



U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

AUDIT REPORT

Lawrence Livermore National Laboratory's
Laboratory Directed Research and
Development Program

OAS-L-15-04

November 2014



Department of Energy
Washington, DC 20585

November 24, 2014

MEMORANDUM FOR THE MANAGER, LIVERMORE FIELD OFFICE

A handwritten signature in black ink, appearing to read "David Sedillo".

FROM: David Sedillo, Director
Western Audits Division
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "Lawrence Livermore National Laboratory's Laboratory Directed Research and Development Program"

BACKGROUND

The Laboratory Directed Research and Development (LDRD) Program was established by Congress in 1984 and is a funding source used to support long-term investment in science and technology at Lawrence Livermore National Laboratory (LLNL). For several years, the LDRD Program enabled laboratories to invest up to 8 percent of their operating budgets in research and development (R&D) efforts. However, in Fiscal Year (FY) 2014, Congress reduced the maximum investment in the LDRD Program to 6 percent. From October 2007 through June 2014, LLNL allocated nearly \$600 million to its LDRD Program.

LLNL's LDRD portfolio is intended to support Department of Energy (Department), National Nuclear Security Administration (NNSA) and LLNL mission areas. As such, LLNL developed a Strategic Investment Road Map (Road Map), which summarizes its mission focus areas and core competencies for R&D efforts. LLNL also primarily organizes its LDRD proposals into one of three major project categories: Strategic Initiative, Exploratory Research, and Laboratory-Wide. Strategic Initiative projects focus on R&D that is likely to set new directions for existing programs or develop new programmatic areas within LLNL's mission. Exploratory Research projects focus on activities that are likely to lead to scientific discoveries and technological breakthroughs that enhance LLNL's competencies or current mission areas. Laboratory-Wide LDRD projects involve innovative research that serves as a growth opportunity for young scientists.

LLNL's LDRD projects must adhere to the requirements in Department Order 413.2B, *Laboratory Directed Research and Development*. In particular, the Department requires LDRD Programs to use internal peer and/or technical management reviews to select projects that emphasize innovative scientific and technological excellence, submit project data sheets to the Department annually, submit an annual LDRD Program Plan to the Department for approval, evaluate LDRD project performance and quality, report to the Department annually regarding

LDRD accomplishments, ensure that LDRD funding levels are consistent with Congressional limits, and ensure that LDRD projects generally do not exceed 36 months. Given the Department's investment in LDRD projects and the importance of the LDRD Program, we initiated this audit to determine whether LLNL was effectively managing its LDRD projects.

RESULTS OF AUDIT

Nothing came to our attention to indicate that controls were not in place over initial LDRD project approval and subsequent project management as required by Department Order 413.2B and LLNL's internal procedures.

During the audit, we became aware that LLNL's Laser Inertial Fusion Energy endeavor was supported by a number of funding sources, including LDRD funds. We plan to make additional inquiries into the appropriateness of LLNL's use of non-LDRD funds to support the endeavor.

Project Approval

The LDRD projects we tested were approved as required by Department Order 413.2B and LLNL's internal procedures. LLNL's process for determining which proposals were selected for LDRD funding was defined in its *LDRD Policies and Procedures Manual*. Specifically, each year the process began with a call for proposals for the three main project categories. Proposals were evaluated by peer review committees comprised of personnel who may be internal or external to LLNL. The elements of the proposal process were based on the project's category. For example, researchers responding to the call for proposals for Strategic Initiative or Exploratory Research categories first submitted a preliminary proposal that was reviewed for mission relevance, including alignment with the Road Map and an endorsement decision. The researchers of endorsed preliminary proposals prepared and submitted formal LDRD proposals, which were reviewed for technical merit. Laboratory-Wide projects did not go through a preliminary proposal process and were not required to align with the Road Map. However, the peer review committee reviewed Laboratory-Wide project proposals for technical merit and relevance to NNSA's mission. During the audit, we noted that the projects selected for testing were subjected, without exception, to a peer review as required by Department Order 413.2B and the proposal process as outlined in LLNL's *LDRD Policies and Procedures Manual*.

We also determined that project data sheets were prepared as required for the LDRD projects we tested. Specifically, we verified that project data sheets existed for each of the sampled projects for each year the projects received funding. Project data sheets included a project description, expected results, mission relevance, prior fiscal year results, if any, and proposed work for the upcoming fiscal year. The data sheets were important because NNSA used them during its LDRD project approval and project management processes, which are described later in this report.

Further, LLNL prepared annual LDRD Program Plans that were approved by NNSA as required. In particular, we reviewed LLNL LDRD Program Plans submitted to the Livermore Field Office for FYs 2008 through 2014 and verified that the plans were approved prior to the start of the fiscal year. The annual LDRD Program Plan contained the individual proposals selected for

final consideration through the proposal process and their associated requested funding amounts. It also provided an overview of LLNL's LDRD Program and a description of how the budget was distributed among the LDRD project categories. The Livermore Field Office formally authorized the start of LLNL's LDRD Program after it completed a review of the project data sheets, LDRD Program Plan and financial records. The Livermore Field Office also reviewed the financial records to verify that LLNL's LDRD Program did not exceed the maximum allowable funding level.

Project Management

In addition to initial project approval controls, we found project management controls in place over the LLNL LDRD projects we sampled. In particular, we found that LLNL and NNSA had implemented performance/quality and financial monitoring controls. One of the primary performance/quality controls consisted of periodic project reviews, which ensured that projects were on track and meeting intended goals. The types and frequency of the reviews were based on the project's category. For example, LLNL's LDRD Office independent committees reviewed Strategic Initiative projects annually because they were usually larger and more technically challenging than projects in the other categories. Exploratory Research projects were reviewed every 18 months by the LLNL LDRD Office independent committees and annually by the responsible LLNL organization. Laboratory-Wide projects that continued for a second year were reviewed by the responsible LLNL organization. Another review performed on one of the projects in our sample was a retrospective review that occurred to assess the cumulative scientific and mission impact once the project was completed. This review consisted of personnel external to LLNL and evaluated the technical quality aspects of the project. We verified that each LDRD project in our sample was reviewed to ensure adequate performance and quality.

We also determined that LLNL reported to the Department annually regarding its LDRD accomplishments, as required by Department Order 413.2B. Specifically, we reviewed LLNL's LDRD annual reports for FYs 2008 through 2013 and noted that they contained the projects we selected for testing. In addition, we found the annual reports provided information, such as the number of patents issued, records of inventions discovered and journal articles published that resulted from LLNL's LDRD Program.

Further, we found that NNSA had implemented LDRD project performance/quality controls. Similar to initially proposed LDRD projects, LLNL submitted annual data sheets for all continuing projects. According to the Livermore Field Office LDRD Manager, he compared each project's current data sheet to the prior year's data sheet to determine whether the accomplishments aligned with the prior year's proposed work. We verified that the Livermore Field Office reviewed the data sheets for the LDRD projects we sampled. As mentioned previously, we also verified that the data sheets were approved by the Livermore Field Office prior to LLNL receiving funds for the upcoming fiscal year.

Finally, we determined that financial controls over LLNL's LDRD projects were implemented as required. For example, NNSA's Office of Field Financial Management reviewed LLNL's method of accumulating LDRD funds annually in accordance with Department Order 413.2B.

During these reviews, the Office of Field Financial Management also sampled projects to ensure they were not funded beyond the maximum allowable duration of 36 months. According to the Office of Field Financial Management's reports on LLNL's LDRD activities for FYs 2008 through 2014, LLNL's LDRD Program generally complied with requirements. Additionally, we noted that LLNL's LDRD Office generated monthly expense reports to ensure projects were not over budget. Our review of LLNL's LDRD expense reports for April through June 2014 showed that all of the ongoing projects in our sample were within budget.

PATH FORWARD

As mentioned above, nothing came to our attention to indicate that controls were not in place over the initial LDRD project approval and subsequent project management. Accordingly, we are not making any recommendations regarding LLNL's overall management of LDRD projects.

We appreciated the cooperation of your staff that provided information and assistance during the audit.

Attachment

cc: Deputy Secretary
Administrator, National Nuclear Security Administration
Chief of Staff

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE

The audit objective was to determine whether Lawrence Livermore National Laboratory (LLNL) was effectively managing its Laboratory Directed Research and Development (LDRD) projects.

SCOPE

The audit was performed between February and November 2014. We conducted the audit at Lawrence Livermore National Laboratory located in Livermore, California and Department of Energy/National Nuclear Security Administration Headquarters in Washington, D.C. and Germantown, Maryland. We conducted this audit under Office of Inspector General Project Number A14LL008.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed applicable laws, regulations, policies and procedures relevant to the LDRD Program at LLNL;
- Judgmentally sampled 8 LDRD projects from a universe of 517 projects based on project cost and those projects that initially appeared to be for work that was potentially outside of the Department of Energy's mission. Because a judgmental sample was used, results could not be projected to the universe;
- Assessed the sampled projects for compliance with applicable laws, regulations, policies and procedures;
- Reviewed documentation associated with the approval and management of selected LLNL LDRD projects; and
- Held discussions with Department of Energy/National Nuclear Security Administration Headquarters, Livermore Field Office and LLNL officials.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides reasonable basis for our conclusions based on our audit objective. The audit included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. In particular, we assessed Department of Energy/National Nuclear Security Administration's implementation of the *GPR Modernization Act of 2010* and concluded that performance measures were established related to the LDRD Program. 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 solely rely on computer-processed data to satisfy our objective. Instead, we performed other procedures to satisfy ourselves as to the reliability and competence of the data by interviewing officials who oversee the LDRD Program and collecting other supporting source documents. Management waived an exit conference.

FEEDBACK

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