem with the Order rather than with the Energy Research's management of the Research Laboratory.

Auditor Comments. The Office of Inspector General believes the Order requirements are clear. The Order requires the evaluation of all alternatives before construction starts. The evaluation of the alternatives and justification for the selected alternative are to be submitted to the Acquisition Official for further evaluation and approval. Energy Research, however, did not evaluate alternatives. Therefore, the Acquisition Official could not determine if the construction of the new Research Laboratory at Richland was the best method to accomplish the Department's mission.

Additional Management and Auditor comments follow.

Management Comments. The single concept designation is indicated in the Justification for New Start dated May 23, 1989, and approved July 25, 1989, by the Director, Office of Energy Research, three Energy Systems Acquisition Advisory Board Hearings, and numerous statements by past and present Secretaries of Energy.

Auditor Comments. Neither the 1989 Justification for New Start, memoranda issued on the three Energy System Acquisition Advisory Board Hearings, nor a report submitted to the Congressional Defense Committees in response to Congressional concerns, mentioned that the Research Laboratory was designated or approved as a single concept.

The Research Laboratory was approved as a major project by an Energy Research Program Secretarial Officer. However, the Acquisition Executive is required to approve pursuing a single concept, according to the March 6, 1987, and June 2, 1992, versions of Department Order 4700.1 for Major Projects and Major System Acquisitions. Additionally, the Order also states: "Even when pursuing a single concept, competition shall be employed in development of the concept. The widest range of acquisition alternatives to satisfy the mission need shall be considered."

Management Comments. Department Order 4700.1 requires the appropriate evaluation of alternatives to meet the Department's



mission needs. There were no existing facilities that met the mission needs. This conclusion was documented in two independent site evaluation reports. Alternatives to the single site concept were considered, and it was determined that "consolidation of research staff, equipment, and interdisciplinary basic science programs in a single laboratory facility is the most cost effective option..."

Auditor Comments. The site evaluation reports were conducted only in the Richland, Washington area and did not consider the possibility of conducting the planned research elsewhere. In addition, one of the site evaluations may not have been entirely independent because it was conducted by Battelle.

The Department did not conduct a study to determine if the Research Laboratory mission could be met at other Department laboratories. However, when the project was under the cognizance of Environmental Management, the justification of mission need stated that an alternative would be to continue using decentralized research staff, equipment, and research programs among the various laboratories throughout the country to meet the mission of the Research Laboratory.

Management Comments. "The reaffirmation of mission need, as approved by the Acting Under Secretary of Energy, during the February 28, 1992, Systems Acquisition Advisory Board, clearly tied the Environmental and Molecular Research Laboratory to the Hanford site..."

Auditor Comments. We do not interpret the 1992 Energy Systems Acquisition Advisory Board statement as requiring that the Research Laboratory be located in Richland. It does, however, recognize the magnitude of the problems at Hanford. While the Hanford environmental restoration and waste management problems must be addressed, the mission needs statement recognizes that Department sites around the country share many, if not all, of the same environmental challenges. Since Battelle plans to use surrogate materials in the Research Laboratory, there appears to be no technical requirement that the research be done exclusively in Richland.

Management Comments. As supported by numerous independent peer reviews, the mission need clearly defines the requirement to collocate the multiple disciplines and to create an interactive environment for the researchers. In so doing, the user facility environment allows an individual researcher's contribution to be shared by others working on related problems, without dealing with the hurdles created by time and distance caused by a fractured program spread throughout the United States.

Auditor Comments. While the peer reviews concluded that the research was necessary, the scope of the reviews did not consider the changing missions of the Department laboratories due to the end of the cold war. Many existing laboratories were and still are downsizing and may be available to pursue the research planned for the Research Laboratory.

In our review of three Department laboratories, we found numerous examples of similar equipment and research efforts which parallel those planned at the Research Laboratory. Also, a peer review cautioned that coordination must take place in order not to duplicate efforts of other Department programs, specifically in the area of structural biology. Further, laboratory scientists stated that frequent research collaborations occur between laboratories. The use of distributed work environments with network capabilities, such as Internet, overcomes the hurdles created by time and distance.

Management Comments. Energy Research stated that the Office of Inspector General made erroneous and misleading judgments because it lacked scientific and technical expertise on the issues.

Auditor Comments. The Office of Inspector General did not make scientific or technical judgments during the course of this audit. The issues raised in the report are based on the criteria established by the Department for the management of Major System Acquisitions, such as the Molecular Sciences Laboratory. We have rendered no opinion on the technical merits of the mission of the Laboratory, nor have we opined as to the ability of any existing laboratory to successfully carryout this mission. Where scientific or technical issues are discussed in the report, we have relied upon scientists and researchers from Sandia, Los Alamos, and Livermore. Department Order 4700.1 requires that alternatives to accomplish mission goals be fully evaluated and that reasons for selection and non-selection must be presented before any construction starts. Energy Research did not evaluate the use of existing Departmental facilities before deciding to construct the new laboratory based on a Battelle concept. This is the essence of the audit finding.

#### EXAMPLE OF CUSTOMER RESPONSE FORM

IG Report No. DOE/IG-0371

#### CUSTOMER RESPONSE FORM

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1. What additional background information about the selection, scheduling, scope, or procedures of the audit or inspection would have been helpful to the reader in understanding this report?
2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?
3. What format, stylistic, or organizational changes might have made

this report's overall message more clear to the reader?

4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

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