

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

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## Maintaining High Scientific Quality at Los Alamos and Lawrence Livermore National Laboratories—*Summary*

### DIVISION ON ENGINEERING AND PHYSICAL SCIENCES

#### Background

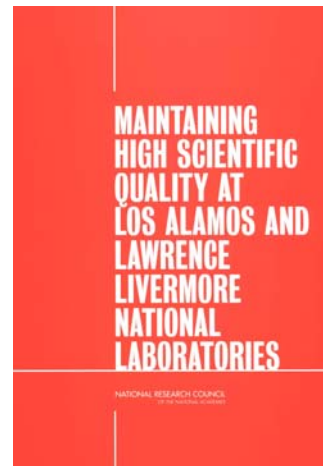
In recent years, there has been concern in Congress about security and operations management at Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL). As a result, Congress directed the Department of Energy (DOE) to hold open competitions for the management and operations (M&O) contracts for both LANL and LLNL, as well as for other DOE national laboratories

The quality of the scientific programs, however, did not appear to be a factor in that action. In view of that, the National Nuclear Security Administration (NNSA), of the DOE, wanted to ensure that the contract competitions preserve the high-quality science and engineering currently being performed at the labs, and it asked the National Research Council (NRC) to do the following:

*[I]dentify key management principles for ensuring high scientific quality in world-class weapons and energy R&D and recommend how best the NNSA can create meaningful qualification and selection discriminators to help ensure world-class scientific quality is maintained in programs and activities at LANL and LLNL. The [NRC] will conduct its study with careful attention to the missions of LANL and LLNL and the needs of NNSA, the current situations at LANL and LLNL and operating requirements imposed upon them, the trends in the management of scientific activities at other relevant federal R&D organizations, and the future availability of scientific manpower required at LANL, LLNL, and similar laboratories.*

The NNSA informed the NRC that it had assigned to others the responsibility for ensuring that security and operations management would be properly addressed by the competitions. To address the study's charge, the NRC constituted the Committee on Criteria for the Management of Los Alamos and Lawrence Livermore National Laboratories,

#### Findings and Recommendations



The committee developed the following primary findings and recommendations::

- **Run the competitions for both LANL and LLNL simultaneously.** Because of their unique role in nuclear weapons research and development (R&D) and stewardship, LANL and LLNL serve as peer communities for one another. The interplay between these two laboratories is very important, and there is a strong sentiment at the laboratories that their coordination and constructive competition are facilitated by their being managed by the same contractor. The NNSA should hold the M&O competitions for both laboratories simultaneously, allowing offerors to bid on an individual laboratory or on both, and should then evaluate the resulting proposals to ascertain which hold the best promise for ensuring that the laboratories' programs remain coordinated and that the laboratories continue to serve as peer reviewers of one another's work. The NNSA should also evaluate its own capabilities for playing that coordinating role in the event that different M&O contractors are selected for LLNL and LANL.
- **Use a single proposal evaluation board assisted by a panel of experts in science and technology management.** The committee recommends that the NNSA constitute a single very knowledgeable evaluation board to evaluate the proposals it will receive for the management and operation of LANL and LLNL, to better enable comparison of management ideas from across the entire set of proposals. The committee also recommends that the evaluation board have available, as an added resource, a panel of experts in S&T management to help assess offerors' responses in areas where additional S&T experience is required and to help formulate questions for the evaluation board to pose to the offerors.
- **Preserve and improve what's working well.** Congressional concerns about security and project management at LLNL and LANL—which are beyond the scope of this study—were not accompanied by criticism of the S&T programs at the two laboratories. Therefore, attempts to address the former should be balanced and integrated with actions to preserve and improve S&T quality. The NNSA also should conduct the competitions in a way that minimizes uncertainty for the laboratories' staffs, including working toward contractor arrangements that are readily extendible beyond the 5 years stipulated in federal procurement regulations and immediately communicating any ground rules for the competitions that bear on continuation of employment and benefits.
- **Seek contractors that can retain the laboratories' world-class scientific staffs.** The NNSA's requests for proposals (RFPs) and proposal evaluations should ensure that the laboratories continue to attract, retain, and develop the world-class S&T staffs that are essential to accomplishing the laboratories' missions. The RFPs and subsequent proposal evaluations should address the aspects under direct control of the contractor (e.g., laboratory facilities and site conditions) as well as the contractor's contributions to the community that enable the attraction and retention of highly qualified science and engineering staff. Because of LANL's isolated location, the community aspects should be weighted more heavily for LANL.

- **Seek contractors with excellent strategic management capabilities.** The RFPs and proposal evaluations should lead to M&O contractor(s) with experience in running a large S&T organization and the ability to create and follow a long-term S&T agenda, and to do so with impeccable integrity and a commitment to national service.
- **Seek contractors that will appoint excellent key personnel to manage the laboratories.** The RFPs and resulting proposal evaluations should lead to key management teams for LANL and LLNL, including governing or advisory boards and visiting committees, that are of the highest quality. The credentials of the team members should be comparable to those of individuals in similar positions at other national laboratories.
- **Seek contractors that are expert at best practices.** Effective and efficient business practices facilitate and support the delivery of high-quality S&T work. The RFPs and resulting proposal evaluations should be tailored to find contractors with demonstrated skills in process, financial, and human and physical resource management. The contractors should be able to plan, construct, and operate major facilities and execute effective but efficient security and safety procedures and training programs.
- **Seek contractors that are skilled at stimulating and supporting innovation.** The contractors should be effective stewards of their Laboratory-Directed Research and Development (LDRD) funds, as these funds provide one of the principal means for the laboratories to remain on the cutting edge of science and engineering and to recruit and retain outstanding young scientists, and the RFPs and resulting proposal evaluations should identify offerors with the best capabilities in this area. The contractors should also creatively manage interactions with the outside technical community, including foreign nationals, and provide productive and stimulating processes for managing intellectual property, facilitating technology transfers, and rewarding exceptional contributions by the S&T staff.
- **Seek contractors that can provide intellectual leadership.** It is essential to the missions of the laboratories and to the continuance of mission-oriented S&T work of the highest quality that the NNSA's RFPs and resulting proposal evaluations identify contractors that can lead the laboratories to continued technical excellence.

This report provides background for these recommendations and includes additional recommendations to the NNSA about how it can evaluate the proposals that result from these competitions. It makes some suggestions for incentives to include in the contract to increase the likelihood of proposals from high-quality R&D organizations. The report also discusses more generally some of the principles of good R&D management, including the need to strike a balance between managerial control and the flexibility that encourages scientific and technical creativity.

## **For Further Information**

Copies of the complete report, *Maintaining High Scientific Quality at Los Alamos and Lawrence Livermore National Laboratories*, can be obtained on the National Academy Press Web site <[www.nap.edu/catalog/](http://www.nap.edu/catalog/)>

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