DOE/IG-0526

AUDIT REPORT

DISSEMINATION OF RESEARCH FROM THE ENVIRONMENTAL MOLECULAR SCIENCES LABORATORY

SEPTEMBER 2001

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

U. S. DEPARTMENT OF ENERGY
Washington, DC 20585

September 26, 2001

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Dissemination of Research from the Environmental Molecular Sciences Laboratory"

BACKGROUND

In response to a 1995 Office of Inspector General report entitled, *Audit of Department of Energy's Environmental Molecular Sciences Laboratory (EMSL)*, Department of Energy officials stated that the laboratory would offer unique interactive and synergistic scientific exploration capabilities and would be equipped with state-of-the-art and first-of-a-kind equipment. Subsequently, the Department constructed and currently operates the EMSL in Richland, Washington. The $229 million EMSL opened in October 1997 as a National User Facility. Under contract with the Richland Operations Office (Richland), Battelle Memorial Institute (Battelle) operates the EMSL as well as Pacific Northwest National Laboratory.

EMSL's designation as one of several Department of Energy user facilities is a key component of its importance to the greater scientific community. Under this concept, non-Departmental laboratory users – including for-profit and not-for-profit entities – can access EMSL's unique facilities for their scientific investigations. Those engaged in proprietary research are obligated to pay the full-cost recovery rate for their use of the EMSL facility. However, users engaged in general or nonproprietary research are not charged, but must document and provide their research results to the EMSL.

Facility officials are responsible for ensuring these results are documented and that deliverables, such as technical reports, are collected and forwarded to the Department's Office of Science and Technology Information (OSTI), through which they are made available to the general scientific community. To date, 97 percent of the research conducted at the EMSL has been nonproprietary. The objective of the audit was to determine if the results of nonproprietary research at the EMSL were collected and forwarded to OSTI.

RESULTS OF AUDIT

The audit disclosed that operating officials at the EMSL did not always collect and forward the results of nonproprietary research to OSTI. In fact, EMSL officials had not received research results or deliverables for 94 of 153 completed research projects that were listed as completed at the time of our audit. Even when deliverables were received, EMSL officials often did not send them to OSTI. We found that Battelle had received over 700 deliverables, yet just 60 had been forwarded to OSTI.

The contract between Richland and Battelle contained provisions to collect and forward all deliverables to OSTI. However, in spite of the contract provisions, Battelle developed a management system that did not identify or track all research projects performed. Also, Battelle, EMSL, and Richland officials alike claimed that they did not fully understand the requirements for sending research results to OSTI. In fact, Richland officials were not knowledgeable of the types of documents that had to be sent to OSTI and were not familiar with the contract provision. Without full dissemination of appropriate EMSL research results to the scientific community, this invaluable resource may not be readily available to other current and future scientists.

MANAGEMENT REACTION

Richland management concurred with the finding and recommendations. Richland also provided a corrective action plan to implement the recommendations.

Attachment

cc: Deputy Secretary
Under Secretary for Energy, Science and Environment
Manager, Richland Operations Office

DISSEMINATION OF RESEARCH FROM THE ENVIRONMENTAL MOLECULAR SCIENCES LABORATORY

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OVERVIEW

INTRODUCTION AND OBJECTIVE

A 1995 Office of Inspector General (OIG) report questioned the need for a proposed Environmental Molecular Sciences Laboratory (EMSL). In responding to the report, Department of Energy (DOE) officials asserted that the laboratory would offer unique interactive and synergistic scientific exploration capabilities and would be equipped with state-of-the-art and first-of-a-kind equipment. Subsequently, DOE constructed and currently operates the EMSL in Richland, Washington. Under contract with the Richland Operations Office (Richland), Battelle Memorial Institute (Battelle) operates the EMSL as well as Pacific Northwest National Laboratory.

The $229 million EMSL opened in October 1997 as a National User Facility. All potential users must sign a user agreement prior to using the EMSL facilities. Users engaged in proprietary research are obligated to pay the full-cost recovery rate for EMSL usage. Users engaged in general or nonproprietary research, however, are not charged but must document and provide their research results to the EMSL. Facility officials are responsible for ensuring that these results are documented and that deliverables, such as technical reports, are collected and forwarded to the Office of Science and Technology (OSTI) for further dissemination to the scientific community. To date, 97 percent of the research conducted at the EMSL has been nonproprietary.

The objective of the audit was to determine if the results of nonproprietary research at the EMSL were collected and forwarded to OSTI.

CONCLUSIONS AND OBSERVATIONS

Operating officials at the EMSL often did not collect and forward to OSTI the results of nonproprietary research. In fact, EMSL officials had not received research results or deliverables on 94 of 153 completed research projects. Since these deliverables were not received, they could not be forwarded to OSTI. Even when deliverables were received, however, EMSL officials often did not send them to OSTI. We found that Battelle had received over 700 deliverables, but had forwarded just 60 to OSTI. The contract between Richland and Battelle contained provisions to collect and forward all deliverables to OSTI. In spite of the contract provisions, Battelle

developed a management system that did not identify deliverables that were due. Further, Battelle, EMSL, and Richland officials alike claimed that they did not fully understand the requirements for sending research results to OSTI. Without full dissemination of research results to the scientific community, future researchers may not benefit from past discoveries. Therefore, DOE may not receive full value from the $48 million it costs annually to operate the EMSL.

Problems with collecting technical reports and forwarding them to OSTI are not currently limited to the EMSL. Recent audits performed at other locations across the DOE complex showed that technical reports were not always received and when received were not always forwarded to OSTI.

The audit identified issues that management should consider when preparing its yearend assurance memorandum on internal controls.

(Signed)
Office of Inspector General

Dissemination of Nonproprietary Research

Research Results Not Made Available to OSTI

EMSL officials did not collect or forward to OSTI deliverables documenting the results of numerous projects. Of the 790 research projects conducted at the EMSL since it opened in October 1997, 769 (97 percent) were nonproprietary. Since the use of the EMSL is free to nonproprietary users, EMSL officials should have collected and forwarded all nonproprietary research deliverables to OSTI. However, the EMSL had no record of receiving deliverables on 94 of the 153 nonproprietary projects that were listed as completed at the time of our audit. Further, even when deliverables were received, officials often did not forward the deliverables to OSTI. From October 1997 to March 2001, only 60 deliverables were sent to OSTI. Our analyses of Battelle and EMSL records and discussions with operating officials revealed that more than 700 deliverables had been received.

National User Facility

DOE established the EMSL as a National User Facility that performs cutting-edge molecular science targeting DOE's environmental mission. The mission of the EMSL is to provide advanced resources to scientists engaged in fundamental research, to conduct fundamental research in molecular sciences, and to educate scientists in the molecular sciences to meet the demanding challenges of the future. National user facilities permit researchers to extend the frontiers of science. In certain scientific disciplines, the most creative research can only be done at these large facilities. Since nonproprietary research is free at a user facility, the value derived from its operation is through the collection and dissemination of technical information to the scientific community through OSTI - the coordination point for all of DOE's scientific and technical information.

OSTI was established to collect, organize, preserve, and disseminate research results. To successfully perform these functions, OSTI relies on DOE field offices and their contractors, particularly those operating national user facilities, to forward appropriate deliverables. In order to send this material, user facility officials must establish life-cycle systems to identify deliverables; track anticipated and actual deliverables; and collect and, then, transmit them to OSTI. To clarify the type of deliverables that should be forwarded, DOE issued the *Guide to the Management of Scientific and Technical Information* in August 1998. The Guide states that deliverables include such items as technical reports, journal articles, professional publications, presentations, and conference proceedings. Further, deliverables provide important technical findings to the widest audience in the scientific community. Ultimately, the deliverables are critical in assessing the scientific work at DOE laboratories and determining its

value in relation to the significant taxpayer investment in DOE's research and development program.

Project Management Controls

EMSL officials were generally unaware that as operators of a user facility they were (1) to account for all research conducted at the user facility; (2) to receive results for all nonproprietary research; (3) to know what deliverables were due, when they were due, and if they had been received; and (4) to collect and forward such deliverables to OSTI. Likewise, Battelle and Richland officials were not aware of the requirement to collect and forward research results to OSTI.

Although Battelle had installed a management system at the EMSL, the system did not identify or track all research projects performed. For example, the system identified 657 projects; however, an analysis of financial reports and discussions with officials within EMSL's 6 directorates revealed that 133 additional projects existed. These additional projects involved Battelle researchers who worked in collaboration with EMSL researchers; thus, these research projects were considered to have been performed by Battelle employees, and consequently did not go through the project management system. The management system used at the EMSL, therefore, was incomplete. In fact it showed that only 48 deliverables had been received, a figure significantly less than the 718 identified through analyses of records and discussions with operating officials.

Finally, Richland officials like their counterparts at Battelle and EMSL did not recognize their duties and responsibilities and, therefore, had done little to ensure that their EMSL user facility obligations were fulfilled. Richland officials were not knowledgeable of the types of documents that had to be sent to OSTI and were not familiar with the contract provision. Therefore, three and one-half years after beginning operations Richland had not reviewed the EMSL management system to ensure the system was accomplishing its objectives. Additionally, Richland did not establish performance measures as intended by DOE Order 241.1, *Scientific and Technical Information Management*, to judge Battelle's progress made in collecting and forwarding deliverables to OSTI for future use and dissemination. Finally, although a management fee was established in the Battelle contract, Richland had not made any fee applicable to the operation of EMSL.

DOE Not Fully Benefiting from the EMSL

The scientific work done at the EMSL is not in question. However, it is questionable whether DOE and the scientific community have fully benefited from the nonproprietary research done at the EMSL. Part of the mission of the EMSL is to educate researchers in molecular sciences to meet the demanding challenges of the future. If the research done in the past is not made available to the scientific community, it is questionable whether the EMSL is fulfilling this aspect of its responsibilities. Research and operation of the EMSL cost taxpayers about $48 million in Fiscal Year (FY) 2000. To ensure that taxpayers benefit from their investment in the facility, research results from nonproprietary research must be promptly collected and disseminated.

RECOMMENDATIONS

We recommend that the Manager, Richland Operations Office:

1. Ensure that Richland, Battelle, and EMSL officials are fully informed of the requirements for the operation of a National User Facility and to collect all deliverables and forward to OSTI those that meet the needs of OSTI.

2. Establish and use performance measures to evaluate EMSL's role in collecting and forwarding deliverables to OSTI and tie the performance measure to the management fee.

3. Direct Battelle to establish a project management system that will track the life-cycle of EMSL nonproprietary research.

MANAGEMENT REACTION

Recommendation 1. Richland concurred with the intent of the recommendation. Richland will ensure that appropriate Richland and Battelle staff are fully informed of the requirements for the operation of a National User Facility and that all appropriate deliverables as identified by OSTI are forwarded to that office. Richland and Pacific Northwest National Laboratory (PNNL) are currently forwarding research results to OSTI based on their understanding of the requirements as identified in the DOE *Guide to the Management of Scientific and Technical Information.* Richland and Battelle discussed requirements with OSTI officials on August 27, 2001, and received written clarification concerning OSTI's requirements. Richland and Battelle will continue to discuss similar matters during regularly scheduled conference calls held with OSTI to ensure that all research results required by OSTI are submitted to them.

Recommendation 2. Richland concurs that performance measures specific to EMSL's User Facility role of collecting and forwarding appropriate deliverables to OSTI should be utilized. Richland will send formal direction to PNNL by September 30, 2001, to establish and use performance measures specific to EMSL's role in collecting research results to be forwarded to OSTI. However, Richland does not believe tracking the numbers of deliverables provided to OSTI is an appropriate performance measure to pay fee for, but instead should be monitored as part of the Business Management and Oversight Process (BMOP). In FY 2001, Richland's oversight of PNNL included monitoring measures through BMOP to increase understanding of and compliance with information release requirements of the laboratory. In particular, Measure 1.3 includes a component that tracks the submission and announcement of technical reports to OSTI from the laboratory.

Recommendation 3. Richland concurred that the existing User Proposal Process would be improved by including a formal project closeout activity that includes an exit survey and an improved process for obtaining information on published research results and documentation of the disposition of nonproprietary work. Documentation received as a result of this exit process will be retained in PNNL's files for possible future reference. PNNL expects to implement this closeout procedure by June 30, 2002.

AUDITOR COMMENTS

Richland's actions are responsive to our recommendations. The OIG agrees that tracking numbers is not a measure for payment of fee. However, one of the prime responsibilities for the operation of the EMSL as a National User Facility is ensuring that a deliverable is received for all research conducted at the facility. Ensuring the results of nonproprietary research reaches the public is the final act of a successful operation of a user facility. Therefore, ensuring that deliverables are received and appropriately sent to OSTI for public dissemination is not just "tracking numbers" but is tracking contract performance. Richland's proposed action to include this area in the BMOP process will meet the intent of the recommendation.

Appendix 1

SCOPE

We performed the audit from December 15, 2000 to August 1, 2001, at Richland, Battelle, and EMSL in Richland, Washington. We also contacted OSTI, located in Oak Ridge, Tennessee. The audit was limited to nonproprietary research conducted at the EMSL from October 1997 through March 2001.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed applicable laws, regulations, policies, and procedures;
- Reviewed user facility agreements;
- Reviewed the accounting for user facility agreement collections;
- Reviewed all EMSL user proposals since inception of the user facility;
- Interviewed Headquarters, Richland, OSTI, and Battelle officials;
- Examined research proposal acceptance criteria and compared the criteria to submitted research proposals;
- Reviewed prior audit reports;
- Evaluated the project management system and compared the system to contractual requirements; and,
- Reviewed 790 research projects at the EMSL.

We conducted the audit 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. Internal controls reviewed included DOE and contractor policies and procedures and Federal regulations related to management and operations of user facilities. We assessed the significant internal controls and performance measures established under the *Government Performance and Results Act of 1993* related to EMSL's management of research projects and results from nonproprietary research. There were no specific performance goals related to our audit objective. Because we limited our review, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We assessed the reliability of computer-generated data and found it was not reliable for the purposes of this audit.

We discussed this report with Richland and Battelle officials on August 29, 2001.

Appendix 2

RELATED OFFICE OF INSPECTOR GENERAL REPORTS

- *Peer-Reviewed Scientific Literature Generated at the Department's Light Sources,* (DOE/IG-0520, August 2001). Only 44 percent of the abstracts associated with the research performed at DOE's light source laboratories in FY 2000 were available for public dissemination through OSTI. Laboratories, although required to do so, did not notify OSTI of available peer-reviewed journal articles. Thus, OSTI lacked a comprehensive listing of relevant journal articles that would have served as a baseline to confirm the accuracy and completeness of the *PubSCIENCE* database. Secondly, even if the requisite information had been provided by the laboratories, OSTI had no systematic methodology for reconciling research articles which it had reason to anticipate would be in the database and those which were actually included. Based on DOE's objectives for the OSTI program, it is clear that researchers may not have had full and ready access to valuable government-sponsored research information and that scientific advancement was not fully promoted.

- *Audit of Departmental Receipt of Final Deliverables for Grant Awards,* (DOE/IG-0415, December 1997). Over 700 grants awarded through Headquarters, Chicago and Oak Ridge Operations Offices, the Federal Energy Technology Center, and the Chicago Regional Support Office did not provide final technical and financial reports. Without the final deliverables, the report concluded that DOE could not demonstrate that the public benefit specified in the grant instrument was achieved.

- *Audit of the Department of Energy's Scientific and Technical Information Process,* (DOE/IG-0407, June 1997). DOE and its management and operating contractors are required to establish life-cycle systems to identify, collect, and disseminate scientific and technical products generated under DOE funded research and development activities and provide these products to the OSTI. DOE neither utilized a life-cycle management process nor ensured that all information generated by DOE's management and operating contractors were provided to OSTI. As a consequence, DOE was not in a position to know whether it received value for its significant investment in research and development or whether information emanating from these efforts received the widest possible dissemination.

- *Audit of Program Administration by the Office of Energy Research,* (DOE/IG-0376, August 1995). Energy Research, excepting the office responsible for fusion energy, generally did not include performance criteria and metrics in work authorizations that provided for research at DOE laboratories. While information was available in the contractor's research proposals, Energy Research essentially relied on the contractors to initiate and execute the research without agreement on expectations. This practice precludes the establishment of documented performance criteria and metrics that DOE elements responsible for performance-based contract management can use to determine whether contractors met the objectives of DOE for their research efforts.

- *Audit of the Department of Energy's Environmental Molecular Sciences Laboratory,* (DOE/IG-0371, April 1995). The Office of Energy Research had not evaluated all practical alternatives in building and equipping the proposed EMSL. Energy Research should have considered other alternatives such as site location and other laboratory availability. Other DOE laboratories were performing related research and had excess space that might have met the proposed Research Laboratory's requirements.

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