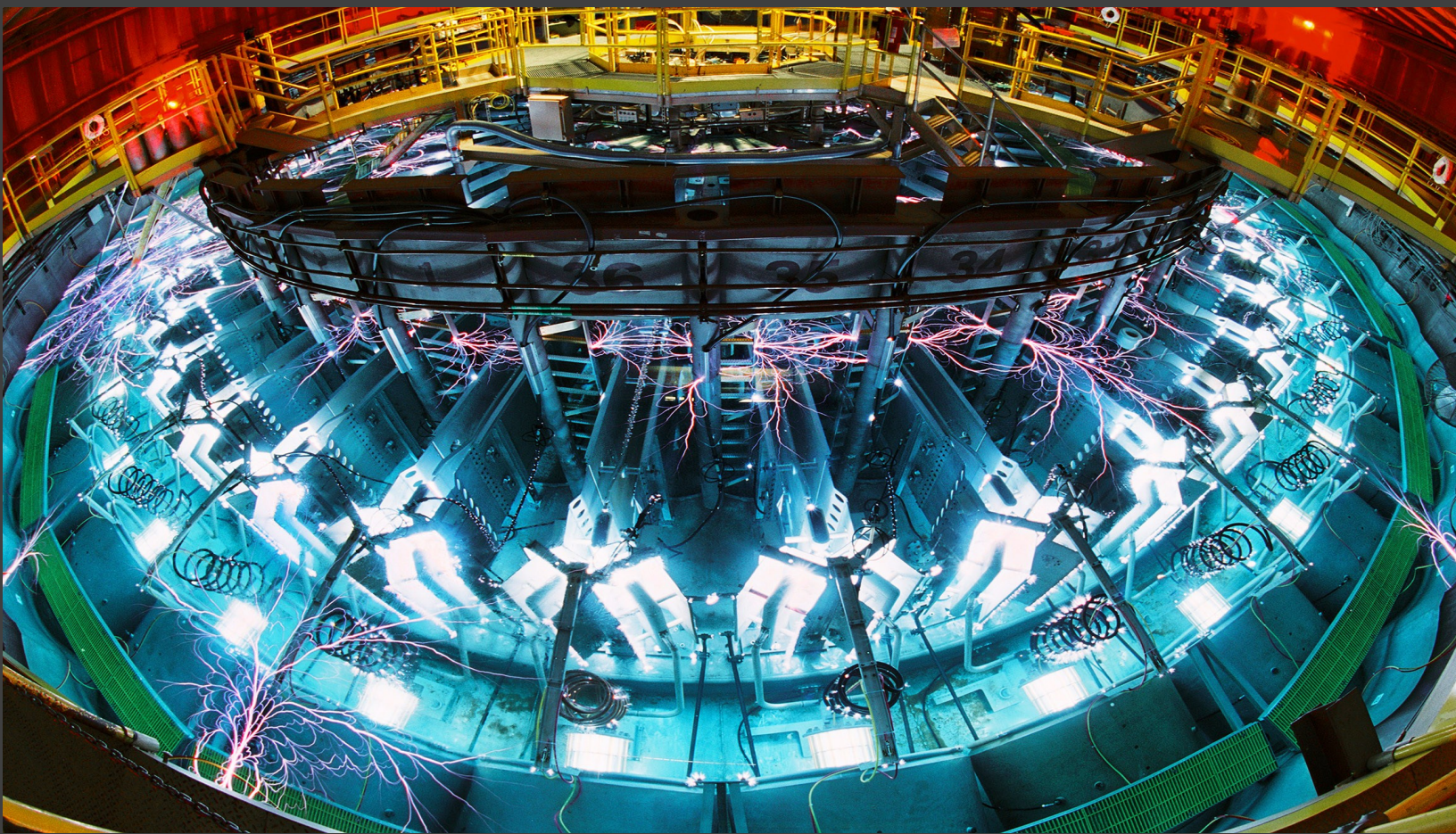


A Report by a Panel of the
NATIONAL ACADEMY OF PUBLIC ADMINISTRATION
for the U.S. Congress and the Department Of Energy

DEPARTMENT OF ENERGY



POSITIONING DOE'S LABS FOR THE FUTURE: *A REVIEW OF DOE'S MANAGEMENT AND OVERSIGHT OF THE NATIONAL LABORATORIES*

January 2013

National Academy of
Public Administration®



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January 2013

U.S. Department of Energy

Positioning DOE's Labs for the Future: A Review of DOE's Management and Oversight of the National Laboratories

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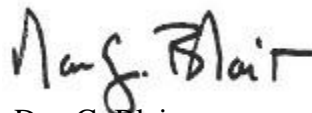
FOREWORD

The Department of Energy's national laboratories have occupied a central place in the landscape of American science for more than 50 years. They have been an important topic of study by distinguished commissions over the last several decades, and even as this study goes to press, other studies dealing with specific aspects of the laboratory system are being conducted by the National Research Council of the National Academy of Sciences and the Institute for Defense Analysis.

Congress tasked the Academy to review how DOE oversees its contractor-operated labs, including a review of the performance metrics and systems that DOE uses to evaluate the performance of the labs. While conducting this review, the Academy Panel overseeing this study determined that these management issues must be considered as part of a broader issue about defining and ensuring the future of the lab complex. Accordingly, the Panel has made several recommendations that recognize that the labs are important not only to their DOE sponsoring organizations; they also play a critical role helping other DOE organizations and other government agencies meet their missions.

The Panel's report is being released at a time of leadership transition at DOE and other departments across the federal government. DOE should take the opportunity to develop new strategies for the government's role in the energy sector, as well as a new vision for the labs' future that takes into account that the labs have truly become a national asset.

As a congressionally chartered, non-partisan, nonprofit organization with nearly 800 distinguished Fellows, the Academy brings seasoned experts together to help public organizations address their most critical challenges. On behalf of the Academy, I extend my appreciation to the U.S. House and Senate Energy and Water Development Appropriations Subcommittees for requesting that we conduct such a review. Thanks to the members of the project Panel for their outstanding work and keen insights and to the study team for their critical staff work. Also, thanks to the DOE leadership and the hundreds of officials, both inside and outside of the Department and its labs, for their thoughtful contributions throughout this project.



Dan G. Blair
President and Chief Executive Officer

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ACRONYMS

Academy	National Academy of Public Administration
ARPA-E	Advanced Research Project Agency-Energy
AST	Astronomy, Science, and Technology
CAASD	Center for Advanced Aviation System Development
CAS	Contractor Assurance System
CFO	Chief Financial Officer
COO	Chief Operating Officer
CPS	Corporate Planning System
CTBT	Comprehensive Nuclear Test Ban Treaty
Department	Department of Energy
DCAA	Defense Contract Audit Agency
DHS	Department of Homeland Security
DNFSB	Defense Nuclear Facilities Safety Board
DoD	Department of Defense
DOE	Department of Energy
EERE	Office of Energy Efficiency and Renewable Energy
EM	Office of Environmental Management
EPAct	Energy Policy Act of 2005
ES&H	environmental, safety, and health
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulations
FEB	FAA FFRDC Executive Board
FFRDC	Federally Funded Research & Development Center
FNLCR	Frederick National Lab for Cancer Research
FY	fiscal year
GAO	Government Accountability Office
GOCO	government-owned/contractor-operated
GOGO	government-owned/government-operated
HSS	Office of Health, Safety, and Security
IG	Inspector General
INL	Idaho National Laboratory
ISO	International Organization for Standardization
JAC	Joint Advisory Committee, Department of Defense
JPL	Jet Propulsion Laboratory
Labs	Department of Energy's National Laboratories
LANL	Los Alamos National Laboratory
LBNL	Lawrence Berkeley National Laboratory
LLC	Limited Liability Company
LLNL	Lawrence Livermore National Laboratory
M&O	Management and Operating
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NDRI	National Defense Research Institute
NE	Office of Nuclear Energy

NFCT	Nuclear Fuel Cycle Technologies
NLDC	National Laboratory Directors' Council
NNSA	National Nuclear Security Administration
NPR	Nuclear Posture Review
NRAO	National Radio Astronomy Observatory
NREL	National Renewable Energy Laboratory
NSF	National Science Foundation
OLO	Office of Laboratory Oversight
OMB	Office of Management and Budget
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PEMP	performance evaluation and measurement plan
PEP	performance evaluation plan
PIC	Program Integration Control System
PNNL	Pacific Northwest National Laboratory
PPBE	Programming, Planning, Budgeting, and Evaluation
R&D	research and development
SAIC	Science Applications International Corporation
SC	Office of Science
SOW	statement of work
SRNL	Savannah River National Laboratory
SRS	Savannah River Site
START	Strategic Arms Reduction Treaty
WFO	work for others

EXECUTIVE SUMMARY

This report responds to congressional questions about whether the Department of Energy's (DOE's) oversight model allows its national labs sufficient flexibility to optimize performance, whether DOE's lab oversight is adequate, and whether DOE's lab evaluation processes measure the right things and hold labs accountable for performance.

The Panel supports DOE's ongoing efforts to move to a performance-based oversight model and an outcome-based evaluation approach. The Panel concluded that although there is room for improvement in both oversight and evaluation, for the most part, individual labs are successfully performing important DOE mission-related work, and evaluations are measuring key performance elements and holding labs accountable.

In studying the specific questions related to lab management, however, the Panel realized that they were part of a broader issue about defining and ensuring the future of the lab complex. New management approaches are needed to address changing conditions and drive the lab complex to optimize its future contribution to the Nation's energy and security goals. To that end, the Panel examined several non-DOE Federally Funded Research and Development Centers, which perform work similar to many of the DOE labs, to identify potential best practices applicable to DOE's lab oversight and evaluation.

The Panel is making recommendations with regard to lab oversight and evaluation that are intended, in the short term, to enhance DOE's ongoing management changes. In the longer term, the Panel's recommendations are aimed at maximizing the lab complex's role in addressing national energy and security challenges with a view towards ensuring their long-term contributions to the Nation.

THE LABS AS A NATIONAL ASSET

The Panel supports DOE's management model for the national labs whereby the major program offices "own" the laboratories. It believes that the labs need to have strong sponsors in DOE headquarters who are good stewards of the labs and advocate on their behalf, and who help ensure that the core competencies of the labs are maintained. However, the Panel has found that there is no mechanism in place to examine the strategic future of the labs from an integrated perspective across the Department or to ensure that the labs' capabilities are being optimized to best meet the needs of the Nation. The Panel believes that this is a serious shortcoming.

The context in which the labs are operating is changing. For example, funding from appropriations is increasingly threatened, new energy missions are emerging, and the defense mission is morphing to a broader national security mission. The importance of looking more broadly—beyond the individual lab sponsoring organizations—is heightened by the fact that decisions about each lab's portfolio are becoming more dispersed. Significant portions of some labs' portfolios are now funded by other DOE programs or by non-DOE agencies. And many labs are actively working to build their non-sponsor funding base, in some cases to support the core resources they need to perform their primary mission. As DOE looks to the future of the lab complex and how it supports DOE's mission, departmental leadership must better integrate the

sponsoring organizations' lab planning processes. The Panel is recommending that DOE build upon existing efforts to integrate laboratory capabilities to strengthen the Department's strategic planning capabilities for the future use of its national labs.

At the same time, the future use of the labs must take into consideration the labs' non-DOE work and how it supports the missions of other agencies as well as DOE. The labs' ability to meet the critical scientific, technical, and engineering needs of the Nation requires a government-wide strategic approach. The Panel, therefore, is recommending that Congress direct the Secretary of DOE to engage an external commission for 2 years to perform an assessment of the strategic future of the national labs that focus on whether DOE is sufficiently integrating the labs' capabilities and optimizing their value to the Nation. If Congress does not take action to authorize the commission, the Secretary should initiate action to establish a presidential commission.

Implementing the commission's recommendations is a departmental responsibility and will require strong leadership from the Secretary's office. The Panel believes that the Deputy Secretary, as the Chief Operating Officer (COO), needs to lead this effort. The Panel recognizes that the Deputy Secretary already has a very full agenda, but few things are more important to the Department's successful mission achievement than its national laboratories.

As the Panel looks across the complex, it also is concerned about the deteriorating infrastructure at many of the labs. Many of the facilities and equipment are one-of-a-kind and not easily replicated. As the steward of this national asset, DOE is responsible for ensuring that these facilities are maintained and that they will serve the Nation well into the future. The Panel recognizes that the budget environment in the past few years has made it difficult for DOE to shoulder the burden of maintaining the labs' infrastructure. Therefore, the Panel is recommending that the commission charged with assessing the strategic future of the labs establish a subcommittee to determine DOE's current and long-term infrastructure requirements and develop recommendations for how to finance them.

EVALUATING THE LABS

The lab evaluation issues Congress asked the Academy Panel to address include whether the evaluations measure critical aspects of the labs' performance and if they hold labs accountable for performance. Two other congressional concerns related to whether poor performance on major construction projects or programs is appropriately reflected in DOE's fee determinations; and how safety, security, and maintenance and infrastructure are treated in lab evaluations.

With few exceptions, the Panel found that all of the sponsoring organizations' evaluation systems address the 3 critical categories of lab performance—mission, operations, and leadership. However, the Panel; is making recommendations with regard to the evaluation process to better ensure assessments include the labs' total portfolios.

In the past, all of the sponsoring organizations have assessed the labs annually against a myriad of specific task-related expectations. According to several DOE officials, this approach led to a focus on "checking boxes" that inhibited efforts to focus on mission outcomes. In 2006, the

Office of Science pioneered an approach to lab evaluation that focuses on expected key outcomes and not on specific tasks or outputs. The National Nuclear Security Administration (NNSA) is now adopting this approach and other DOE lab sponsoring organizations are moving in this direction as well. The Panel believes this is a positive change and is recommending that DOE encourage all lab sponsoring organizations to adopt this approach. But NNSA and the other lab sponsors will need to move carefully and keep a close eye on implementation of what is a significantly different evaluation model.

With respect to the evaluation of major construction projects or programs, many of the projects the committee staff identified were not laboratory projects. The Panel did examine how DOE addresses major projects in its lab evaluation processes, however. Such projects are included in evaluations, but performance in other areas, combined with the evaluations' subjective nature, can obscure the impact of success or failure of specific projects on overall evaluation ratings and fees. The Panel believes these projects and programs should have greater transparency in the evaluations and is recommending that DOE require that major construction projects and highly important programs be assessed under stand-alone evaluation factors with predetermined, clearly weighted measures that cannot be offset by performance in other areas.

The Panel found that most of the sponsoring organizations included assessments of safety; security; and maintenance and infrastructure in the annual evaluation of the labs' operational performance. Those that didn't chose to hold labs accountable for performance in these areas through other provisions of the contract. The Panel saw no need for a specific recommendation in this area.

Evaluations Are a Key Factor in Accountability

The lab evaluation process fosters communication between DOE and the labs and provides feedback to the labs to help ensure their work meets DOE's needs. DOE also uses the annual lab evaluations to hold labs accountable for their performance by publicizing the results, using the evaluation results to determine eligibility for up to 15 years of award term contract extensions, and using the evaluations as the primary determinant for how much at-risk award fee will be paid to the contractors each year. However, the Panel found that the relatively small amount of award fee available for most labs and the historical likelihood that most of that fee will be awarded reduce the value of the fee as a motivating influence on performance and an accountability mechanism. Therefore, the Panel is recommending that DOE eliminate award fees and, instead, use cost plus nominal fixed fee contracts with a 5-year base period and award term provisions.

SYSTEMS-BASED OVERSIGHT

With the introduction of performance-based contracts, DOE's approach to lab oversight is changing. In the past, DOE's oversight of operational risk relied heavily on site office staff performing transactional, compliance-based reviews of the labs' operations. Nearly all of the management and operating contracts now require the contractors to implement a Contractor Assurance System (CAS) that has sufficient data and observational information to successfully demonstrate its ability to identify and respond to risks. With a systems-based CAS in place, site office staff analyze the contractors' systems and the data produced to assure themselves that

operational risks are properly managed. The status and maturity of CAS varies among the labs; and within each lab, the maturity of the operational risk components also vary.

The Panel fully supports DOE's efforts to shift from a transactional/compliance-based oversight model to one that is centered primarily on an analytical assessment of the lab contractors' CASs and lab managements' responses to operational risks. However, the Panel recognizes that the contractors' CASs are in varying stages of maturity and that DOE needs to exercise caution as it moves to this new oversight model. DOE must "trust but verify" that the contractors' systems can identify potential problems before they happen. The shift to this new oversight model requires a significant change in the roles and skill sets of DOE staff and may have implications for staffing levels. These changes in roles and responsibilities have to be clearly defined.

But for a culture change of this magnitude, it is not enough to merely issue new directives or procedures or to convene a few meetings. To achieve the necessary changes in attitudes that are critical to transforming behaviors and fully implementing this new operating model, DOE leadership must find ways to involve the staff in their planning and implementation. The political leadership and career leadership must work together to develop and train the rest of the organization. Such an effort will require strong leadership from the most senior executives in the Department. The Panel believes that it is essential that the Deputy Secretary, as DOE's COO, fulfill this role. As the COO, the Deputy Secretary is responsible for the internal operations of the Department. The Panel believes that ensuring that DOE staff are properly trained and working according to an outcome-based, complex-wide management model to oversee and evaluate the labs should be the Deputy Secretary's highest priority.

CHAPTER 1: INTRODUCTION

The genesis of this report stems from language in the Senate and House Conference Reports accompanying the Department of Energy's (DOE or the Department) fiscal year (FY) 2012 Appropriations Bill (P.L. 112-74), which directed the National Academy of Public Administration (the Academy) to conduct an independent review of the management and oversight of the Department's national laboratories (labs). In directing the study, the Appropriations Committees stated that the Academy should consider such issues as how DOE headquarters and site offices oversee lab operations; whether existing performance metrics for the laboratories' management and operating (M&O) contractors measure critical aspects of their performance; and how the Department utilizes performance metrics and data.

Although the committees did not explain all their reasons for commissioning the study, there appeared to be 2 primary motivating factors. One issue, which committee staff explained in depth to the Academy Panel overseeing the project, was dissatisfaction with some performance based award fee determinations on major projects where the contractor received virtually the entire available fee, but committee staff believed that the contractor had not delivered on promised performance.¹ Another factor that prompted the study was a list of issues that the National Laboratory Directors' Council (NLDC)² submitted to the Secretary of Energy. That list contained 20 policies or practices that the NLDC characterized as burdensome and unnecessary. It included such issues as unneeded approvals, excessive oversight, unnecessary reporting, over regulation, and lengthy and outdated financial practices. A list of the NLDC issues, along with a description of the actions DOE has taken to resolve them is included as Appendix A in a separate book of appendices.

At the time Academy staff began their review, a substantial portion of the issues on the NLDC list already had been resolved.³ As of the date of this report, only 1 item, dealing with the funds distribution system is still outstanding. However, the Academy Panel believes that the funds distribution issue is of sufficient importance to warrant some discussion in this report, and both discussion and a recommendation on the issue are included in Chapter 3. The other issues that the NLDC raised, especially over regulation and excessive oversight, were integrated into the study in accordance with guidance from committee staff that the Academy focus only on concerns from this list that illustrate systemic issues that must be addressed in order to improve laboratory management.

THE ENVIRONMENT

The national laboratories are operating in an uncertain budget environment. With the prospect of future reductions in federal financial support, the laboratories' management teams must carefully

¹ Under DOE's M&O contracts for the national labs, fees are awarded to the laboratory contractor over and above their costs based on both objective and subjective measures of performance. A complete discussion of the performance measurement system and fee determinations is included in Chapter 5.

²The NLDC membership is comprised of the DOE national laboratory directors.

³ Although DOE and the NLDC have determined that issues are resolved, some lab officials are not satisfied with the results, noting that the solution to some of the issues was to take no action and that some burdensome requirements still remain.

examine how to best support the research needs of their sponsoring organizations and, more broadly, DOE's mission. Any decisions with respect to staffing, infrastructure, etc. must factor in the possibility that the labs' funding levels may be reduced. These budget uncertainties also make issues relating to evaluating the work of the laboratories even more important than they may have been in the past.

The current budget environment also raises questions about the role of competition between the labs and between the labs and other providers of research and technology. Suggestions have been made that there are too many labs. A November 2011 DOE Inspector General (IG) report recommended a Base Reduction and Closure-style commission to examine alternatives for evaluating, consolidating, or realigning the Department's research and development (R&D) laboratory complex. That same IG report also recommended a review of all R&D activities in the Department. While this study did not look at the issues raised by the IG, it was clear to the Panel that there are broader questions than those the Academy was tasked to examine, and that those questions are relevant to this study as well.

The environment also includes mission-related questions. The National Nuclear Security Administration (NNSA) is shifting from a cold war focus on defense to a broader focus on national security. In doing so, it is expanding not only its mission but its customer base beyond NNSA's program offices. This expansion is necessary, according to NNSA and laboratory officials, to better ensure NNSA can maintain the assets and capabilities necessary to support its original and still core national defense mission. Many of the DOE labs also are seeking other sources of work to help support their core capacities.

NATURE OF THE STUDY—THE TASKS

Based on discussions with Appropriations Committee staff, the Academy agreed to pursue the following lines of inquiry, which were included in the statement of work (SOW) for this project:

- how the national laboratories carry out their tasks and what flexibility is required to obtain optimal performance
- how DOE site offices oversee the laboratories, including an identification of existing tools/systems used by the site offices to manage their laboratory-related responsibilities
- how DOE headquarters program offices oversee both the laboratories and the site offices managing laboratories
- whether DOE's existing laboratory performance metrics measure critical aspects of their performance (recognizing that within the laboratory complex, different metrics may be appropriate for different laboratories)
- how DOE utilizes its performance metrics and data—in particular, whether metrics are applied in a consistent manner and the extent to which performance data are used to hold the labs accountable for all relevant aspects of performance
- whether the Department's management systems provide adequate support to the work of the laboratories

The SOW also noted that the Appropriations Committees were concerned that the system of program office "ownership" of the labs may result in inconsistent treatment of the laboratories,

and they expected the Academy to examine this issue and develop appropriate recommendations for how DOE can increase consistency in the management of the laboratories and share best practices.

The DOE labs that are the focus of the Academy's study are Federally Funded Research and Development Centers (FFRDCs). Other departments also sponsor FFRDCs. FFRDCs have a special relationship with their sponsoring organization, which is specified in law and regulation and is described more fully in Chapter 2. The Department asked the Academy to benchmark a limited number of non-DOE FFRDCs to answer such questions as:

- How do they communicate requirements and expectations to their contractors? (Do they have a mechanism similar to DOE directives or does everything go into the contract?)
- Do they use an enterprise risk model to determine the level of controls they want to place on their contractors (beyond the laws)?
- How would they define their governance model; specifically, what oversight do they perform?
- If they have an onsite presence as part of their governance model, how do they segregate local versus headquarters responsibilities and authorities?

This study was not an investigation of specific incidents; it was a comprehensive review of a system for managing and evaluating the labs. It also was not a project management review. During the course of the study, both Academy staff and Panel heard much about congressional dissatisfaction with some major projects, primarily construction projects. These included the Waste Treatment and Immobilization Plant at the Hanford site in Richland, WA, the Salt Waste Processing Facility at the Savannah River Site (SRS) in Aiken, SC, the Mixed Oxide Fuel Fabrication Facility at SRS, and other major projects. However, most of the specific projects cited are not being managed by the national laboratory complex and, therefore, were not examined.⁴ To the extent that the labs were managing construction projects, Academy staff examined how those projects were treated within the evaluation system, but not whether the projects were being managed correctly. In addition, several observers have raised the question of the cost of the lab structure. While the question is of interest, the focus of the study was not on costs but on evaluation and management. Should Congress or DOE desire an examination of costs or other questions, a separate study would be necessary.

THE NATIONAL LABORATORY COMPLEX

The focus of this study is the 16 DOE national laboratories that are FFRDCs.⁵ FFRDCs are independent, privately operated entities that use their core competencies and expertise to meet their sponsoring organizations' R&D needs that cannot be as effectively met by other sources of R&D support, either in-house or from other outside entities. While FFRDCs meet long-term

⁴ The congressional committees also were concerned about the security breaches at the Y-12 facility at Oak Ridge. Although NNSA sometimes treats its production facilities in the same fashion as its labs, the Academy study focused only on the labs, and the recommendations in this report are not meant to be extended to NNSA's production facilities.

⁵ There is a 17th national lab that is not an FFRDC. The National Energy Technology Lab is a government-operated lab and is not part of this study.

strategic R&D needs, they also can respond to immediate, short-term sponsor requests for assistance to meet urgent, high priority R&D needs within their competency areas. Currently, 10 federal departments/agencies sponsor 40 FFRDCs as shown in Table 1-1 below.

Table 1-1: FFRDCs and Their Sponsors

Sponsoring Department/Agency	Number of FFRDCs
Department of Energy	16
Department of Defense (DoD)	10
National Science Foundation	5
Department of Homeland Security	3
Department of Transportation	1
Department of Health & Human Services	1
United States Judiciary	1
National Aeronautics and Space Administration	1
National Research Council of the National Academy of Sciences	1
Department of the Treasury	1
Total	40

In the DOE system of management, the major program offices “own” the labs, i.e., they are the stewards of the labs. For purposes of this study, the DOE program offices that “own” the labs are referred to as a “lab sponsoring organizations.” The Office of Science (SC) sponsors 10 labs, NNSA sponsors 3 labs, and the Offices of Energy Efficiency and Renewable Energy (EERE), Nuclear Energy (NE), and Environmental Management (EM) each sponsor 1 lab. Table 1-2 lists the 16 DOE labs and their sponsoring organizations; the yellow highlighting indicates the labs the Academy staff visited or contacted directly.

Table1-2: DOE FFRDCs and Their Sponsors

Laboratory	Sponsor
Ames Lab	SC
Argonne National Lab	SC
Brookhaven National Lab	SC
Fermi National Accelerator Lab	SC
Idaho National Lab	NE
Lawrence Berkeley National Lab	SC
Lawrence Livermore National Lab	NNSA
National Renewable Energy Lab	EERE
Los Alamos National Lab	NNSA
Oak Ridge National Lab	SC
Pacific Northwest National Lab ⁶	SC
Princeton Plasma Physics Lab	SC

⁶ Not part of the field work, but had some telephone discussions with the site office

Laboratory	Sponsor
Sandia National Lab	NNSA
Savannah River National Lab	EM
Stanford Linear Acceleration Center	SC
Thomas Jefferson National Accelerator Facility	SC

All 16 of DOE’s FFRDC labs are government-owned/contractor-operated facilities—or GOCOs. The federal government owns these facilities, but contracts for their management and operations.

STUDY METHODOLOGY

The Academy convened an expert Panel experienced in DOE issues to guide the project’s research and to make recommendations to improve DOE’s oversight and management of the national labs. Staff experienced with DOE issues or with comparable experience were recruited to support the Panel. For acquisition expertise, the Academy subcontracted with the Jefferson Consulting Group. Biographical sketches of Panel members and staff are provided in Attachment 1.

The primary means of data collection were interviews conducted with officials from all DOE headquarters lab sponsoring organizations, nine laboratories, and the DOE site offices at those laboratories. Academy staff also conducted interviews with other senior DOE officials, including the Secretary and Deputy Secretary. Appendix B includes a complete list of all interviews and contacts. In addition to interviews, staff collected and reviewed documents pertinent to the study from DOE headquarters and field staff as well as the laboratories. Staff also coordinated with both the Government Accountability Office and the National Research Council of the National Academies of Science. Both of those organizations had done extensive work on the national labs, especially those sponsored by NNSA, and at the direction of the Appropriations Committees that mandated this study, efforts were made to ensure that there was neither duplication of effort nor work at cross purposes. Finally, project staff conducted benchmarking interviews and reviewed documents provided by six non-DOE FFRDCs shown in Table 1-3.

Table 1-3: Benchmarked FFRDCs

FFRDC	Sponsor	Contractor
Lincoln Labs	DoD— Assistant Secretary Defense Research & Engineering	Massachusetts Institute of Technology (university)
Jet Propulsion Lab	National Aeronautics and Space Administration	California Institute of Technology (university)
Frederick National Lab for Cancer Research (FNLCR)	National Cancer Institute	Science Applications International Corporation-Frederick (SAIC-F) (for- profit)
Center for Advanced Aviation System Development	Federal Aviation Administration	MITRE Corporation (nonprofit)
National Defense Research Institute	DoD—Under Secretary of Defense for Acquisition, Technology, & Logistics	RAND Corporation (nonprofit)
National Radio Astronomy Observatory	National Science Foundation	Associated Universities, Inc. (university consortium)

A description of each of the benchmarked FFRDCs is included in Appendix C. Results from the benchmarking reviews have been integrated into the appropriate parts of this report.

There are significant differences in mission among the DOE labs as well as among the benchmarked FFRDCs. One key difference among DOE labs is the extent to which they perform primarily basic science research, the key mission of the SC labs, versus the predominantly applied science and production missions of the NNSA, NE, and EERE labs. In the basic sciences, both objectives and outcomes are longer term and less specific; excellent science can result in “failed” experiments. In contrast, applied science, and especially production missions, are often shorter term and more definable. Poor performance can have more concrete impacts. DOE labs also differ in the level of safety and security risks inherent in their work. The benchmarked FFRDCs also differ in focus, some having basic science and research missions and others more applied missions, and have varying levels of risk associated with their work. The Panel took these differences into consideration in developing comparisons and recommendations.

ORGANIZATION OF THE REPORT

The remainder of the report is organized as follows:

- Chapter 2 discusses the management of the labs as a national asset.
- Chapter 3 discusses how work is assigned to the labs and the flexibility they have to perform their work, including how budgeting and fund allocation issues are handled.
- Chapter 4 discusses how DOE oversees both programmatic and operational activities at the national labs and how these practices compare with those used at the benchmarked non-DOE FFRDCs.
- Chapter 5 provides a detailed examination of the different evaluation systems the DOE sponsoring organizations use to assess the performance of the national labs and to determine the fees awarded to lab contractors.

Panel recommendations are included in each chapter. A list of all recommendations is included as Attachment 2. Appendices are provided in a separate document.

CHAPTER 2: MANAGING A NATIONAL ASSET

The national laboratories have occupied a central place in the landscape of American science for more than 50 years. This chapter discusses the role of the national labs and DOE's management of its laboratory complex and offers recommendations to improve the management of this national asset.

THE NATIONAL LABS: THEIR VALUE TO THE NATION

With the advent of World War II, extraordinary amounts of resources were committed to wartime scientific problems that resulted in the creation of new technologies, such as radar, the atomic bomb, and other defense technologies that proved decisive for the Allied victory. Several secret sites, including laboratories at Los Alamos, NM and Oak Ridge, TN were created for bomb research and material development. Other existing labs, such as Lawrence Berkeley (then called the Radiation Laboratory) also joined the wartime efforts. It was out of this wartime mobilization of science that the national laboratory system came into being.

The labs were originally thought to be temporary creations. But after the war, the newly created Atomic Energy Commission took over the wartime laboratory facilities and extended their lives indefinitely. Funding and infrastructure were secured to sponsor other "national laboratories" for both classified and basic research, especially in physics. Each national laboratory's work was generally centered around unique capabilities and facilities/equipment that were one-of-a kind assets that could not be easily or inexpensively replicated, and labs were encouraged to cooperate with one another to achieve research objectives. However, competition also was encouraged within the laboratory complex as laboratories with similar missions were created. For example, Lawrence Livermore (LLNL) was designed, in part, to spur innovation and compete with Los Alamos to ensure that independent capabilities and judgments could be brought to bear in the development of nuclear weapons, an especially important element in the last 2 decades of no nuclear testing. And today, looking at the core competencies of the national labs, one finds considerable overlap.

Tasked with conducting highly advanced, high-risk research to meet the needs of the Nation, the national labs have had a rich history of exceptional service. From the origins of the labs in the Manhattan Project and the development of nuclear weapons, reactors, and other defense technologies, the labs' capabilities are being used to address other critical national research needs in the areas of computers, meteorology, space science, molecular biology, environmental science, and alternative energy sources. Increasingly, DOE's national laboratories are performing work for non-DOE sponsors that is critical to meeting those agencies' missions. The Sandia National Laboratory has the largest percentage of non-DOE sponsored work—over one-third of the lab's work in FY 2011. The Department of Defense (DoD) is Sandia's largest non-DOE sponsor. Almost 20% of LLNL's work is work for others; again a large portion of that work is for DoD. To meet the needs of their non-DOE customers, some labs have established separate offices. For example, LLNL has established the Office of Strategic Outcomes to develop and manage its interagency work. That office has three program/thrust areas: the nuclear security portfolio, national security, and energy and environment. (See Chapter 3 for more information on work for others.)

The National Labs: Federally Funded Research and Development Centers

As noted in Chapter 1, the 16 DOE national labs that are the focus of this study are among 40 entities that have been designated as Federally Funded Research and Development Centers (FFRDCs). An institution or entity can only be designated as an FFRDC if it:

- “[p]rovides one or more of the following R&D activities: basic research, applied research, development, or management of R&D.” (Entities engaged primarily in routine quality control and testing, production, mapping and surveying, and information dissemination are excluded.)
- is managed by an entity that constitutes a separate organizational unit within the parent organization or is organized as a separately incorporated organization
- performs R&D services resulting from either a specific request or a broad charter from the sponsoring government agency
- receives the majority of its funding (at least 70%) from the federal government
- has or will have a long-term relationship with the sponsoring agency (or agencies). These are often, but not necessarily, 5-year commitments that can be renewed if the sponsor determines that it continues to require this long-term special relationship.
- operates facilities that are mostly or totally owned or funded by the federal government
- has an average annual operating budget (including equipment, operating, and capital costs) of at least \$500,000⁷

Sponsoring Organization Responsibilities

To create an FFRDC, the sponsoring organization must identify its long-term R&D needs and demonstrate that that they cannot be effectively met by other R&D service providers, including in-house resources. In DOE, the sponsoring organizations—SC, NE, EERE, EM, and NNSA—outline their R&D needs and define the purpose and nature of the ongoing relationship required in long-term sponsoring agreements (usually 5-year agreements) with the managing entities of the FFRDCs. Once a sponsoring agreement is in place, the sponsoring organization, must:

- monitor the performance of the FFRDC in a manner that does not “cause disruptions that are detrimental to the productivity and/or quality of the FFRDC’s work”⁸
- approve any FFRDC work for others
- “[a]ssure a reasonable continuity in the level of support to the activity consistent with the agency’s need for the activity and the terms of the sponsoring agreement”⁹
- review the need for continuing the FFRDC at least once during the long-term sponsoring agreement
- issue a new sponsoring agreement or terminate/decertify the agreement

⁷ NSF Master List of FFRDCs General Notes, p 1.

⁸ Ibid, p 2

⁹ Ibid, p 3

FFRDC Responsibilities

Because of the long-term sponsoring agreement with their sponsoring organization, an FFRDC receives unique access to the sponsor's proprietary data, employees, and other facilities not accorded other R&D contractors. This privileged access imposes some special requirements on FFRDCs. FFRDCs are required to operate in the public interest in a responsible manner, emphasizing objectivity and independence in its R&D activities. A key concern is the avoidance of any organizational conflicts of interest. FFRDCs must provide full disclosure of their affairs and activities to their sponsoring organizations. FFRDCs cannot use their advantageous access to sponsor data, facilities, and employees to compete with the private sector for other research work. However, FFRDCs may perform work for others (primarily federal agencies) when requested by the entity seeking help and with the approval of its sponsoring organization.

FFRDC Versus Support Service Contractors—A Distinction

The terms and conditions under which both the federal government and the FFRDCs are supposed to operate are specifically designed to set these relationships apart from support service contractors. An underlying principle behind the FFRDC concept is to bring FFRDCs more “inside the fence” in their dealings with their federal sponsors. They are selected because of the expertise they bring to the table and are intended to be trusted advisors and partners with their sponsoring organizations. However, as Academy staff spoke to DOE and lab personnel around the national laboratory complex, it was clear that there is no uniform understanding of what that means and how that should translate to working relationships on the ground. This may be attributed, in part, to DOE's management model for the labs, which is discussed below.

CONTRACTING FOR THE NATIONAL LABORATORIES

The DOE sponsoring organizations execute management and operating (M&O) contracts to administer, manage, and operate the 16 government-owned/contractor-operated national laboratories. The M&O contract model is consistent with the contract relationship between the government and FFRDCs and provides DOE with the appropriate flexibility and control to oversee and manage lab performance. Three different types of entities have been awarded these contracts: (1) universities (or consortia of universities), (2) nonprofit organizations, or (3) corporate entities. The Department of Energy Acquisition Regulation, Part 970 establishes special provisions for the award and administration of M&O contracts. In general, these contracts:

- involve the use of government-owned or government-controlled facilities
- are cost reimbursement, with advance understandings negotiated in the contract for personnel costs
- establish performance-based requirements for a broad spectrum of long-term or continuing activities
- are typically 5 years in duration, with competitions or extensions in 5-year increments
- are funded through a letter of credit
- provide that books of accounts are government-owned and integrated into the Department's system of accounts

Fifteen of the laboratories are operated under M&O contracts executed specifically for the management and operation of the labs. The contract for the Savannah River National Laboratory (SRNL), however, is part of a broader EM contract for performing the environmental cleanup of the Savannah River Site; developing and deploying technologies to support the cleanup mission; providing capability for supporting the enduring nuclear weapons stockpile; and processing and storing nuclear materials in support of U.S. nuclear non-proliferation efforts.

Program/Mission-Related Requirements

Each laboratory contract contains a scope of work that describes in general terms the work planned or required to be performed to meet the program/mission-related needs of the sponsoring organization. Work authorizations are issued to assign individual work activities to be performed within the scope of work, and must be issued prior to commencement of the work and incurrence of any costs. The contract also contains facility operation, protection, and performance requirements for the overall stewardship of laboratory facilities.

Other Contract Requirements/Deliverables

- **Performance Evaluation and Measurement:** As a condition of their contracts, 15 of the 16 DOE lab contractors are required to participate in the development of annual performance plans as part of the bilateral negotiation process for determining annual performance measures. The contract with the Idaho National Lab (INL) contains a provision that encourages the contractor "to propose outcome based, and where appropriate, multi-year performance measures with long-term benefits for the INL." At all the sites visited by the project team, the labs actively participated in establishing the annual performance plans. These documents are incorporated into the labs' contracts by modification at the beginning of each fiscal year. The labs are required to track and report accomplishments against the applicable plan; many of the contracts require the labs to perform an annual self-assessment. (See Chapter 5 for more information on performance evaluation plans.
- **Compliance with Applicable Federal, State, and Local Laws and Regulations:** DOE laboratory contractors must comply with any statutory mandate regarding external regulation of laboratory facilities, whether by the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, the Environmental Protection Agency, and/or state and local entities with regulatory oversight authority.
- **Application of DOE Directives:** Laboratory contractors must comply with a host of DOE directives. Examples of their subject matter include:

○ physical security	○ environment, safety and health	○ real property management
○ cyber security	○ protection of human research subjects	○ information technology management
○ personnel security	○ accounting	○ official foreign travel
○ management of nuclear materials	○ budget formulation	○ aviation management and safety
○ radioactive waste management	○ records management	
○ interface with the Defense Nuclear Facilities Safety Board	○ accident investigation	

- **Contractor Assurance System (CAS):** DOE laboratory contractors are required to develop and implement an internal management assurance system that provides reasonable assurance that the objectives of the contractors' management systems are being accomplished and that the systems' controls will be effective and efficient. DOE may revise its level and/or mix of oversight when it determines that the assurance system is or is not operating effectively. (See Chapter 4 for more information on CAS.)
- **Other management plans and reports:** In addition to plans and reports required by provisions in the contract, the contractor may be required to submit "periodic plans and reports, in such form and substance as required by the Contracting Officer." DOE's intention is to consult with the contractor in advance concerning the necessity, form, and frequency of any such requirement.

Fee and Award Term Incentives

SC, NE, EERE, EM, and NNSA all have cost plus performance-based award fee provisions in the M&O contracts for their respective labs. The maximum amount of the award fee is negotiated each year and the entire available fee is at risk. Annual performance evaluation plans identify the factors and metrics used to evaluate the laboratories' annual performance, and the sponsoring organizations' assessment of the labs' performance against those factors and metrics is the primary factor used to determine the amount of award fee the labs earn. In addition to award fee, NNSA's contracts with its 3 laboratories also include a fixed fee.¹⁰ According to NNSA officials, a fixed fee is used in their contracts because of the additional risks associated with managing defense/nuclear sites.¹¹ It should be noted, however, that comparable levels of risk exist at the Idaho National Lab and Oak Ridge National Lab (ORNL), neither of which have fixed fee provisions in their contracts. All but 5¹² of DOE's national laboratory contracts include award term provisions, which allow the contractors to extend the length of their contracts by specified periods of time if they meet or exceed defined performance expectations. As described in DOE's Acquisition Guide:

An award term incentive has similarities to award fee, with the major difference being the contractor earns additional periods of performance instead of award fee. An award term incentive rewards the contractor with additional contract term if: (1) the performance of the contractor meets specific contractually required criteria; and (2) any contract specified conditions are met. The process for administering award term can be similar to, or separate from, the process for administering award fee, but the award term performance objectives must be distinct and separate from the award fee performance objectives.¹³

(See Chapter 5 for more information on DOE's use of award fee and award term incentives.)

¹⁰ SC's Ames Laboratory M&O contract is the only other contract to include a fixed fee in addition to a performance-based award fee.

¹¹ Unlike DOE's other FFRDCs, the NNSA contractors are for-profit entities, which may impact the bidding process and the types and amounts of fees.

¹² The SRNL, National Renewable Energy Laboratory, Idaho National Laboratory, Brookhaven, and ORNL contracts do not include award term provisions. However, contract extensions are allowed under other contract provisions.

¹³ DOE Acquisition Guide, Chapter 70.15

Contract Types and Incentives for the Benchmarked FFRDCs

There were noticeable differences between the contract types and incentives in DOE's national laboratory contracts and the contracts for the 6 benchmarked non-DOE FFRDCs. Except for the Frederick National Lab for Cancer Research (FNLCR), none of the other contracts for the benchmarked labs had award fees. And FNLCR's award fee was relatively nominal—only 1.5% of the contract. Lincoln Labs (a DoD-sponsored lab) has no-fee contracts. The master contracts are modified as the lab obtains funds for specific research from various DoD agencies/offices. The Jet Propulsion Lab (JPL)¹⁴ and the Center for Advanced Aviation System Development have cost plus fixed fee contracts, and the National Radio Astronomy Observatory uses a cost-reimbursement cooperative agreement that provides for a small management fee. None of the benchmarked labs use award term contracts. (Comparisons of contract type and incentives are discussed in further detail in Chapter 5.)

DOE'S MANAGEMENT OF THE LABS

Management responsibility for the labs is vested in each of the sponsoring organizations; SC “owns,” i.e., is responsible for managing and overseeing its 10 national labs; NNSA is responsible for its 3 labs, etc. Each sponsoring organization determines the scope of work to be performed by the labs and establishes policies and procedures for overseeing and assessing the labs' programmatic and operational performance. The sponsoring organizations' headquarters program offices are responsible for program management, and their site offices located onsite or near the labs are responsible for operational oversight. (See Chapter 4 for additional information on oversight of the labs.)

As will be discussed throughout this report, sponsoring organizations take somewhat different approaches to how they manage the laboratories with respect to their planning, oversight, and evaluation systems. This decentralized approach to the management of the labs gives each sponsoring organization control over the resources that perform its mission, i.e., the sponsoring organization has the necessary responsibility and authority to make decisions on how to best use its lab(s) to achieve its mission. This decentralized lab management model, which is critical to effective lab oversight and management, does raise questions, however, about how the Department integrates information about the laboratory complex as a whole and to what extent it looks at the labs as a system as opposed to a collection of individual labs.

Most of the departmental cross-lab efforts focus on operational issues. For example, the Chief Operating Officer Board and the Field Management Council focus on operational issues across labs. The National Laboratory Directors' Council is recognized as an opportunity for labs to share best practices, work to solve common problems, and bring necessary issues to the Secretary's attention. But it too focuses primarily on operational issues rather than corporate program issues.

¹⁴ JPL had a small award fee (less than 1.4% of the total contract) until about 2 years ago. At that time, they decided that the work required to support an award fee contract was not justified.

The labs themselves undertake efforts to leverage capabilities of other labs and are generally recognized as the “integrators” of programs. Within the Department, the only place where management of lab programmatic issues can come together complex-wide is in the Secretary’s office. As the Chief Operating Officer (COO) for the Department, it appears to the Panel that this responsibility must rest with the Deputy Secretary. DOE has instituted several mechanisms that are intended, at least in part, to achieve synergies among programs and labs. Examples include the Energy HUBS and Energy Frontier Research Centers. In addition, DOE’s “Agreements for Commercializing Technology” engages the laboratories in business partnerships that are intended to create job and bring technologies to the market faster. However, there is nothing institutionalized at this time to look programmatically across the complex; there is no mechanism in place to examine the strategic future of the labs from an integrated perspective across the Department to ensure that the labs’ capabilities are being optimized to best meet the needs of the Nation.

There are various efforts within the sponsoring organizations that link across programs, but, by definition, they do not include all DOE labs. For example:

- SC has established an integrated annual lab planning process that brings together all of the DOE programs funding work at each SC lab as well as other agency funders.. This is being done on a lab-by-lab basis. (See Chapter 3 for more information.)
- NNSA recently changed the reporting structure of its site offices, bringing site office management under 1 headquarters office, in an effort to better manage its 3 labs and 5 production facilities as 1 complex. Program oversight remains in the individual program offices, however.
- The DOE lab sponsoring organizations are moving toward a more common approach to lab evaluations. (Chapter 5 discusses these changes in more detail.)
- In FY 2013, NNSA includes the extent to which labs drive synergies across the NNSA complex, not DOE-wide, as 1 criterion in its lab evaluation system.

While these are positive signs that the sponsoring organizations look to optimize their use of the labs and the labs’ technical capabilities, most of these activities are conducted within the stovepipes of the sponsoring organizations. It is interesting to note in this regard that 4 of the 6 non-DOE FFRDCs benchmarked had either a sponsoring organization (DoD and the National Science Foundation (NSF)) or a contracting parent entity (MITRE and RAND) with multiple FFRDCs. All except NSF had department-wide or corporate-wide management plans, policies, or procedures that governed management and operations of their multiple FFRDCs.

The importance of looking more broadly—beyond the individual sponsoring organizations—is heightened by the fact that decisions about each lab’s portfolio are becoming more dispersed. As discussed in Chapter 3, many labs are now working to build their non-sponsor funding base, in some cases to support the core resources they need to perform their primary mission. Significant portions of some labs’ portfolios are now funded by other DOE programs or by non-DOE agencies. NNSA labs have actively pursued work from non-DOE sponsors, but the other labs in the complex also are more focused on non-sponsor work.

It should be recognized that the NNSA and DOE have been leading an effort to partner with other federal agencies in order to balance the work for others activities in the NNSA labs' portfolios with a top-down strategic overlay. In 2010, a cabinet-level governance charter brought DOE together with DoD, the Department of Homeland Security, and the Office of the Director of National Intelligence to coordinate shared, long-term planning of their combined assets to better align the national security mission needs of the partner agencies with the scientific, technical, and engineering capabilities resident at the national laboratories and within the participating agencies. The resulting Mission Executive Council (MEC) is the working body of this new approach to governance. As a standing body, it plays a novel role in governance across agency boundaries.

In this report, the Panel makes several recommendations with regard to lab oversight and evaluation that would provide a greater foundation for a complex wide management view. But the Panel remains concerned that there are significant questions that cannot be addressed by DOE as currently configured. For example:

- What is the proper amount of work that the labs should perform for non-DOE sponsors? What is the long-term outlook for increasing/decreasing this type of work?
- Is there a need to look at the lab complex from a national, multi-department view in terms of determining the portfolio of work performed throughout the complex and forecasting the capabilities that the labs need?
- In times of decreasing (or increasing resources), what is the best allocation of resources and capabilities among the labs?
- What is the correct balance between the need for competition among labs to help ensure quality and to provide independent verification of research findings versus the cost of duplicating competencies and diverting resources from science to proposal preparation?
- What is the best way to support the lab complex infrastructure to ensure DOE's mission is met as well as needs of other sponsoring agencies?

Even if DOE, in consultation with other agencies, could effectively answer these questions, the Panel doubts that DOE could act alone on the forthcoming answers. The national labs as a whole, and individually, have strong supporters outside the Department, in Congress, and in local and state governments. Decisions about modifying the labs' capabilities affect the economies of localities and the lives of employees.

Conclusions and Recommendations

Since the first national laboratories came into being, the national laboratory complex and the role that the labs have played in cutting-edge research and the development of new technologies has expanded significantly beyond wartime needs. As the breadth of their expertise has grown, so too has their importance to the Nation in meeting current and future scientific challenges in many fields of endeavor.

The Panel supports DOE's management model for the national labs whereby the major program offices "own" the laboratories. It believes that the labs need to have strong sponsors in DOE headquarters who are good stewards of the labs and advocate on their behalf, and who help

ensure that the core competencies of the labs are maintained. To accomplish this, DOE leadership needs to reinforce the expected role for the sponsoring organizations. The Panel also believes that DOE needs to strengthen and integrate the strategic planning and analytic capabilities for all of its programs to better integrate the labs' capabilities to meet the mission needs of DOE's programs and other government departments and agencies.

The Panel recommends that DOE build upon existing efforts to integrate laboratory capabilities, such as the Office of Science's planning process, the Quadrennial Energy Review, and peer reviews, to strengthen the Department's strategic planning capabilities for the future use of its national labs.

While the Panel believes that DOE can significantly improve its strategic planning to better integrate how it uses the labs' capabilities to meet its missions, the labs' ability to meet the critical scientific, technical, and engineering needs of the Nation requires a government-wide strategic approach. The MEC is an example of how DOE can work with other agencies to plan strategically for the future use of the national labs. While it already seems to have delivered value, the MEC's focus is only on the government's national security missions, which excludes many of the national labs' capabilities from its purview. The Panel believes that Congress needs to authorize an external commission to assess the strategic future of all of the national labs from a government-wide perspective, taking into consideration how the labs can best meet the government's needs while supporting a more cost-effective and efficient use of their capabilities.

The Panel recommends that Congress direct the Secretary of DOE to engage an external commission for 2 years to perform an assessment of the strategic future of the national labs that focuses on whether DOE is sufficiently integrating the labs' capabilities and optimizing their value to the Nation. As part of its assessment, the commission should examine the work of the Mission Executive Council and any other groups focused on multi-program/multi-agency strategic planning for the labs. The commission should advise the Secretary and provide its report to Congress, and Congress should fund the costs of the assessment. Congress should extend the life of the commission if, after 2 years, it believes that DOE has not progressed sufficiently with developing its internal planning capacity. If Congress does not take action to authorize the commission, the Secretary should initiate action to establish a presidential commission.

Implementing the commission's recommendations is a departmental responsibility and will require strong leadership from the Secretary's office. The Panel believes that the Deputy Secretary, as the COO, needs to lead the change efforts that the recommendations require.

FUNDING LABORATORY INFRASTRUCTURE

Maintaining, operating, and in some cases, expanding or modifying federally-owned R&D facilities pose significant challenges to DOE labs relative to most other FFRDCs. In FY 2009, 18 FFRDCs received federal funds for their R&D facilities; only 3 were non-DOE FFRDCs, 2 were NSF sponsored; 1 was Department of Homeland Security sponsored), and the amounts they

received were quite small—\$98.8 million—compared to the \$1.5-plus billion provided to DOE FFRDCs for R&D facilities that year.¹⁵

However, many of DOE’s FFRDCs face particular challenges maintaining lab facilities because they are decades old. For example, the average age of the facilities at LLNL is 40 years, which is not atypical throughout the laboratory complex. When discussions during site visits turned to the condition of facilities, many lab officials indicated that the laboratory facilities needed updating. One senior official at LLNL went so far as to say that the condition of some of the facilities was a detriment to attracting the best and the brightest to work at the lab. Similarly, an ORNL senior official commented that if you consider the requirements for new buildings and the declining federal budget, he is concerned that “we are relegating ourselves to mediocrity.”

The industry standard for maintenance funding is 2-4 percent of replacement plant value. This level of funding was endorsed in a 1998 National Research Council report¹⁶ and in a DOE guidance memorandum dated March 10, 2004 from then DOE Deputy Secretary McSlarrow. However, another National Research Council report in 2004 expressed concerns that this target level of 2-4 percent is not sufficient for the long-term management of DOE’s assets.¹⁷

One indicator of the adequacy of facilities maintenance funding is the level of deferred maintenance. At the end of FY 2010, the deferred maintenance for the SC labs was an estimated \$465 million. SC is attempting to reduce this backlog through its Infrastructure Modernization Initiative, which focuses on line-item construction projects to modernize the SC infrastructure, thereby reducing the maintenance backlog. But it is clear that funding for maintaining the labs’ infrastructure is clearly an issue.

To help meet its infrastructure needs, FNLCR, 1 of the benchmarked FFRDCs, has acquired new facilities using third-party financing. The lab’s contractor, SAIC-F, received approval from its sponsoring organization to enter into a lease with a commercial developer to construct a building shell and to outfit the general purpose/administrative infrastructure of the building using the tenant improvement allowance built into the lease rate. The interior fit out of the special purpose/research-related activities housed in the building was accomplished with appropriated federal funds.¹⁸ The building shell is owned by the developer and SAIC-F owns everything inside the building. This enabled SAIC-F to acquire the special laboratory space it needed to meet its contract requirements without using appropriated funds to finance the entire construction.

¹⁵ National Science Foundation, *Federal Funds for Research and Development* (Table 15), 2009.

¹⁶ National Research Council, *Stewardship of Federal Facilities: A Proactive Strategy for Managing the Nation’s Public Assets*, 1998.

¹⁷ National Research Council, *Intelligent Sustainment and Renewal of Department of Energy Facilities and Infrastructure*, 2004, p. 34.

¹⁸ This was accomplished using the National Cancer Institute’s authority under U.S. Code Title 42, Section 241(a)(7) Section 301 (a)(7). This citation references USC Title 10, Section 2353 that “a contract...for research or development, or both, may provide for the acquisition or construction by, or furnishing to, the contractor, of research, developmental, or test facilities and equipment.”

In the early 1990s, the Massachusetts's Institute of Technology (MIT) used third-party financing to construct a lab on Hanscom Air Force Base for Lincoln Labs. MIT used a 20-year mortgage to finance the construction costs; about \$300 million. Overhead funds from R&D projects are used to amortize the loan. The note will be paid off in 2014. MIT owns the building and will continue to own it until 2034, when the Air Force can either take over the use of the building or raze it. A Lincoln Labs official expects that the lab will urge the Air Force to retain the building and lease it back to MIT/Lincoln Labs. He also noted that because of "concerns in Washington," it has been more difficult to employ this approach to acquiring new infrastructure. There is some concern that third-party financing may be viewed as a way to get around congressional appropriations, and the Office of Management and Budget discourages its use.

In the past, DOE has authorized the labs to use third-party financing to update their infrastructure. There are 3 State of Tennessee-funded buildings located at ORNL. The construction of these facilities was paid for entirely by the State, which made a commitment of \$26 million in the original proposal submitted by the University of Tennessee and Battelle Memorial Institute to operate ORNL. DOE transferred the land for these buildings to the State via quitclaim deed. The State selected the contractor and managed the construction. ORNL shares space within these facilities with the University of TN. There is no charge to ORNL for the use of the space and no lease between the parties. There is, however, an agreement between UT-Battelle and the University of Tennessee that addresses roles and responsibilities. UT-Battelle is responsible for maintenance and utilities at all the State-owned buildings; the University reimburses UT-Battelle for those services by paying a space charge based on the square footage it occupies.

There also are 4 privately-developed buildings located at ORNL. The construction of these buildings was paid for through private bond financing. DOE transferred the land for the buildings to a private company via quitclaim deed. The private company then competitively selected a developer to fund and build the buildings. The completed buildings were leased back to the private company, which subleased them to UT-Battelle. Three of the buildings were covered by 1 bond offering in 2002, and the fourth building was financed through a supplemental bond offering in 2005. UT-Battelle maintains all of these buildings in the same manner as the DOE-owned facilities onsite. DOE has the right to repurchase three of the buildings after 25 years for nominal consideration, and the fourth building after 24 years for a price mutually agreed upon by the parties.

For both the State and the private buildings, UT-Battelle, under its M&O contract, was responsible for extending the utilities to the new facilities. The Oak Ridge Site Office facilitated these transactions by providing the appropriate subject matter expert support.

ORNL officials believe that these arrangements for securing new infrastructure were very successful. More recently, DOE considered proposals for third-party financing transactions at ORNL and the Pacific Northwest National Lab, although they were not approved due to specific concerns about the business cases.

Conclusions and Recommendations

The national laboratories are a national asset. Many of the facilities and the equipment contained within are one-of-a-kind and not easily replicated. The Panel recognizes that the budget environment in the past few years has made it difficult for DOE to fund the labs' infrastructure requirements. Nonetheless, DOE is responsible for ensuring that the labs are able to maintain and modernize these facilities so that they will serve the Nation well into the future. In doing so, DOE needs to consider not only the labs' current infrastructure requirements, but also the labs' long-term needs arising from the assessment of the strategic future of the labs recommended above. Given the current budget climate, which is likely to continue for the foreseeable future, the Panel believes that DOE needs to explore other options for maintaining and modernizing the national labs' infrastructure. Third-party financing has been used successfully in the past by DOE and other FFRDCs, and is 1 option worth exploring.

The Panel recommends that the commission charged with assessing the strategic future of the labs establish a subcommittee to determine DOE's current and long-term infrastructure requirements. The subcommittee also should examine the authorities available to construct/modernize national laboratory facilities using third-party financing; research the objections/concerns about using third-party financing; explore other avenues for financing the national laboratories' infrastructure requirements; and develop recommendations for the Secretary's consideration.

CHAPTER 3: ASSIGNING WORK TO THE LABS AND LAB FLEXIBILITY

As part of its review of the DOE national laboratories, the Academy was asked to examine how the laboratories carry out their tasks and the flexibility they require to obtain optimal performance. This chapter describes how work is assigned to the labs and discusses issues that impinge upon needed flexibility.

TASKING THE LABS

Planning and Budgeting

Tasking the national laboratories to perform work is done annually and begins with DOE's planning and budgeting processes. Note that there is no single, DOE-wide process. Rather, each major office, e.g., SC, NE, EERE, etc. is responsible for developing a plan for how it intends to carry out its work and to formulate its budget requirements. To accomplish this, the major offices rely on their program offices to develop plans for each of their program areas. As the program offices formulate their plans, they consider the core competencies of the lab(s) that they sponsor as well as the core competencies of the other labs in the national laboratory complex, universities, and the private sector to determine how to best meet mission objectives. All of the planning processes rely on input from the laboratories to inform the final planning documents. But Academy staff found that DOE's major offices had somewhat different internal processes to develop their annual plans.¹⁹ However, the Office of the Undersecretary for Energy²⁰ has an initiative underway to import the SC lab planning process to the Undersecretary's organization, which will impact EERE, NE, and Fossil Energy.

- The SC lab planning process establishes a 10-year horizon. SC sends a guidance document to the labs it sponsors in February asking them to write a high-level plan that lays out their vision. From mid-May until the end of June, each lab comes to headquarters to discuss its plan and receive feedback. Non-SC sponsors of work at the labs—NE, EERE, NNSA, and the Department of Homeland Security (DHS)—are invited to these meetings. However, according to 1 DOE official, they do not always attend or “energetically participate.” The non-sponsoring organizations don't appear to be as interested in a forward thinking process for labs that they don't “own.” They also can deal directly with the SC labs and if they are not satisfied with performance, they can decide to take their work elsewhere. In addition to input from the non-SC sponsors, the various SC program offices have advisory committees that they rely on to inform their planning and strategy efforts.
- NNSA has a Programming, Planning, Budgeting, and Evaluation (PPBE) process that involves its headquarters program and site office staffs and the labs. According to the

¹⁹ For the purpose of this discussion, work assignment at the Savannah River National Laboratory (SRNL) is not discussed. Unlike the other 15 DOE government-owned/contractor-operated labs, SRNL does not have a separate management and operating (M&O) contract for operation of the laboratory. SRNL work is a small part of a broader array of services performed by the M&O contractor responsible for managing the entire Savannah River Site.

²⁰ This office oversees Energy Efficiency and Renewable Energy, Fossil Energy, Electricity Delivery and Energy Reliability, Nuclear Energy, and Indian Energy Policy and Programs.

recently issued Transformational Governance and Oversight document—NNSA Policy Letter NAP 21—NNSA headquarter program managers “integrate program, budget and direction to ensure consistent and balanced direction to the field by providing programmatic technical direction with NNSA-wide expectations.” However, a senior NNSA official has commented that the program and planning aspects of the process are not very mature. Also, the process appears to be limited to an internal NNSA review; there is little mention of incorporating other DOE program expectations into this planning guidance and process for the NNSA labs that perform significant amounts of work for other DOE programs. GAO expressed numerous concerns about the process in a recent report and has recommended that DOE update the departmental order for budget reviews, improve the formal process for reviewing budget estimates, and reinstitute an independent analytical capability.²¹

- The NNSA labs’ annual lab planning processes set forth their visions for NNSA’s work. To a large extent, these planning processes are driven by the Nuclear Posture Review, congressional direction, DOE/NNSA strategic plans, the lab directors’ strategic visions and priorities, DoD life extension programs for nuclear weapons, the nuclear weapons stockpile memo, and improvement opportunities based on peer reviews, assessments, and metrics; and they are part of an ensuing dialogue throughout the year with NNSA headquarters. Typically, NNSA convenes a spring conference enterprise-wide where all the labs gather to discuss NNSA’s expectations and the labs’ capabilities to deliver. The process is fluid as NNSA tries to get the scope of work to match the available funding. Ideally, in October, NNSA and the labs reach agreement on the work for the upcoming year even though funding can rarely be established until appropriations are determined. NNSA also has started to develop an annual work for others (WFO) strategic plan, and in 2011, it established the Office of Interagency Work to focus on strategic planning to sustain essential laboratory and plant expertise and capabilities.
- NE uses a top down planning approach that involves the DOE strategic plan, the R&D Roadmap (which looks out 10 years), and program plans developed by each of the NE program offices. Labs across the complex are involved in the development of the Roadmap and program plans. The planning process focuses on integrating the program plans developed by the various NE program offices. In developing the annual plan for its lab—the Idaho National Laboratory (INL) —there does not appear to be any formal or informal process for obtaining input from other DOE programs that are funding significant amounts of work at INL.
- Under the leadership of its recently-appointed Assistant Secretary, EERE is implementing management reforms in its engagement/stewardship of its lab—the National Renewable Energy Laboratory (NREL). One area of focus is EERE’s planning processes. The Assistant Secretary wants to move to a more corporate approach in lieu of the current process that is driven by EERE’s individual program managers, and wants to engender laboratory involvement in a much more structured, 5-year planning process. Key components of the new planning process include:
 - developing EERE’s priorities

²¹ Government Accountability Office. *Modernizing the Nuclear Security Enterprise: NNSA’s Review of Budget Estimates and Decisions on Resource Trade-offs Need Strengthening*, GAO-12-806, July 31, 2012.

- identifying the core competencies of the national labs through project manager involvement and use of a new NREL evaluation process
- clearly communicating areas of direct funding versus areas that will be competed
- making annual operating plan decisions earlier in the year
- using the FFRDCs to a greater extent for independent, impartial testing and analysis
- achieving more coordinated planning between EERE and NREL leadership and with other labs

On October 9, 2012, EERE and NREL leadership met to discuss the lab's 5-year plan initiatives and FY 2013 expectations. They also reached an agreement on a timeline for future planning activities.

DOE management reported that in 2011, the Department established a set of "Integrated Technology Teams" (tech teams) in a variety of energy technology focus areas. Although their activities are not focused on or limited to the labs, these cross-cutting teams consist of the relevant federal program managers from SC, Advanced Research Project Agency-Energy (ARPA-E), and the applied technology programs—EERE, NE, Fossil Energy, and the Office of Electricity Delivery and Energy Reliability. (Some teams also include representatives from EM and NNSA.) The tech teams are coordinated by the Office of the Undersecretary for Energy and serve as the primary forum in which DOE coordinates across the spectrum of basic, applied, and high-risk/high-reward research. They also serve as a "single point of entry" for outside entities interested in discussing new energy technology concepts with DOE. The tech teams meet on a regular basis with the Undersecretary, the Director of the Office of Science, and the Director of ARPA-E. They also provide periodic briefings for the Secretary, offering the widest view of the Department's entire portfolio in each specific technology area. As of November 2012, the tech teams are: (1) Batteries for Electric Vehicles; (2) Biofuels; (3) Grid Technologies; (4) Carbon Capture, Utilization, and Storage; (5) Advanced Computing; and (6) Hydrogen and Fuel Cells.

DOE's history of late appropriations and multiple continuing resolutions has necessitated planning against multiple funding scenarios. But the Department's planning processes ultimately result in each major program office making decisions about the work:

- to be started, continued, or terminated
- to be directed to their sponsored lab(s)
- to be directed to DOE labs sponsored by other program offices
- to be performed by universities or other contractors/recipients
- to be competed among the labs or the labs and other entities, e.g., universities

Flexibility to Meet the Nation's Research Needs

When asked whether the planning process gives the national labs the flexibility to work on the most critical research problems facing the Nation, most of the senior lab officials queried responded in the affirmative. However, 2 lab directors expressed similar concerns to those raised by the Panel in Chapter 2 that the decisions to determine the work of the labs are not made from

a complex-wide or nationwide perspective and, therefore, DOE may not be optimizing the labs' capabilities to address the Nation's most critical needs. One of the lab directors also commented that the annual plans his lab receives often include such a specific level of detail with respect to milestones that he worries that DOE is losing sight of the big picture.

Work Authorizations

Once annual plans are in place, program offices issue work authorizations to the labs to execute those plans. Work authorizations identify individual work activities to be performed and the funding source for those activities. A work authorization and a notice that the appropriate financial plans have been updated must be issued and approved by the contracting officer at the site responsible for administering the laboratory's contract prior to a lab commencing work or incurring costs.

As noted in Chapter 1, the major outstanding item on the National Laboratory Directors' Council (NLDC's) list of issues is the funds distribution system. The labs have experienced significant time lags between the program offices authorizing work and the "paperwork" (work packages and funding documents) reaching the labs so they can begin work. Delays of 4 to 8 weeks to receive financial plan updates have been reported. These problems with DOE's funds distribution system were highlighted in the Academy's 2009 report on DOE's mission support functions.²² DOE reported that in response to the Academy's prior recommendations in this area, the Chief Financial Officer (CFO) established a steering committee to work in collaboration with the NLDC and program offices to reduce the timeframe for distributing funds. The committee considered several options to streamline the process. The tentative project plan calls for short-term improvements that will somewhat streamline the funds distribution process and for the development of an automated funds distribution system over the next 2 years. However, when this study began, little progress had been made. The issue has now been elevated within the Department, and senior officials indicate that this effort has been given a sense of urgency.

In written comments provided to the Academy Panel on November 7, 2012, DOE reported that a Lean Six Sigma²³ process improvement analysis performed in 2011 "verified that the current process was capable of performing funds distribution within a range of 44 to 77 days after program requested changes, which was deemed unacceptable." As a result, DOE determined that a new process and system could "potentially distribute funding on a weekly basis while reducing infrastructure costs by consolidating existing legacy systems." To date, the Panel has seen no progress in implementing the new process and system, and the need for change is as urgent today as it was in 2009 when the previous Academy Panel recommended it.

²² National Academy of Public Administration. *Managing at the Speed of Light—Improving Mission-Support Performance*, July 2009.

²³ Lean Six Sigma combines Motorola's Six Sigma system and lean manufacturing techniques to make work processes better and faster.

Focusing on the “How” and Not the “What”

The current laboratory management and operating (M&O) contracts are issued as “performance-based”²⁴ instruments that are designed to describe the desired results of contractor performance while leaving the contractor the flexibility to determine how to achieve those results. The performance-based concept is widely embraced by senior DOE management, but there are problems with its implementation. Academy staff heard frequent complaints from laboratory management and staff that some work authorizations not only define the deliverables and due dates but are very prescriptive about the interim steps to be followed to complete the work assignment. In their view, lab staff are the experts on how the end result should be achieved and they should have the maximum discretion in defining project methodology. The laboratory staff interviewed believed that the issuance of prescriptive work authorizations was not the result of any program office policy but rather was the reflection of individual program managers’ management styles or personal preferences.

Work for Others

As discussed earlier in this report, most of the national labs have work funded by other than their own sponsoring organization. This can be work for other DOE offices or for other departments or agencies. As shown in Table 3-1 below, the portion of non-sponsor work varies significantly among labs, but in some cases it is extensive. Among the 4 SC-sponsored labs that Academy staff visited, the portion of SC-funded work in FY 2011 ranged from 99.6% at Fermi to only 48.5% at the Oak Ridge National Laboratory (ORNL). For the Pacific Northwest National Laboratory (PNNL), SC-funded work accounted for less than 21% of the lab’s portfolio. Complex-wide, the non-sponsoring organization work is fairly evenly split between work funded by other DOE offices and work funded by non-DOE organizations, i.e., WFO—17.9% and 15.3%, respectively. At PNNL, WFO accounts for over 18% of the lab’s work, and it exceeds 10 percent of the portfolios of 5 of 10 SC labs. At Sandia, WFO is over 33% of the lab’s work. NNSA’s other 2 labs—Los Alamos and Lawrence Livermore—also do a significant amount of work for others, and all NNSA labs are seeking to do more.

Table 3-1: Funding Sources for Work in DOE Labs (FY 2011 Costs \$ in millions)

LAB	LAB SPONSOR	OTHER DOE	WORK FOR OTHERS	DHS ^a	Total FY 2011 Cost\$
Ames	70.5%	15.3%	13.7%	0.5%	34
Argonne	55.3%	29.3%	11.8%	3.6%	763
Berkeley	70.1%	14.5%	14.8%	0.6%	824
Brookhaven	83.7%	9.9%	6.3%	0.1%	750
Fermi	99.6%	0.0%	0.4%	0.0%	437
INL	55.2%	22.0%	20.4%	2.4%	1,063
Lawrence Livermore	74.7%	6.9%	13.7%	4.6%	1,584

²⁴ Performance-based acquisition as defined in Federal Acquisition Regulation 2.101 means “an acquisition structured around the results to be achieved as opposed to the manner by which the work is to be performed.”

LAB	LAB SPONSOR	OTHER DOE	WORK FOR OTHERS	DHS^a	Total FY 2011 Cost\$
Los Alamos	70.7%	18.5%	8.8%	1.9%	2,551
NREL	89.4%	6.1%	4.4%	0.1%	521
Oak Ridge	48.5%	34.6%	14.0%	2.9%	1,542
Pacific Northwest	20.8%	52.0%	18.3%	9.0%	945
Princeton	98.1%	0.0%	1.9%	0.0%	87
Sandia	55.1%	9.5%	33.1%	2.3%	2,438
SLAC	97.1%	0.8%	2.0%	0.0%	375
Thomas Jefferson	93.8%	0.3%	5.9%	0.0%	214
Grand Total	64.2%	17.9%	15.3%	2.6%	\$14,128

^a The Homeland Security Act of 2002 (6 U.S.C. 189) authorizes DHS to use the labs in support of its mission. The Act directs DOE and DHS to enter into cooperative agreements regarding DHS's use of the DOE labs, authorizing the labs to accept work for DHS on an equal basis with DOE work and to charge DHS the DOE rate for administrative and personnel costs. Because of the Act's provisions, SC does not include DHS funds as WFO.

Each M&O contract contains a required provision entitled Work for Others Program (Non-DOE Funded Work),²⁵ which places conditions on the labs' WFO programs, including prohibitions on direct competition with the domestic private sector; cost recovery, recordkeeping, and subcontracting provisions; and the requirement that a DOE contracting officer or designated representative approve the WFO proposal package. The DOE Order on WFO (DOE O 481.1C, sec. 4 c) also includes requirements for any WFO project, including that the project must be consistent with or complementary to missions of DOE/NNSA and the facility to which the work is to be assigned; will not adversely impact programs assigned to the facility; and will not create a detrimental future burden on DOE/NNSA resources.

The DOE site contracting officer and technical staff review the WFO requests and are responsible for ensuring that all conditions are met. Academy staff inquiries concerning how well the WFO review process worked produced mixed reactions. The major complaint was the length of time DOE staff took to complete their reviews, which was 1 of the concerns raised in the NLDC list of issues. However, efforts have been taken to streamline the WFO review process. DOE officials reported that NNSA has collaborated with the laboratories and DOE's other major program offices to conduct a Lean Six Sigma assessment of the WFO review process. The recommendations, which include the development of templates and checklists, are being implemented. In addition, the Golden Field Office reported a process improvement effort that reduced their WFO review time from 10 days to 2-3 days.

Planning and Work Authorization at Non-DOE FFRDCs

The majority of the R&D work performed by 4 of the 6 non-DOE FFRDCs benchmarked is for a single federal department. However, these FFRDCs receive less than half of their total annual R&D funds as core funding from their sponsoring organization. Two of the benchmarked DoD FFRDCs—Lincoln Labs and RAND's National Defense Research Institute (NDRI)—receive no

²⁵ Department of Energy Acquisition Regulation, 970.5217-1 Work for Others Program.

core funding and must obtain all their funds for their approved R&D plans from various program funding sponsors, many of whom have sponsored work at these FFRDCs for a number of years.

The fact that these non-DOE FFRDCs are multi-program labs, i.e., they have multiple funding sources, directly affects their planning and work authorization processes, which were similar among the benchmarked FFRDCs. The non-DOE FFRDCs develop and revise annually long-range R&D plans that they submit to their sponsoring agencies and to oversight boards or committees comprised of their major funding sponsors for review and approval. In reviewing and approving these long-range FFRDC R&D plans, the oversight boards ensure that the proposed plans reflect the high-priority R&D needs of the departments, not just the sponsoring organizations. For example, Lincoln Labs annually produces a 5-year R&D plan. This so called “Grey Book” is submitted to the Joint Advisory Committee, which is chaired by the Office of the Secretary of Defense (Defense Research & Engineering) and has members that include DoD agencies that fund the lab.

Oversight board approval of the non-DOE FFRDCs’ long-range R&D plans does not provide or guarantee funding for the proposed R&D activities contained in these plans. The annual or semi-annual meetings of these oversight boards provide an opportunity for all major R&D funding sponsors to provide assessments of past performance and to consider possible synergies that can enhance the FFRDC’s contribution to departmental R&D needs. The role of these FFRDC oversight boards is discussed further in Chapter 4 and described more completely in Appendix C.

The need to seek funding annually for a large part of their R&D funding also affects the work authorization processes for the non-DOE FFRDCs. To secure funding for specific R&D projects, the FFRDCs need to reach agreement with their funding sponsors on the technical scope and quality expectations for the R&D projects, the timeframe for completing the projects, and their expected costs. These specific R&D project performance expectations are then incorporated into the FFRDCs’ master contracts or sponsoring agreements. This negotiation of performance expectations provides the FFRDCs some flexibility in defining specific R&D work activity before accepting that work.

Another factor that affects planning for the DoD FFRDCs is that there is a staffing limit on the total number of their science and technical staff. Congress sets an aggregate staff ceiling limit for DoD’s labs and DoD allocates the total among its labs. This staff ceiling limits the total amount of R&D work that these FFRDCs can undertake in any given year. Both Lincoln Labs and NDRI have greater demand for their R&D efforts than their staff ceilings can support. Consequently, they can be more selective in the specific R&D projects they choose to undertake in any year, further increasing their flexibility in managing proposed R&D activities.

Conclusions and Recommendations

DOE’s major offices have fairly extensive planning processes that produce challenging work assignments for the national labs. However, the Panel has similar concerns with respect to planning that it raised in Chapter 2 with respect to DOE’s overall management of the labs. While the tech teams described earlier in this chapter are a step in the right direction, there is no comprehensive mechanism to integrate DOE’s planning processes to ensure that the Department

is optimizing the labs capabilities to meet the most critical needs of the Nation. The Panel believes that its recommendation in Chapter 2 should address its concerns.

Although there is a general commitment within DOE's senior management cadre to employ performance-based approaches in assigning work, some DOE program managers are issuing work authorizations that unduly restrict lab flexibility in pursuing work objectives. Successful implementation of performance-based acquisition requires that program and contracting staff develop and apply a new and different set of skills and competencies. The Panel believes that DOE should issue clear written direction regarding work authorizations that is supported by guidance and training. Enforcement of the directions should be at the site level.

The Panel recommends that DOE:

- **issue written direction that requires work authorizations to conform to established performance-based concepts. The direction should be supported by templates and examples that clearly illustrate the correct approach as well as training for staff in these new approaches.**
- **require site contracting officers to monitor implementation of this policy and, if appropriate, withhold their approval of work authorizations that do not conform to the direction**

The Panel believes that DOE has not been aggressive enough in its efforts to address the funds distribution issues that another Academy Panel identified over 3 years ago, and is pleased that the Department is now placing a high priority on addressing these issues. Likewise, it is encouraged by the efforts underway to streamline the WFO process and suggests that DOE move swiftly to implement the identified process improvements across the Department. However, the Department should take steps to determine whether the changes being implemented are sufficient.

The Panel recommends that once process improvements to DOE's work for others procedures are implemented, the Department should assess whether the changes have improved the timeframes for processing work for others requests and make further refinements to the process, as necessary.

BUDGETING AND FUNDING ALLOCATION ISSUES

In addition to the funds distribution issue discussed above, Academy staff interviews with DOE and lab personnel revealed 2 other major funding allocation issues. Over the last several decades, DOE has established control points pursuant to congressional and Office of Management and Budget (OMB) limitations and directions that dictate how DOE should manage, distribute, and use its funds.²⁶ In addition, program offices have established work scope controls that further define how recipients may use DOE's funds. These controls have led to the

²⁶ DOE uses "budget and reporting codes" for this purpose. The codes go well beyond OMB and congressional limitations and directions, however.

creation of thousands of “funding buckets”²⁷ that govern how the labs may use DOE funds, and in some cases, multiple federal program managers have been assigned responsibility for managing these “funding buckets.” These controls restrict DOE program managers’ flexibility to send new funds to the lab and move existing funds within the lab, and create a heavy transaction workload and a high transaction cost for both DOE and the labs.

As reported in a 2009 Academy report, “DOE maintains 51 distinct appropriations from Congress with 111 separate funds or line items for its major programs and activities. Compounding this complex appropriation structure, Congress also establishes more detailed spending controls for DOE through appropriation language or specific limitations in report language accompanying the appropriation bill.”²⁸ As that report indicated, the DOE CFO’s office had established 392 control points in its annual base table allocating DOE appropriated funds to the field CFOs. But only 324 of these line item controls reflected congressional limits from the congressional report table. Further compounding the budget limits were an additional 117 internal program spending controls established primarily by Program Assistant Secretaries. OMB adds yet another set of limitations by apportioning most DOE funds on a quarterly basis. This is further complicated by internal CFO rules that establish separate funding limitations on the use of carryover funds—creating even more control points. The prior Academy report recommended that DOE stop that practice, but the CFO’s response was that they intended to continue it even though OMB does not require it.²⁹

According to 1 senior lab official at Sandia, NNSA’s nuclear weapons program has 100-plus different “funding buckets” that money is allocated to. To successfully finish work on a project, the lab often must get permission to move dollars between “funding buckets.” To do that can require a lot of discussion and negotiation with several federal program managers, which can impact lab efficiency. The potential impact on major projects is significant. For example, lab officials at Sandia advised Academy staff that there are multiple DOE program managers assigned to each of the “funding buckets” on the life extension program for the B61,³⁰ and that the aggressive schedule for that effort will be jeopardized if funding allocation problems are not adequately addressed.

The Golden Field Office has taken steps to reduce the number of budget control points within EERE. All funds received or obligated in the current year are now authorized via work authorizations at the program level, e.g., solar, biomass, etc. Funds obligated in prior years, i.e., uncosted balances, will be controlled at the 9-digit budget and reporting level. For prior year funds, Golden already has completed raising the control level (via a “super work authorization”) for 2 programs—solar and wind. It has consolidated the “funding buckets” from 237 to 8 for the solar program and from 176 to 9 for the wind program. The next programs to have their “funding buckets” consolidated will be biomass and buildings with the expectation that the

²⁷ The term “funding bucket” is used consistently by the labs and the field to refer to funding allocations and sub-allocations that are related to budget and reporting codes.

²⁸ *Managing at the Speed of Light – Improving Mission – Support Performance*. National Academy of Public Administration, July 2009, p 96.

²⁹ DOE also establishes control codes for object classes, another control not generally required.

³⁰ The B61 nuclear bomb is one of the primary thermonuclear weapons in the U.S. Enduring Stockpile following the end of the Cold War.

“funding buckets” will be reduced from 160 to 11 in the biomass program and from 121 to 13 in the buildings program.

Another fund allocation problem is that at some labs, DOE program offices have been allocating funds in increasingly small amounts. For example, ORNL’s \$2.5 billion multi-year budget authority is allotted to over 2,500 projects, 40% of which are less than \$50,000. In addition to potentially limiting the lab’s flexibility because lab staff are addressing problems in small chunks of work and not in an integrated manner, the effect of this practice is to clog up the funding pipeline, exacerbate the “bucket” problems described above, and drive up laboratory overhead. The results of the Academy staff’s benchmarking efforts revealed that non-DOE FFRDCs generally receive approved funding on a total project basis and receive quarterly allotments.

Conclusions and Recommendations

The Panel recognizes that Congress and federal contract administrators need visibility in the budget in order to effectively manage federal programs and ensure accountability for funds. However, the Panel believes that the budgetary controls that have led to the creation of thousands of “funding buckets” significantly reduce the labs’ flexibility; creates excessive administrative costs and burdensome reporting requirements; and impedes mission accomplishment. Prior Academy Panel recommendations for DOE to work with its appropriations committees to simplify the number of budget controls have not been implemented. Nor does it appear that DOE has reformed its internal budget allocation processes to simplify or reduce the number of additional controls established by the CFO’s office and Program Assistant Secretaries. The program offices’ practice of allocating funds in small dollar amounts further inhibits the labs’ ability to effectively perform their work. It also increases the administrative burden on the funds distribution system by clogging it with small, incremental funding allotments. The Panel believes that improvements to the DOE funds distribution system require more than accounting and system improvements. Program offices also need to examine how their policies and processes contribute to the problem.

The Panel recommends that as DOE works to improve its funds distribution system, it should consider not only the technical operation of the system, but how program offices’ fund allocation processes can be modified to minimize the number of “funding buckets” and small, incremental funding allotments.

COMPETITION

Each of the labs has core competencies and capabilities. Many of these core competencies are unique to 1 lab; others can be found at multiple labs across the national lab complex. The scope of this project did not call for an examination of the extent to which the labs’ core competencies overlapped. It is evident, however, that there is significant overlap in many core competencies across the lab complex. For example, multiple labs share competencies in nuclear physics, particle physics, condensed matter physics, accelerator science, advanced computer science, chemical engineering, applied materials science and engineering, climate change science, and fusion technology.

Lab management personnel interviewed consistently emphasized the need to support the labs' core competencies through some level of base funding. However, the Energy Policy Act (EPA) of 2005 requires that "research, development, demonstration and commercial applications, shall be accomplished competitively to the maximum extent practicable." Unless a lab possesses a clear and unique core capability, DOE sponsor organizations compete their R&D requirements among the labs and/or other sources (e.g., universities or private industry). Many non-DOE FFRDCs have little or no core funding and are thus dependent upon funding from multiple sources beyond their specific sponsoring organization.

Competition is a well-established public policy, and in interviews with Academy staff, DOE program managers generally expressed the view that it enhanced the quality of their research programs. Many lab officials concurred that competition can improve the science. However, a significant number of lab officials also voiced concerns that the increasing emphasis on competition is having a negative impact on funding stability and is pulling lab staff away from their primary responsibilities in order to respond to solicitations. At ORNL, as the size of the average project has decreased, lab officials estimate that principal investigators need at least 10 projects to have enough work for full-time employment and that they spend 20% of their time writing proposals in response to solicitations.

NREL officials expressed similar sentiments concerning the inordinate amount of time they spend writing proposals. In addition, they raised concerns about the requirements for cost sharing³¹ on those competitions. The direct funding that DOE provides the labs through the annual planning process does not require cost-sharing. However, when DOE allows labs to participate in competitions for Funding Opportunity Announcements, they are not exempt from cost-sharing requirements that apply to other competitors. Normally in those cases, there is a 20% cost-share requirement for an R&D activity of an applied nature and a 50% share required for demonstration or commercial application programs or activities. Because the national labs are prohibited from providing cost sharing, they must find an industry partner to provide their required share. NREL lab officials indicated that this can place them in a subordinate role to an industry partner and perhaps compromise their ability to provide objective advice to EERE concerning technology deployment. EPA Section 988 provides that the Secretary may reduce or eliminate the cost-sharing requirements if the Secretary determines that the reduction is necessary and appropriate. In 2011, the Secretary approved such a waiver for the cost-sharing requirements for 2 early stage solar research and development projects.

Conclusions and Recommendations

The Panel recognizes DOE's legitimate need to encourage competition in its research programs. However, too much emphasis on competition can result in wasted administrative efficiency in the programs and the labs. Without a defined, enterprise-wide approach to competition, the labs are free to compete on any solicitation, which may encourage them to expand their capabilities beyond their core missions in the off chance that something might be competed. The Panel is

³¹ Department-wide cost sharing requirements are established by Section 988 of the EPA of 2005 for most research, development, demonstration, and commercial application activities initiated after the date of the Act's enactment, August 8, 2005. Some programs authorized in other sections of EPA may have specific cost sharing requirements.

concerned that this may undermine the very principles under which the labs were formed and allow the Department to avoid making hard choices concerning lab missions.

The Panel also believes that competition needs be carefully balanced against DOE's duty to exercise responsible stewardship of the national labs and to ensure that lab core competencies have viable funding sources. DOE needs to build and maintain the core competencies within the national laboratory complex in order to achieve national objectives. If DOE doesn't make the necessary investments in those competencies today, they won't be there in the future. For where competition is appropriate, the Panel believes that DOE needs to ensure that competition and cost-sharing requirements do not negatively impact the labs' funding stability, maintenance of core capabilities, and existing workload.

The Panel recommends that DOE:

- **annually assess the impact of current competition and cost-sharing requirements on the labs**
- **take steps to address the negative impacts identified by the assessment, including obtaining appropriate waivers from cost-sharing requirements**

CHAPTER 4: OVERSIGHT OF THE NATIONAL LABS

Responsibility for day-to-day oversight of programmatic and operational activities at the national labs rests with the line management organizations responsible for the labs—the lab sponsoring organizations. Within these organizations, headquarters and field offices share responsibility for lab oversight. In addition to the lab sponsoring organizations, other DOE offices, such as the Office of Health, Safety, and Security (HSS), also regularly oversee lab performance. However, lab oversight is not the exclusive domain of DOE. The parent organizations of the contractors managing the labs or the contractors themselves perform extensive reviews of the labs’ programmatic and operational performance and the effectiveness of lab management and control systems in managing lab program and operational risks. Other organizations, such as the Government Accountability Office (GAO), departmental Inspector General (IG) offices, Defense Contract Audit Agency (DCAA) auditors, and the Defense Nuclear Facilities Safety Board (DNFSB) also oversee lab management and their control of operational risks.

In recent years, the management and operating (M&O) contracts for the labs have required the lab contractors to develop Contractor Assurance Systems (CASs)—internal comprehensive management assurance systems—designed to assure both DOE and contractors’ management that lab operational and programmatic risks are effectively and efficiently identified, controlled, and managed. In theory, CAS can be used to assess and manage both programmatic and operational risks. In fact, lab directors use these internal management information and control systems to review and manage all lab work activity, including both programmatic and operational risks. Currently, DOE practice has been to use CAS to help oversee primarily lab operational risks.

At some labs where CASs have matured, the DOE oversight model is changing. Although there is some consistency in the oversight approaches used by the organizations that sponsor multiple labs, such as SC, there is no consistent oversight model applied across the national laboratory complex. DOE’s oversight of the labs also differs in several respects from the oversight approaches the benchmarked non-DOE FFRDCs employ.

This chapter examines DOE’s oversight of its 16 FFRDC national laboratories, the evolving role of the CAS in overseeing risks at DOE’s national labs, and lab oversight performed by other organizations; and compares these with the experiences of the benchmarked non-DOE FFRDCs.

PROGRAMMATIC OVERSIGHT

DOE’s national labs and the benchmarked non-DOE FFRDCs face fairly common risks that require their sponsoring organizations to have appropriate management control and oversight to ensure that those risks are being minimized. At the research and development (R&D) project level, these standard risks³² involve:

- completing the R&D project on schedule and within the approved budget

³² Safety and security issues also arise as tasks inherent in project work and are frequently added to this list of standard project risks. For this report, safety and security issues are examined in conjunction with operational risks discussed later in this chapter.

- meeting all technical requirements established for the R&D project
- achieving or exceeding quality standards established for the project

At the program level, the national labs and non-DOE FFRDCs also need to ensure that:

- their R&D portfolio of work is responsive to the long-term needs of their sponsoring organization, i.e., that it is aligned effectively with the long-term strategic needs of the sponsor
- the lab or FFRDC is uniquely qualified to perform the range of R&D work it undertakes, i.e., the work could not be done as quickly and/or competently by another non-FFRDC research entity

Effective programmatic oversight requires both project-specific monitoring on the progress being made against milestones and a comprehensive assessment of the program's entire R&D portfolio and how it is achieving the program's mission. Good program management cannot occur without good project management. And good project management requires an understanding of the overall program and how the individual projects support it. Effective programmatic oversight and project management involve three key components—careful planning to establish clearly defined goals and objectives; consistent monitoring of progress towards meeting those goals and objectives; and a thorough evaluation of outcomes. Successful implementation of these components depends on the quality of the management information systems supporting each component and management's attention to each of them.

DOE Project Oversight

Program execution is accomplished via thousands of projects managed by the national labs and other R&D providers. Program managers and their project officers are responsible for ensuring that 1) clear project goals, timelines, and costs are initially established and understood, 2) the projects are carried out effectively and efficiently, and 3) project performance expectations are met.

Each funded project will have a work plan—usually developed by the principal investigator at the lab—that is reviewed and approved by the responsible program official. These approved work plans will define the expected outputs and outcomes from the R&D project and establish key milestones for completing the defined work products. The specificity and level of details in each of these work plans vary across DOE program areas and even within a specific program area to reflect the nature of the project and the preferences of the responsible program official.

Each program office that funds R&D projects at a lab oversees its projects by tracking progress against agreed-upon milestones. DOE program staff meet regularly with their lab counterparts to review project progress and discuss and resolve issues. But who performs that oversight and the systems used vary by program office.

- SC headquarters program staff perform project oversight for projects funded at all SC sponsored labs.

- NE site office staff provide oversight of R&D projects undertaken at the Idaho National Laboratory (INL). NE headquarters program staff oversee R&D projects their programs fund at other labs or other R&D facilities.
- NNSA and EERE headquarters staff provide project oversight of their R&D projects with varying degrees of participation by site office staff for R&D projects at the labs they sponsor.
- EM site office staff oversee the projects at the Savannah River National Laboratory (SRNL).

For most labs, the project oversight roles and responsibilities of DOE headquarters and site office staff are reasonably well defined and distinct. In those instances where both headquarters and site office staff perform project oversight at the lab, there appears to be adequate communication between the staffs to minimize potential conflicts. In a few instances, however, lab staff indicated that they received conflicting or overlapping messages from headquarters and the site office, creating some confusion at the lab.

Monitoring Systems

DOE's program offices have project tracking systems for monitoring progress in meeting agreed upon milestones for individual projects; many of these systems are electronic. The content of these systems vary, but generally, monitoring program officials upload the approved project work plans into these systems and then use the information provided by lab staff performing the project work to track progress against approved milestones. For example:

- The NE tracking system—Program Integration Control (PIC)—provides monthly reports on the labs' progress in meeting specific milestones, but does not include quality measures or defined outcomes. The PIC system includes information on all NE R&D projects, not only those undertaken by INL or other labs.
- In SC, the program area associate directors have their own systems for monitoring progress in meeting project milestones for all R&D projects, including those undertaken by SC-sponsored labs. Some program area systems, e.g., Basic Energy Sciences are evolving to electronic systems.
- EERE has a Corporate Planning System (CPS) that includes project milestones and other project-specific data, e.g., funding actions, guidance letters, etc. EERE staff use CPS to monitor project progress, but also use individual tracking systems that range from electronic dashboards to simple spreadsheets.
- NNSA currently uses data from an electronic system—ePegasus—to monitor project progress, but Sandia is developing a new, integrated system as part of its governance reform initiative.

Non-DOE FFRDC Project Oversight

The sponsoring organizations for the 6 non-DOE FFRDCs benchmarked for this study oversee their projects for R&D activities in much the same way as DOE oversees projects at the national labs. In collaboration with the FFRDC, individual funding offices establish agreed upon project objectives, milestones, and quality standards for each project and then rely on information

supplied by the FFRDC to monitor progress in meeting these individual elements. Because the sponsoring organizations have very few or no staff onsite at the lab, their headquarters offices are responsible for project oversight. Headquarters staff conduct periodic reviews either monthly or quarterly to assess whether satisfactory progress is being achieved for the specific projects underway.

DOE's Program Oversight

The DOE lab sponsoring organizations are responsible for executing their programmatic missions. Within each organization, individual headquarters program managers are responsible for effectively managing and overseeing their programs. As discussed in Chapter 3, the lab sponsoring organizations have various planning processes to determine the short- and long-term goals for their programs and how they will use the national labs to meet those goals. And except for EM's oversight of SRNL, which is discussed below, the headquarters program managers within each program office have primary responsibility for these planning activities and for assessing how well the labs meet established goals. Several program managers interviewed indicated that they rely on multiple national labs and other R&D providers to execute their programs. Consequently, programmatic oversight by these program managers extends to all of the labs and R&D providers undertaking specific R&D activities funded by their program. Because these program managers require comparable management information and data to assess the effectiveness of each lab in meeting designated program goals, each lab's internal management information system must be sufficiently flexible to meet the DOE program managers' data needs.

Similar to project oversight, some lab sponsoring organizations, e.g., NNSA and NE, have technical staff at the site offices that assist with program oversight; others, e.g., SC, do not. Each of the headquarters program offices within the sponsoring organizations has its own processes for overseeing its programs, depending on the needs of the program and the program managers' personal preferences. Some headquarters program managers have regularly scheduled monthly meetings with the labs to discuss programmatic issues; others meet less frequently or on a more ad hoc basis. Most of the program offices reported using peer review to help assess their programs. For example:

- NE's Nuclear Fuel Cycle Technologies (NFCT) program area provides program oversight in several different ways. The headquarters program managers hold monthly teleconferences with the national technical directors at the labs performing NFCT work to review progress against their approved spending plans and project milestones; depending on the program, site office staff will participate. NFCT uses NE quarterly meetings with the labs, which review the status of the work in each major R&D area, to discuss the results of peer reviews of the labs and assess the value added from approved R&D projects. NFCT also hosts an annual meeting with all R&D program staff at 1 of the labs. Finally, NFCT is starting a process to have outside experts perform relevancy reviews to examine the significance of ongoing R&D within each major R&D program area. These relevancy reviews are expected to occur about every 2 years.
- NNSA's Defense Programs conducts quarterly meetings that are primarily focused on performance and out-year planning at the labs. Both lab and site office staff (senior

program managers from the labs, site office managers, program liaisons from the site offices) participate in the programmatic meetings to maintain alignment for potential planning. On occasion, program offices invite other DOE offices and other agencies, e.g., the Department of Defense (DoD), to their program reviews.

- SC uses both Committees of Visitors, comprised of 25-30 experts in the scientific fields SC supports, and triennial program reviews at each of the SC-sponsored labs to assess how well the SC R&D program portfolios at the SC-sponsored lab are meeting DOE's long-range science R&D needs.

These examples of programmatic oversight are in addition to the annual planning meetings and evaluation meetings described in Chapters 3 and 5. In all cases, the focus of these interactions is on the specific program(s) for which the headquarters program office is responsible. For a single-purpose lab, such as Fermi, the lab is dealing with only 1 program office. And, as the data in Table 3-1 indicate, almost half of the DOE labs are funded primarily by 1 program area sponsor.³³ However, over half of DOE's labs perform work for several DOE and non-DOE sponsors and, therefore, must address the programmatic concerns of multiple program areas. Currently, DOE does not have a formal Department-level mechanism to provide joint programmatic oversight of these multi-program labs.

As discussed in Chapters 3 and 5, the lab sponsoring organizations have annual planning and evaluation meetings with the labs to review and approve lab R&D plans and to assess overall lab performance relative to the prior year's goals and objectives. Some of the sponsoring organizations, e.g., SC, have invited other DOE offices that sponsor R&D work at SC-sponsored labs to participate in SC's planning meetings. NNSA has invited other agencies that fund significant R&D work at the NNSA-sponsored labs, e.g., DoD, to participate in the evaluations of its labs. However, the results from these informal processes appear mixed in terms of both consistent and complete participation by all sponsors that fund work at the labs. This contrasts with the formal processes used by the non-DOE FFRDCs, described below, which are based on full participation among all major funding sponsors. As discussed in Chapter 2, the one exception to these informal processes is NNSA's Mission Executive Council, a cabinet-level interagency council, comprised of DOE, DoD, the Department of Homeland Security, and the Office of the Director of National Intelligence. The Council provides an ongoing forum to coordinate long-term planning for the science, technology, and engineering capabilities resident in all of the participating agencies, including the capabilities of the national labs, which are of cross-cutting strategic national security interest.

SRNL is unique among DOE's national labs. SRNL's primary focus has largely been to support the environmental clean-up operations at the site. Although it may be looking to expand its focus in order to use its unique capabilities to address problems in other areas such as homeland security, SRNL remains an anomaly among the DOE national labs. The Office of Laboratory Oversight (OLO) at EM's Savannah River Site Office, not EM headquarters program offices, has line authority for the programmatic oversight of SRNL. OLO has responsibilities similar to the headquarters program managers in the other lab sponsoring organizations, including developing

³³ For this study, those labs with 75% or more of their funding derived from their sponsoring organization are considered primarily funded by that sponsor. As shown in Table 3-1, 7 of the 16 DOE national labs meet that criterion.

strategic planning guidance and monitoring the contractor's program execution; coordinating SRNL's mission planning; controlling the EM funds allocated to the lab; and evaluating the effectiveness of the lab's research organizations, partnerships, and demonstrations. However, EM headquarters program offices establish the scope, fund, and oversee over half of the core technical work performed at the Savannah River Site, and EM senior management reviews and approves the Laboratory Directed Research Program and the Savannah River Site 10-Year Plan.

Other Programmatic Oversight of DOE Labs

In addition to the programmatic oversight of their DOE sponsoring organization, the labs themselves, their managing contractors, and their parent organizations have an array of activities to assess and oversee how the labs are meeting their programmatic goals. These include reviews by various committees and subcommittees that assess the work of the labs. Lab self-assessments along with peer reviews, Committee of Visitor reviews, and advisory committee reviews all combine to provide a complex array of review mechanisms that serve to ensure that the work done by the lab is of the highest quality. For example:

- The University of Chicago has separate Boards of Directors to oversee the operations at the SC-sponsored Argonne and Fermi National Labs. The Board of Directors overseeing Fermi is a partnership between the University of Chicago and the University Research Alliance. The Board of the limited liability company overseeing Argonne has 22 members from academia, industry, and nonprofit organizations elected to staggered 3-year terms. The Board meets regularly 3 times per year and has committees that review the lab's effectiveness in 4 scientific areas—photon sciences; physical sciences and engineering; energy engineering and systems; and computing, environment, and life sciences.
- Similar activities are performed by the University of California (Berkeley) for its oversight of the Lawrence Berkeley National Laboratory (LBNL). The Berkeley Advisory Board is comprised primarily of external scientific leaders who serve staggered 5-year terms. It evaluates the overall direction of the LBNL scientific program and provides advice and comments on the lab's strategic vision and the effectiveness of lab management in fulfilling the lab's mission effectively, efficiently, and safely.
- Other university-managed labs have similar mechanisms for overseeing lab operations. The managing contractors of other labs and their nonprofit and for-profit parent organizations also have similar structured reviews of lab programmatic and operational activities.

Non-DOE FFRDC Programmatic Oversight

The sponsoring organizations' and funding agencies' headquarters offices perform all of the programmatic oversight at the 6 benchmarked non-DOE FFRDCs. Only 2 of the 6 sponsoring organizations—the Jet Propulsion Lab (JPL) and the Frederick National Lab for Cancer Research (FNLCR)—have site offices located at the labs, and the National Aeronautics and Space

Administration (NASA) site office at JPL primarily provides contract administration support services.³⁴

As noted in Chapter 3, many of the non-DOE FFRDCs receive limited or no core funding from their sponsoring organizations. By comparison, 11 of the 16 DOE labs receive more than 70% of their funding from their sponsoring organizations.³⁵ Without substantial core funding, the non-DOE FFRDCs are substantially dependent upon the R&D funding obtained annually from funding sponsors or “clients” other than their sponsoring organization. Therefore, the sponsoring organization alone does not have the ability to assess how effectively the FFRDC’s proposed R&D program plan and its performance against that plan meet the long-term R&D needs of the FFRDC’s principal sponsors or clients.

A significant difference between DOE and the non-DOE FFRDCs is the latter’s use of oversight boards to review, evaluate, approve, and monitor FFRDC proposed R&D program plans. These formal oversight boards for the benchmarked non-DOE FFRDCs include all the major R&D funding clients in order to provide a more comprehensive review of the relative value of the FFRDC’s R&D portfolio to their long-term R&D needs.³⁶ Sponsoring organization staff and non-DOE FFRDC directors expressed strong support for the role their oversight boards play in approving annual proposed R&D program plans, evaluating overall performance, and ensuring that the FFRDCs’ R&D activities continue to meet high priority, long-term R&D goals. The composition of these oversight boards varies with the range of funding clients supporting the FFRDC. However, these boards uniformly include high-level managers from the sponsoring organization and each major funding client, and meet at least annually with the FFRDC.

- At Lincoln Laboratory, a Joint Advisory Committee (JAC) is chaired by the lab’s DoD sponsoring organization and includes its major DoD funding agencies—the Air Force, Army, Navy, the Defense Advanced Research Projects Agency, the National Reconnaissance Office, and the Missile Defense Agency. The JAC meets annually, usually in the May/June timeframe, to review and approve the lab’s proposed 5-year R&D program plan; affirm that this plan meets DoD’s long-term, high priority research needs; examine specific project evaluations from funding sponsors; and discuss overall Lincoln Laboratory programmatic performance.
- The RAND Advisory Board for the National Defense Research Institutes (NDRI) is chaired by NDRI’s DoD sponsoring organization and includes its major DoD funding agencies—the Office of the Secretary of Defense, the Joint Staff, the Air Force, the Navy, and other major DoD sponsors. The RAND Advisory Board meets semi-annually to convey guidance to NDRI to help develop its annual 5-year strategic research plan; review and approve that plan; discuss progress in meeting plan objectives; and evaluate overall NDRI performance.

³⁴ The other FFRDC with a site office—FNLCR—is really more of a hybrid FFRDC. The lab director at FNLCR is a federal employee who also heads the National Cancer Institute’s site office. The FNLCR “model” has elements of both a government-owned/government-operated (GOGO) and a government-owned/contractor-operated (GOCO) “model.”

³⁵ See Table 3-1.

³⁶ The exception is FNLCR.

- The oversight committee for the Center for Advanced Aviation System Development (CAASD), the Federal Aviation Administration's (FAA's) FFRDC Executive Board (FEB), is chaired by the Assistant Administrator for Next Gen and includes the Associate Administrator for Aviation Safety, the Air Traffic Organization chief operating officer, 2 other FAA Assistant Administrators, and 4 senior FAA senior vice presidents. The FEB meets semi-annually to formulate and review CAASD's proposed R&D program goals and objectives; approve annual work plans; and discuss and resolve broad policy issues, including any programmatic performance issues.
- The oversight committee for JPL is NASA's Strategic Management Council, which is chaired by the NASA Administrator and includes all Mission Directorate Directors. The Council meets at least annually to review NASA's strategic plan; discuss JPL and other NASA Centers' performance; and allocate resources to JPL and other NASA Centers for approved R&D activity.
- The National Radio Astronomy Observatory's (NRAO's) National Science Foundation sponsoring organization, the Astronomy, Science, and Technology (AST) Division, establishes an external program review panel to review and make recommendations on NRAO's proposed 5-year long-range plan. Although AST provides most of NRAO's annual funding, this program review panel contains academics and other users of the NRAO facilities to assure AST that NRAO's proposed long-range plan is effectively meeting the high priority R&D needs of the astronomical science community.

Appendix C provides more detailed information on each of the benchmarked non-DOE FFRDCs.

Conclusions and Recommendations

Ensuring that DOE's high-level, high-risk scientific R&D is being performed well and is producing the desired outcomes is a huge responsibility and a major challenge. DOE's programmatic oversight of the national labs is a multi-faceted activity that requires program managers to stay abreast of and assess how the labs are meeting goals and objectives at both the project level and at the broader program level. To do so effectively, program managers and their staffs must possess the requisite technical and program management skills to know that the work being performed by the labs is indeed advancing their programs', and DOE's, mission. This study did not assess DOE staff capabilities for executing their oversight responsibilities. However, the Panel believes that DOE needs to ensure that staff receive the training necessary to ensure that they excel in their jobs. Further, it is essential that DOE managers' oversight roles are clearly defined and distinguished from the lab managers' roles in executing the work itself.

DOE's project oversight processes are similar to those used by the non-DOE benchmarked FFRDCs and appear to work well. Any differences in the approaches taken for project oversight appear to reflect differences in programmatic needs and management preferences among the individual R&D funding sponsors of the labs and FFRDCs. With respect to program oversight, however, there is a sharp contrast between DOE and the benchmarked non-DOE FFRDCs.

DOE's approach to program management tends to focus on the sponsoring organization's programs and the goals for those programs. This approach may work well for those labs that are funded primarily by their program sponsor, e.g., Fermi, Brookhaven, Thomas Jefferson,

Princeton Plasma Physics, and the National Renewable Energy Laboratory (NREL). However, it does not appear as effective for those labs with a multi-program focus such as Argonne, Oak Ridge National Laboratory (ORNL), INL, Sandia, LBNL, and the Pacific Northwest National Laboratory. While some program offices, e.g., SC, have sought input from other DOE program areas on an informal basis as part of their programmatic oversight protocol, these informal processes appear to have had mixed results. Most of the benchmarked non-DOE FFRDCs have oversight boards comprised of their labs' principal funding sponsors that help provide joint programmatic oversight; there is no similar mechanism within DOE that facilitates programmatic oversight of the labs' R&D contributions to all major funding sponsors. The Panel believes that for labs with multiple major funding sponsors, this limits DOE's ability to assess the effectiveness of the national labs' R&D programs in meeting DOE's long-term R&D programmatic needs.

The Panel recommends for each lab with multiple DOE major funding sponsors, that the lab sponsoring organization strengthen its planning and programmatic oversight process for that lab by formally including all major DOE funding sponsors in that process, to at least annually: 1) review the effectiveness of the lab's R&D program activity in meeting DOE's long-term R&D needs, and 2) approve the lab's proposed long-term R&D program plan.

The Panel recognizes that SC's annual planning process for its labs does include participation from other DOE major funding sponsors. However, the Panel believes that a DOE policy directive requiring such participation would help ensure that all major DOE sponsors for every lab are involved in the labs' planning processes.

OPERATIONAL OVERSIGHT

DOE's national labs and the benchmarked non-DOE FFRDCs face many similar operational risks in their R&D programs. These risks include:

- health and safety of the work environment
- physical security of the work place
- cyber security and other protections for information technology operations
- environmental impact on surrounding geographical areas
- litigation
- financial activities
- personnel/human capital—ability to attract, retain, and improve skills of the workforce
- conflict of interest; perhaps a unique concern of FFRDCs given their special status relative to their sponsoring government agency
- reputational concerns about both the quality of R&D products and overall work environment
- management effectiveness in preparing for and responding to various changes and disruptions, especially unanticipated “events”

- political concerns about the visibility of lab/FFRDC activities and external reactions to “events” that impact those activities

However, the level of operational risk will vary; some DOE labs—primarily the NNSA labs, SRNL, ORNL, and INL—may confront unique environmental, safety and health (ES&H) operational risks to the extent they work with highly toxic, dangerous nuclear and chemical materials. Few of the benchmarked non-DOE FFRDCs incur these unique ES&H risks, although FNLCR does process some potentially toxic chemical and biological materials.

Federal, state, and local government agencies have established regulatory requirements that guide the management of some of these operational risks, and failure to comply with them can result in various legal liabilities. For example:

- The Department of Labor’s Occupational Safety and Health Administration (OSHA) regulations define standards/requirements for creating and maintaining a healthy and safe work environment.
- Environmental Protection Agency regulations define standards for maintaining clean air and water and a safe and healthy environment for surrounding neighborhoods and broader geographical areas.
- The Department of Labor regulations define specific work rules; pay and benefit requirements; and other workers’ rights established by federal statutes.
- The Office of Management and Budget and other agencies such as the Financial Accounting Standards Advisory Board establish financial and accounting standards for managing and controlling financial resources.

In addition to government regulations/standards, as noted in Chapter 2, the M&O contracts require the labs to comply with a host of DOE directives that apply to the operation of laboratory facilities, e.g., ES&H, security, and management of nuclear materials. In some cases, the directives are very prescriptive; they specify how the operational risks are to be managed. Staff at some of the labs visited complained about the excessive number of these directives and have maintained that some are unnecessary or overly burdensome. The National Laboratory Directors’ Council (NLDC) cited DOE’s promulgation of the Worker Safety and Health Program—10 CFR A851—as an example of a DOE directive that imposed requirements substantially in excess of OSHA standards without demonstrating any need for or improvement from those additional requirements. DOE and the NLDC have agreed to defer work on this issue for the time being.³⁷ DOE maintains that, “although there are some enhancements,” the OSHA regulations are the linchpin of the DOE requirements.

DOE Operational Oversight

DOE Order 226.1 B establishes departmental expectations for implementing a “comprehensive and robust oversight process.” Site offices have primary responsibility for overseeing lab

³⁷ Assessing the appropriateness or cost effectiveness of any specific DOE operational risk requirement that exceeds current industry or other federal agency standards is not within the scope of this study.

operational risks, and all site offices have several means by which they gather data to carry out their responsibilities:

- walkthroughs and inspections
- observation/surveillances
- required reports
- functional reviews (internal and external)
- team assessments
- independent reviews
- laboratory/contractor assessments/reviews
- meetings with lab staff (formal and informal)
- lab self-assessments
- managing contractor/parent company functional management reviews

But the extent to which the site offices use these options and how they interact with the labs differ. Some of these differences reflect the presence of unique hazardous materials at specific labs and the degree or intensity of specific risks facing each lab. Others may reflect differences in personalities and the working relationship between site office and lab staff and varying levels of risk aversion among site office managers. Still others may be due to the fact that DOE is evolving to a performance-based lab oversight model and some sites are further along in this evolution than others.

Role and Evolution of Contractor Assurance Systems

In the past, DOE's oversight of operational risk relied heavily on transactional, compliance-based reviews of the labs' operations by site office staff. With the introduction of performance-based contracts, this approach is changing. Nearly all of the M&O contracts³⁸ now require the contractors to develop a CAS that outlines the contractor's plans for managing specific operational and programmatic risks and the procedures or policies for implementing those plans. The International Organization for Standardization (ISO), local trade groups, and Chambers of Commerce have standards to help guide the management of some of these operational risks. However, the CAS must address the current DOE requirements for managing operational risks, not those industry or other government standards. Where these requirements are the same, certifications from ISO or other industry and governmental entities can provide DOE some reassurance about the adequacy of the CAS in managing those specific risks.

With a CAS in place, instead of performing inspections of operational transactions to determine that contractor actions comply with DOE and other requirements, DOE oversight is expected to focus on system approval and verification of system effectiveness and the use of management information to assess lab managements' responses to emerging operational issues. Under this systems-based oversight approach, site office staff analyze the contractors' systems and the data produced to assure themselves that the lab's CAS can properly control and manage lab operational risks. While they continue to maintain operational awareness through a variety of

³⁸ The NREL, Ames, and Thomas Jefferson lab contracts do not include a CAS requirement. NREL, however, is developing a CAS. Academy staff did not obtain the contract for the Princeton Plasma Physics Lab.

regular contacts with the lab, site office staff no longer rely so heavily on their independent reviews of operational activities to oversee the contractor's operational performance. Site office staff are expected to be "eyes on, hands off." At the same time, inherent in the CAS is that the contractor is using its systems to oversee its operations and takes ownership of that process. And more important, this new oversight model is based on transparency and mutual access to data; DOE and the labs must openly share information on all aspects of lab performance.

Part of the evolution to a CAS oversight model is the site offices' assessment that the labs' CASs are adequate—they can identify potential problems before they happen and have established management processes to respond to operational issues that emerge. SC has recently completed a peer review of lab CASs at all 10 SC-sponsored labs. These reviews documented the differing degree of maturity and adequacy of specific systems within each SC-sponsored lab CAS. NNSA has begun a formal affirmation process for its labs' and production facilities' CASs where an external team reviews the CAS. Of NNSA's 3 labs, only Sandia's CAS has been reviewed. Based on that review, the Site Office Manager affirmed Sandia's CAS in May of this year.

DOE Order 226.1B describes DOE's requirements for an acceptable and effective CAS to manage lab operational risks. The order defines the major operational risks to be covered—lab "work performance [must] meet the applicable requirements for environment, safety, and health, including quality assurance and integrated safety management; safeguards and security; cyber security; and emergency management."³⁹ In addition to establishing processes, policies, and procedures for identifying and managing these operational risks, an acceptable CAS also must:

- identify methods for validating CAS processes by third-party audits and/or other independent reviews
- contain rigorous and credible self-assessment and corrective action processes
- establish management processes and data systems for identifying management risks, and documenting effectiveness of management responses to address those risks
- include an issues management process that prioritizes operational risks; evaluates solutions to specific issues; and communicates those results to higher level contractor management and DOE oversight staff

For lab directors, the CAS is their primary management tool for controlling and managing internal lab programmatic and operational risks. Under current practice, however, DOE offices overseeing lab operations have used CAS to focus principally on operational risks. As SC's 2012 evaluation guidance for its operational goals states: "for the 4 M&O goals (5-8), DOE will rely on a combination of the information through the Contractor's own assurance systems [CAS], the ability of the Contractor to demonstrate the validity of this information, and DOE's own independent assessment of the Contractor's performance."

The status and maturity of the CASs vary among the labs; and within each lab, the maturity of the CAS for specific operational risk components also varies. For example, Academy staff observed that the CAS at Argonne was more mature overall than the CAS at Fermi. However, even Fermi's CAS had some operational areas, e.g., ES&H that were more fully developed than

³⁹ DOE Order O 226.1B Attachment 1, p 1.

others. At some labs, the CASs had transparent management systems, agreed-to performance criteria, and data systems shared by both lab and site office management that provide timely information to monitor progress. For example, at Fermi, the lab and site office have used available technology to share critical management information through their SharePoint Tool Box. Similar systems are in place at Berkeley and PNNL.⁴⁰ At ORNL, site office staff have access to all lab data. A couple of labs also have obtained ISO certification for some of their CAS management processes.

The extent to which site offices rely on CAS to oversee lab operational risks varies significantly. At LBNL, NREL, Fermi, Argonne, ORNL, and Sandia, lab and site office staff reported that they were moving steadily towards a CAS-based oversight model. Academy staff found a high level of transparency in many lab-site office staff working relationships. In addition to the shared information systems noted above, some site office staff are invited to attend the labs' meetings to observe their work. The topics of these meetings are not solely lab operations, however. For example, at Sandia, site staff have an open invitation to attend the lab's quarterly Executive Management Reviews where the lab's senior leadership examines all aspects of the lab's program and operational activities. Sandia site office staff also are invited to shadow the labs' internal operational reviews. These shadow reviews are increasingly replacing the transactional reviews that the site office used to perform. At Fermi, site office and lab staff have begun to schedule and hold joint inspections and facility walkthroughs. Similarly, site office and lab staff at have begun conducting "partnered" reviews, limiting the number of site office staff-only reviews. At each site, however, if site office staff have any concerns, they can conduct an independent review. The Idaho and Lawrence Livermore site offices have been slower to adopt a systems-based approach to operational oversight. According to data provided by the Lawrence Livermore National Lab (LLNL), the Livermore Site Office conducted over 1,100 assessments of the lab during FY 2012, including 323 walkthroughs, 369 observation/surveillance activities, 150 functional area assessments, 47 shadow assessments, 16 team assessments, 169 contract/programmatic awareness activities, and 80 CAS element assessments.

As 1 site office manager noted, the level of trust between lab and site office staff is critical to the site office's willingness to accept and rely on the lab's CAS to manage operational risks effectively. Trust levels, in turn, are strengthened by the maturity and transparency of an individual CAS; the timely sharing of accurate information on operational issues; the manner in which the lab responds to issues; and the effectiveness of the lab's remedial actions. Like any major change, time is needed for staff to transition to a new way of doing business.

DNFSB officials have raised some concerns about the effectiveness and/or reliability of CAS to control and manage DOE's operational risks satisfactorily, particularly any unique ES&H risks associated with the management of nuclear or other highly toxic materials. DNFSB staff have expressed doubts about the maturity of NNSA labs' CASs and whether they could ever develop sufficiently to substitute for site office onsite inspections and transactional reviews at the NNSA labs. Key NNSA headquarters staff also share the view that current NNSA lab CASs aren't sufficiently mature to be relied on to oversee certain operational risks. Lab staff at Sandia and LLNL indicated that they did not intend to change their transactional oversight model for their nuclear facilities.

⁴⁰ Fermi based its system on the PNNL SharePoint system.

As lab CAS management processes fully mature and are accepted by site offices, the roles and responsibilities of site office staff for overseeing operational risks will need to change. The implications for the size and skill levels of site office staff and the role of parent contractor staff will need to be reassessed. The operational risk oversight model or approach used by the benchmarked non-DOE FFRDCs can provide some insights on the types of changes that may be expected.

Non-DOE FFRDC Operational Oversight

As noted earlier, the non-DOE FFRDCs confront similar operational risks as those faced by the DOE national labs, although the severity or criticality of specific risks may differ. However, the sponsoring organizations of the benchmarked non-DOE FFRDCs' approach to the oversight of operational risks, with 1 exception,⁴¹ differs strikingly from DOE's current operational oversight approach for the national labs. The non-DOE FFRDC sponsoring organizations rely on the FFRDC managers' (or the parent companies') management systems to address operational risk issues and provide information on the resolution of any operational issues that emerge.

There are several reasons for the non-DOE FFRDCs' very different approach.

- First, the sponsoring organizations for the non-DOE FFRDCs have concentrated their oversight on programmatic rather than operational risk issues.⁴² This appears to reflect not only the priority accorded programmatic issues, but also a willingness to rely on contractor management systems to manage and control operational risks. All of the non-DOE FFRDCs rely on parent systems and parent reviews of operations at the FFRDC as 1 way to ensure that operational risks are being effectively managed. Audits by third parties are another way to reassure sponsoring organizations that FFRDC management is complying with their own internal management policies and procedures and that operational risks are being effectively managed.
- Second, all but 2 of the benchmarked non-DOE FFRDCs have no or minimal sponsoring agency staff on site. There is a NASA site office at JPL, but the role of that office is to provide contract administrative support for the FFRDC. The NASA site office performs

⁴¹FNLCR is the exception. As noted earlier, this FFRDC is at best a hybrid reflecting more of a GOGO than a GOCO model. The lab director is a federal employee, not a contractor employee. Federal staff at the site perform R&D and other operational activities and represent over 25% of total FNLCR staff. Federal and contractor staff work side by side on R&D activities at the Ft. Detrick site. The National Cancer Institute site office director, who also serves as the FNLCR director, does review annually both programmatic and operational risks at FNLCR. But this reflects the fact that all FFRDC directors have the responsibility to manage and review all operations and work activities at their FFRDCs, including overseeing both programmatic and operational risks.

⁴² Contractor management of operational risks is reviewed with management of program risks during the comprehensive review of the FFRDC's performance as the 5-year sponsoring agreement is considered for renewal. In addition, some sponsoring organizations, e.g., NASA, have separate headquarters agencies that conduct an independent review of certain operational risks (e.g., ES&H) once every 2-3 years during the 5-year term of the sponsoring agreement.

no onsite inspections of JPL operations.⁴³ FNLCR has a very large federal site office presence, but this is an anomaly among the benchmarked FFRDCs.

- A third reason is that the non-DOE FFRDC sponsoring organizations rely primarily on general government and industry standards to manage FFRDC operational risks. Unlike DOE, the non-DOE FFRDC sponsoring organizations establish few unique requirements for their labs' operations. Consequently, independent reviews and audits of the labs' operations applying these government and industry standards can verify the effectiveness of the non-DOE FFRDCs' contractor management systems in managing and controlling operational risks. ISO certification of parent or FFRDC management processes is yet another way for these non-DOE FFRDCs to reassure their sponsoring organization about the adequacy of their management of operational risks.⁴⁴ Even when a non-DOE FFRDC sponsoring organization has special requirements, it relies on the FFRDC to develop and implement a plan for managing any specific, unique risks. For example, Lincoln Labs submits its proposed management approach for meeting security requirements for classified work to the sponsoring organization for review and approval.
- Finally, in several cases, the non-DOE FFRDC facilities are owned by the FFRDC managing parent—MITRE's CAASD, RAND's NDRI, and Associated Universities, Inc.'s NRAO. But, even where the facilities are government owned, e.g., Lincoln Labs and JPL, the sponsoring organization relies on the managing contractor to manage and maintain these government-owned facilities using the contractor or contractor parent management and control systems.

Both FFRDC and sponsoring organization management and staff have expressed high satisfaction with this approach to operational oversight.

Other Oversight

In addition to the operational assessments conducted by site offices, most of the lab contract managers and their parent organizations undertake periodic operational reviews of lab systems and management practices. The national labs also are subject to audits and operational reviews from a number of other entities, including GAO, the DOE IG, DOE's HSS office, and DNFSB. For example, in FY 2012, LLNL had 415 separate operational assessments in addition to the 1,100+ Livermore Site Office assessments. These included 285 LLNL internal independent audits and assessments, 30 state and local government audits and assessments, and 100 external reviews and audits. This latter figure does not include assessments by DOE's HSS office, which are extensive, or the onsite activities of the DNFSB. LLNL indicated that half of these operational reviews are concentrated on ES&H and emergency management operational risks.

The current number and diversity of the external operational reviews at many DOE labs, in conjunction with continuing operational reviews by DOE site office staff, help explain the source of complaints from some labs about excessive operational oversight requirements. The extent

⁴³ There are several DCAA auditors on site at JPL who perform standard independent audits of various operational risks and information systems. These other independent operational reviews are discussed in a later section of this chapter.

⁴⁴ Where industry and DOE standards are the same, these ISO certifications can provide DOE another source of validation of the adequacy of CAS to manage specific operational risks.

and timing of these onsite assessments vary significantly across all labs, and the ostensible purpose for the assessments is not always clear to the labs. Some lab staff complained about the duplication of site office inspections or reviews with reviews or audits from external entities; the paucity of joint reviews or inspections with lab staff; and the failure to prioritize reviews and inspections to reflect the sensitivity or importance of specific operational risks likely to be encountered at the lab. As 1 lab staff member commented, when “everything is treated equally” it is not possible to pursue a risk-based management strategy for managing operational risks.

On the other hand, several site offices have initiated efforts to coordinate their inspections better with internal lab reviews and to reduce duplication with other external reviews. The Berkeley Site Office, for example, has developed a master review schedule with LBNL to coordinate onsite inspections and various operational reviews. At all of the labs Academy staff visited, site office staff regularly conduct joint onsite assessments with lab staff. At Sandia, site office staff reported that they have tried to work with other DOE offices and external organizations to coordinate reviews in an effort to minimize their impacts on the lab. Those efforts have had some limited success.

Other efforts underway to streamline the labs’ operational oversight burden focus on reducing lab reporting and review requirements. The Berkeley Site Office has undertaken a joint initiative with LBNL—Contract 31—to review DOE directives and streamline or eliminate excessive, irrelevant, or redundant guidelines that impede operational activities and other work at the lab. This has eliminated 14 DOE directives from the LBNL contract. Thomas Jefferson lab has begun a similar initiative. DOE’s HSS office has initiated efforts to streamline their periodic safety and health reviews of individual labs.⁴⁵ Despite HSS’ efforts, however, some labs report that they have observed little change at their sites.

The non-DOE FFRDCs also are subject to audits and operational reviews by external entities and their contractors’ parent organizations. However, there are no separate site office inspections, audits, or operational reviews to compound these operational reviews. Several non-DOE FFRDCs have noted that they have an “audit rich environment.” Lincoln Labs has about 80 audits per year conducted by DCAA, in addition to a number of independent audits conducted by its contractor’s (the Massachusetts Institute of Technology’s) audit division. Cal Tech’s JPL undergoes about 60 audits annually; about 40 of these are conducted by DCAA and another 15 or so are conducted by Cal Tech. But these “audit rich environments” at several of the benchmarked non-DOE FFRDCs most comparable in size and R&D activity to the majority of DOE labs appear less extensive and intrusive relative to the audit and oversight assessment environment facing many of the DOE labs, e.g., the LLNL environment described above.

The non-DOE FFRDC staff recognize that these audits and operational reviews are needed to reassure both their sponsoring and parent organizations that they are managing and controlling operational risks effectively. External audits and operational reviews can perform a similar function for the DOE labs, particularly as site office operational oversight shifts to a more direct reliance on each lab’s CAS.

⁴⁵ A recent GAO study, *Nuclear Safety: DOE Needs to Determine the Costs and Benefits of its Safety Reform Effort*, GAO-12-347 (Washington, DC: April 20, 2012) noted the need for some reforms in these reviews.

Conclusions and Recommendations

The Panel fully supports DOE's efforts to shift from a transactional/compliance-based oversight model to one that is centered on an analytical assessment of the lab contractors' CASs and lab managements' responses to operational risks. Just as DOE management is advocating for a performance-based approach to programmatic oversight, so too should it embrace performance-based operational oversight.

The Panel recognizes that the contractors' CASs are in varying stages of maturity and that DOE needs to exercise caution as it moves to this new oversight model. DOE must "trust but verify" that the contractors' systems are capable of identifying potential problems before they happen. The site offices will continue to have an important role in overseeing lab operations, but that role will change with the shift to this new oversight model. This shift to a new oversight model will, in turn, require a culture shift for both site office and lab staff. The former will have to step back from reviewing transactions and identifying issues, and the latter will have to step into that role. This culture shift cannot be limited only to DOE's site offices and the labs, however. The Panel believes that the entire Department, including DOE headquarters offices, needs to embrace a systems-based approach to operational oversight. If DOE headquarters maintains a transactional management style, CAS will simply become another program layered upon existing programs, with the subsequent inefficiencies and complaints that would be expected.

A systems-based or CAS-reliant approach to operational oversight requires a significant change in the roles of site office and headquarters staff, requiring new sets of skills. And the changes in the type of work performed may have implications for staffing levels. DOE needs to ensure that its offices have the proper and necessary level of resources and training to perform their work and that there is strong management support for the cultural change that needs to take place throughout the organization.

The Panel recommends that DOE evaluate the staffing, skill mix, and oversight practices of its offices and identify the changes required to rely primarily on Contractor Assurance Systems and risk management practices for operational oversight of individual labs.

The Panel recognizes that some program offices have or are currently undertaking a review of site office staffing levels. The recent SC site office review identified 3 discriminating factors that help define each lab's mission complexity and the corresponding site office staffing required to accommodate that complexity. NNSA also is reviewing staffing levels at their site offices. While the SC study is a step in the right direction, the discriminating factors identified—number of customers, size of M&O contract, and presence of nuclear materials—still have a transactional focus. The Panel's recommendation requires a more fundamental re-assessment of the roles and functions expected of site office staff once a fully mature CAS is the primary focus for managing operational risks. At a minimum, this will require evaluations of the number of staff required to

- review and validate the effectiveness of specific management information and control systems within each CAS
- analyze data from these systems monitoring lab operational risk
- assess lab management responses to operational issues

- meet with lab management and staff to review effectiveness of lab responses to unanticipated operational events
- assess overall lab performance in addressing operational risks
- evaluate overall lab performance in addressing operational risks

For those program areas where operational oversight is shared between site and headquarters staff, this oversight review must extend to all offices with that responsibility.

A lab's mission complexity and the number of transactions occurring at the lab place demands on the various management systems within the lab's CAS. But site office staff requirements under this new operational oversight model will depend more on the ability of the lab's CAS to manage and control this complex work environment than the number of operational activities themselves.

As DOE relies primarily on systems-based operational oversight, the Panel believes that DOE will need to focus more carefully on those labs with unique levels of ES&H operational risks due to the presence of nuclear and other highly toxic materials. DOE will need greater assurance that the labs' CASs effectively manage and control any unique operational risks that may arise. Effectuating such a change without increasing operational risks requires careful planning to ensure that each lab's CAS is fully mature, operating effectively, and sufficiently transparent for site offices to evaluate contractor management and control of operational risks at the lab.

The Panel recommends that DOE revise its current order on Contractor Assurance System (CAS), as necessary, to provide explicit guidance on the requirements needed for a mature CAS; the types of information and data sharing expected to ensure sufficient transparency; the timeframe for contractors to develop and site offices to review and approve a mature CAS; and incentives for accomplishing this.

As DOE continues to implement a CAS-based oversight model across the complex, strong leadership from the Deputy Secretary will be needed to ensure that the necessary transitions to this new way of doing business are fully implemented. Because this cultural transformation will take time, the Department should look concurrently for opportunities to eliminate orders or directives that may be redundant or no longer necessary. The Panel also believes that DOE can improve current operational oversight activities and reduce the burden on both site office and lab staff by adopting some best practices from current site office efforts to coordinate the timing and focus of current operational reviews and audits of lab operational systems.

The Panel recommends that DOE designate site offices as the official contact points and coordinators of all DOE operational reviews and audits of lab operational systems and activities, and require the site offices to develop a consolidated annual plan or master review schedule for such audits and reviews.

As noted earlier, several site offices have already begun to assume this coordinator role. The Panel believes that this recommendation for site offices to provide a "gate-keeping" and coordinator role needs to be extended to all site offices. Establishing a consolidated annual plan or master review schedule is a critical first step. But site office staff also should encourage

maximum use of joint reviews, with full sharing of information collected and the resultant findings, to minimize operational oversight burdens and maximize the effectiveness of such reviews. This site office “gate-keeping” function should apply to data calls generated by all headquarters program and staff offices. A DOE policy directive establishing the site offices’ “gate-keeping” role should ensure that their coordination responsibilities extend to the activities of all DOE offices. The Panel believes these site office actions should mitigate some of the complaints from lab staff about duplication, redundancy, and insufficient prioritization among these various additional operational reviews and audits.

These Panel recommendations for improving oversight of operational risks will not necessarily reduce the myriad of entities overseeing lab operational risks. But they should change how some of these entities perform that oversight. In addition, the extended and strengthened “gate-keeping” role recommended for the site offices, if implemented, should eliminate current duplicative and repetitive operational reviews. The Panel believes these recommendations should provide more effective and less burdensome oversight of lab operational activities.

CHAPTER 5: EVALUATION AND FEE DETERMINATION

The metrics DOE uses to assess lab performance were a key interest in the Appropriations Committees' charge to the Academy. Specifically, the Academy was charged with determining:

- if the performance metrics measure critical aspects of their performance
- the extent to which performance data are used to hold labs accountable for performance
- whether metrics are applied in a consistent manner across labs

The Panel looked closely at the construct and processes for evaluating DOE's 16 Federally Funded Research and Development Center (FFRDC) labs. In most cases, the Panel examined the FY 2011 evaluations because they were the most recently completed when Academy staff started their work. In some cases, the FY 2012 evaluation plan was reviewed. The discussion below also addresses changes that have occurred or are expected in FY 2013 and beyond.

This chapter describes how DOE's evaluation processes assess critical aspects of the lab management and operating (M&O) contractors' performance, including a discussion of significant differences in the lab sponsors' evaluation approaches. It also describes changes underway to lab evaluations and the role the evaluations play in lab accountability.

BACKGROUND: EVALUATION CONSTRUCT AND PROCESS⁴⁶

Each of the DOE lab sponsoring organizations, described in Chapter 1, has specified the criteria, format, and process for the annual evaluation of the lab(s) they sponsor. These plans are included, by modification, in the contracts, and serve as the primary criteria against which contractor performance is evaluated. DOE M&O contractors are eligible for performance-based fees (award fees or incentive fees) that are "at-risk;" that is, the amount of fee awarded is determined by evaluation of performance. The portion of fee awarded is determined primarily through these annual lab evaluations. In each case, however, there are provisions for the evaluations or fees to be modified based on circumstances or lab conduct beyond that specifically addressed in the annual evaluation plan.

The annual evaluation is the culmination of ongoing discussions about performance throughout the year. While a key difference among the sponsoring organizations is the extent to which specific, objective expectations are set, all of them include a significant level of subjectivity, allowing DOE discretion in determining the final score.

Appendix D provides more detailed descriptions of the various evaluation approaches, including similarities and differences in evaluation content and in fee determination.

⁴⁶ The Savannah River National Lab (SRNL) has a significantly different configuration than the other 15 labs: it is operated as one part of a broader Office of Environmental Management (EM) contract for managing the entire Savannah River Site. The lab's main purpose is to provide direct support to the site cleanup activities. Consequently, although the Panel included EM and SRNL in its review, the Panel has chosen to exclude SRNL from most of the discussion in this chapter. However, information about EM and SRNL is contained in Appendix D-5, in a separate document.

Evaluation Design and Content

There have been significant differences in the sponsoring organizations' evaluation constructs. SC specifies uniform expectations and performance criteria in the Performance Evaluation and Measurement Plans (PEMPs) for all of its 10 labs. The PEMP for each lab includes 8 broad goals, stated as desired outcomes, e.g., "Provide for efficient and effective mission accomplishment." Rather than list specific tasks or deliverable outputs, 26 outcome objectives are specified across the 8 goals.⁴⁷ Each SC program office that funds work at a lab establishes weights for each goal and for each objective within each goal. Evaluation of the goals and objectives is supported by common criteria and factors to consider in determining the evaluation score, as well as a common set of definitions for various levels of performance. Since 2010, SC has been including "notable outcomes," unique to each lab, for some or all of the objectives in the evaluation plans to provide more specific guidance on DOE priorities for the lab.

NNSA also has set forth broad guidance on evaluations for its 3 labs in its Performance Evaluation Plans (PEPs), specifying several categories of performance to be measured (e.g., programs; operations; business and institutional management; and multi-site) as well as the portion of the award fee associated with each category. In contrast to the SC approach, until FY 2013, each NNSA lab evaluation plan spelled out unique expectations, usually with specific deliverables and milestones. For example, the FY 2011 Lawrence Livermore National Laboratory (LLNL) evaluation plan included 11 performance categories, 41 objectives and 80 measures.⁴⁸ Beginning in FY 2013, NNSA has revised its lab evaluation process, using what it calls a strategic approach, along the lines of the SC approach. The evaluation plans for all NNSA labs (and production facilities) have the same 5 major performance objectives. For each of the 5 objectives, lists of "contributing factors," also the same for each lab, help to flesh out the scope and performance expectations. The major performance objectives are weighted, and weights vary among the labs. Similar to SC, NNSA also includes a limited number of "site-specific outcomes" to help identify NNSA priorities for each lab.

The other sponsoring organizations (each with 1 lab) have lab evaluation plans that have similarities to both the SC and NNSA approaches. But 1 common element is the inclusion of more specific output expectations. For example, the FY 2011 Idaho National Laboratory (INL) evaluation plan specified 6 major focus areas (goals) and 76 objectives. Similarly, the National Renewable Energy Laboratory's (NREL's) evaluation plan had 9 goals, 23 objectives, and 126 targets at the "meets expectations" level.

Evaluation Process and Fee Determination

All of the evaluation approaches use numerical and letter or adjectival scores for the objectives and goals, and tie scores to a set percentage or dollar amount of the total available award fee. The approach to allocating the award fee is different, however.

⁴⁷The content and number of objectives may change from year to year. In FY 2012 there were 23 objectives in total.

⁴⁸The 3 NNSA labs have significantly different evaluation plans. Throughout this chapter, LLNL is used as an example where individual lab information is included. Appendix D provides more information about the Sandia National Laboratory and the Los Alamos National Laboratory evaluations.

In SC, each objective is evaluated and those scores are rolled up into a goal score. Goal scores are rolled up into scores for science and technology (mission) and maintenance and operations. A percentage of the award fee is allocated to these 2 major performance categories. Similarly, in EERE (NREL), objective scores are rolled up into goal scores and goal scores are rolled up into 3 categories—mission, operations, and construction. A percentage of the award fee is allocated to these 3 major performance categories.⁴⁹ In INL, a portion of fee is allocated for each of 6 focus areas and to objectives within the focus areas.

In contrast, before FY 2013, NNSA specified a portion (or a minimum) of the award fee to be allocated to each major performance category (mission, operations, business, and multi-site objectives). But the individual lab plans differed in how they allocated the award fee to performance objectives within those specified allocations. For example, LLNL allocated percentages in accordance with the NNSA guidance at the performance category level, while the Los Alamos National Lab, in contrast, allocated award fee for each of the many performance outputs specified in the plan. As noted above, under NNSA’s new evaluation approach, all 3 lab evaluation plans now have the same 5 major performance objectives, and each objective is allocated a portion of the award fee; allocations are lab-specific.

The annual evaluations also support decisions about contractors’ eligibility for award term contract extensions. As noted in Chapter 3, most of the DOE lab M&O contracts have award term provisions that allow DOE to extend the base contract term (usually 5 years) 1 to 3 years at a time for up to 15 additional years, if specified criteria are met. In SC, the criteria are minimums for objective and goal scores. In NNSA, contractors had to achieve at least a “very good” (4 on a 5-point scale) in each performance category as well as achieve at least 4 of 5 specified performance objectives to be eligible for award term. Under NNSA’s new approach, contractors must earn an evaluation of at least “very good” on all 5 objectives and “experience no significant safety or security incident...” to be eligible for the award term incentive.

In SC, NNSA, and EERE, the evaluation process involves both headquarters and site office staff, with headquarters program staff taking the lead on evaluating programmatic performance and the site office leading the evaluation of operational performance. The other 2 lab sponsoring organizations had different approaches.

- At INL, the site office has a fairly large staff with considerable programmatic expertise; it has the lead role, working with the headquarters program staff, in assessing the lab’s programmatic performance.
- At SRNL, much of the work is overseen by the site office; site office staff have primary responsibility for assessing the lab’s programmatic as well as operational performance.

Lab self-assessments played heavily in the evaluation process of some labs, but not in others. Most of the contracts require lab self-assessments. Such assessments are generally considered a good management practice, and sound self-assessment is a critical underpinning for successful implementation of the Contractor Assurance System oversight approach discussed Chapter 4. In some cases, especially NNSA, NREL, and INL, contractors performed extensive self-

⁴⁹ See Appendix D-4 for a description of how the performance categories affect fee determination.

assessments and presented them to DOE as part of the annual, as well as interim, DOE lab evaluation process. These assessments provided a basis for dialogue about performance during and at the end of the year. SC headquarters officials indicated that they do not use such assessments to assess programmatic performance, but that some site offices used them as input to the evaluation of operational performance. SC officials said DOE evaluators need to have sufficient information to evaluate the labs without relying on the self-assessments.⁵⁰

CRITICAL ASPECTS OF PERFORMANCE ARE ASSESSED IN THE ANNUAL EVALUATIONS

In spite of the differences among the labs' evaluation plans, with only one exception, they all cover 3 main categories of performance: mission, operations, and leadership, which are, in the Panel's opinion, the appropriate areas to assess for these M&O contracts. Table 5-1 below summarizes key evaluation areas for the sponsoring organizations.

⁵⁰ The Academy did not review the labs' self—assessments, but notes that the Government Accountability Office has raised concerns about the adequacy of some labs' assessments.

Table 5-1: Content Categories in DOE Labs' Annual Evaluation Plans and Reports^a

OFFICE OF SCIENCE	NUCLEAR ENERGY (INL)	NNSA (details are for LLNL, FY 2011)	NNSA Strategic PEP	EERE (NREL)
Program/Mission				
<ul style="list-style-type: none"> • Mission Accomplishment • Design, Fabrication, Construction, and Operation of Research Facilities • Program Management 	<ul style="list-style-type: none"> • Deliver Transformational Science • Deliver R&D Program Commitments – milestones • Develop Capabilities for the Future • Establish Broader, More Effective Collaborations • Safety, Operations, and Stewardship 	<ul style="list-style-type: none"> • Complete essential activities for core weapons program requirements • Strengthen the foundation of deterrence through stockpile science, technology, and engineering • Propose and implement strategies for sustaining a strong deterrent at low numbers compatible with START, NPR and CTBT goals^b • Execute Inertial Confinement Fusion Ignition and High Yield Campaign in support of stockpile stewardship • Support non-proliferation and threat reduction • Provide science, technology, and engineering excellence 	<ul style="list-style-type: none"> • Nuclear Weapons Mission • Broader National Security Mission • Science, Technology, and Engineering Mission 	<ul style="list-style-type: none"> • Advancing science and technology • Science and technology management, analysis, and integration • Accelerating commercialization and increasing deployment • Major construction (set forth as separate set of goals in evaluation, i.e., not part of mission or operations category)
Operations				
<ul style="list-style-type: none"> • Environment, Safety, and Health • Business Systems • Facilities and Infrastructure • Security and Emergency Management 	<ul style="list-style-type: none"> • Some inclusion (see 5th bullet above), focused on specific activities. Otherwise, operations are “expected [to show] adequate performance” and problems are handled through other contract provisions 	<ul style="list-style-type: none"> • Support current and evolving mission performance by providing effective and efficient facilities and infrastructure • Maintain effective environmental, safety, and health institutional programs • Maintain secure operations in an efficient and effective manner in support of mission objectives • Manage business operations in an effective and efficient manner while safeguarding public assets and supporting mission objectives 	<ul style="list-style-type: none"> • Security, Infrastructure, Environmental Stewardship, and Institutional Management 	<ul style="list-style-type: none"> • Business operations • Security and emergency management • Environment, safety, and health management • Infrastructure development and site operations

OFFICE OF SCIENCE	NUCLEAR ENERGY (INL)	NNSA (details are for LLNL, FY 2011)	NNSA Strategic PEP	EERE (NREL)
Leadership				
<ul style="list-style-type: none"> • Contractor leadership-stewardship • (Goal 1 also includes leadership) 	<ul style="list-style-type: none"> • Quality of leadership in management and operations 	<ul style="list-style-type: none"> • Governance assures performance and creates long-term sustainable value for the institution 	<ul style="list-style-type: none"> • Contractor leadership 	<ul style="list-style-type: none"> • Enhancing leadership and creating lasting national value (included in mission goals in evaluation)

^a Categorization is the Academy's; lab sponsors use other terminology

^b START: Strategic Arms Reduction Treaty; CTBT: Comprehensive Nuclear-Test-Ban Treaty; NPR: Nuclear Posture Review

Programmatic and Leadership Performance

All of the evaluation plans address program performance and leadership, but the approach taken and the relative importance of each to the overall evaluation differ. In part, the differences stem from the differences in overall approach—broad criteria versus task-specific criteria. But, beyond that, the emphasis on various elements differs. For example, all of the evaluation plans look specifically at program outcomes with regard to the quality of the science and its contribution to scientific progress and DOE’s mission. The weight those goals carry and the extent they relate to specific programs or goals in the evaluation differ, however.

Similar differences exist with regard to assessment of leadership. Some evaluations include leadership as a separate category, others as part of mission, and others as part of operations. The weight assigned within the evaluation plans also varies. The specifics of what is evaluated also differ; for example, some focus more on operational leadership, others more on programmatic leadership, and some on the resources the contractor brings to the lab.

Operational Performance

Evaluation of operational performance was one of the main differences among the sponsors’ annual evaluation approaches. Congressional committee staff asked specifically how 3 operational areas—safety; security; and maintenance and infrastructure—were considered in the evaluations. For the most part, consideration mirrored differences in how the sponsors evaluated operations in general, as discussed below. Information on these 3 areas is summarized below and in Table 5-2.

In SC, operational performance is evaluated for 4 goals, which (as a group) receive the same weight as mission goals and for which scores are published. However, performance in operations does not significantly affect award fee unless significant problems are identified. Likewise, for EERE (NREL), 4 goals for operations are separately evaluated and weighted, but performance affects the fee only if problems are identified. SC officials explained that the safe, secure, efficient, and effective operation of the lab is an expected outcome. SC’s goal is to have labs meet expectations with regard to operations. The fee calculation is intended to deter laboratories from making large expenditures to drive marginal improvement in these areas. In both SC and EERE, each of the 3 factors—safety, security, and infrastructure—is included in 1 of 4 separate operations goals.

NNSA also evaluates specific operational criteria and those assessments directly affect the award fee. In FY 2011, evaluation of the NNSA labs’ operational performance accounted for 35% of the evaluation score.⁵¹ Individual goal scores were published, and the scores directly affected the fee awarded. NNSA guidance specifically included safety, security, and infrastructure among the factors to be considered in the operations performance category. NNSA’s new evaluation plans continue this approach. One of 5 performance outcomes involves “security, infrastructure, environmental management, and institutional management” (including safety). It accounts for 30% of LLNL’s evaluation and award fee calculation. NNSA officials said they agree with SC’s philosophy, but believe significant improvement is still needed in these areas at the NNSA labs,

⁵¹ Business and infrastructure management accounted for another 20% of the evaluation score.

so they want to directly incentivize operations. Eventually, this category in the evaluation plan may disappear.

In contrast, NE (INL) does not emphasize assessment of operations, security, safety, etc., in its evaluation plan. Their rationale mirrors SC's. Officials explained that adequate performance in operational areas, such as safety, security, and health, is expected from the contractor, and the annual evaluation does not specifically address it. As described by NE officials, the "safety, operations, and stewardship" goal is focused mostly on support of specific programs. However, DOE oversight in areas such as safety, security, and health is ongoing, and potential problems are identified and addressed. There is sufficient flexibility in the contract provisions to allow DOE to hold the contractor accountable for any significant problems that arise, through actions such as reducing fees or assessing fines. For example, in FY 2011, as a result of a safety incident at INL, the amount of award fee was reduced below that calculated based on the annual evaluation.

Table 5-2: Evaluation of Safety, Infrastructure, and Security

	Safety	Infrastructure	Security
SC^a	1 of 4 operations goals: Sustain excellence and enhance effectiveness of integrated safety, health, and environmental protection	1 of 4 operations goals: Maintaining, renewing facility and infrastructure portfolio	1 of 4 operations goals: Integrated safeguards and security management and emergency management systems (separate objectives for cyber security, physical security, and classified information)
EERE (NREL)	1 of 4 operations goals: Environment, Safety and Health (ES&H) Management (30% of operations evaluation). 1 of 3 goal objectives: Maintain a safe and healthful workplace based on identified and managed risks	1 of 4 operations goals: Infrastructure and Development and Site Operations (25% of operations evaluation). Only one objective: Maintain full availability of existing science and support infrastructure	1 of 4 operations goals: Security and emergency management (20% of operations evaluation). 2 objectives: (1) Create secure work environment based on identified and assessed security vulnerabilities and threats, and manage programs to avoid or mitigate these risks (2) Protect computer information networks and proprietary business-sensitive information
NNSA^b	NNSA guidance lists ES&H as 1 area to be assessed under operations category. LLNL included “maintain safe and environmentally sound operations in an efficient and effective manner in support of mission objectives” as 1 of 4 operations category goals, with 2 objectives.	NNSA guidance lists facilities as area to be assessed under operations category. LLNL included “provide effective and efficient facilities and infrastructure” as 1 of 4 operations category goals; measures include maintenance of facilities and infrastructure.	NNSA guidance lists safeguards and security (cyber, physical, and property) as areas to be assessed under operations category. LLNL included “Maintain secure operations in an efficient and effective manner in support of mission objectives” as 1 of 4 operations goals.
NNSA Strategic PEP	1 of 5 goals: Security, Infrastructure, Environmental Stewardship, and Institutional Management (30% of evaluation). One specified contributing factor is to deliver efficient and effective and responsive environment, safety, and health management and processes.	1 of 5 goals: Security, Infrastructure, Environmental Stewardship and Institutional Management (30% of evaluation). One specified contributing factor is to deliver efficient and effective facility and infrastructure management.	1 of 5 goals: Security, Infrastructure, Environmental Stewardship, and Institutional Management (30% of evaluation). One contributing factor is to accomplish the safeguards and security... mission... with no significant failures; another is to deliver... secure networks and information systems.
NE (INL)	A few program-specific, safety-related objectives. Generally, NE expects satisfactory performance in implementing ES&H, incorporating into program activities. Poor performance can result in reduced fee, fines, etc.	1 of 6 goals: Develop Capabilities for the Future (20% of evaluation) includes maintaining existing core capabilities and developing... capabilities (includes human capital, facilities, and equipment).	Not specifically mentioned in evaluation plan. Generally, expect satisfactory performance in implementing, incorporating security into program activities. Poor performance can result in reduced fee, fines, etc.
^a Weight for each area in overall evaluation differs for each lab. ^b Operations accounted for 35% of overall evaluation.			

TRANSITIONING TO OUTCOME-BASED EVALUATIONS

All of the lab sponsoring organizations have, in the past, assessed the labs annually against a myriad of specific task-related expectations. This approach can, and according to several officials in DOE did, lead to a focus on “checking boxes” and got in the way of efforts to focus on mission outcomes. SC moved to an outcome-based assessment several years ago. Also, currently, all but 1⁵² of the other DOE lab sponsors are considering moving to an outcome-based evaluation, using the SC approach as a model to some extent. The Panel sees this as a positive move and notes that the non-DOE FFRDCs the Academy staff benchmarked do not perform the kind of detailed annual evaluations of contractor performance that DOE’s lab sponsoring organizations perform.

The Outcome-Based Model in DOE

As discussed briefly above, the SC approach to lab evaluation focuses on expected key outcomes and does not focus on specific tasks or outputs. The core of the current system was implemented in 2006 to respond to several concerns SC officials had, including:

- lack of consistency across labs
- lack of sufficient detail on which to make award fee and contract extension decisions
- need for incentives to motivate specific contractor management behaviors

SC labs are assessed on the same 8 goals (see above Table 5-1) and the same objectives for those goals. All of the objectives are fairly broad statements of expectations. SC staff use guidance to perform the assessments, which includes:

- performance definitions for the numerical and grade scores for each of the program objectives and for the operational goals category
- “assessment elements” to be considered for each objective; for example, 2 elements for Goal 1 are the lab’s performance with respect to (1) research plans and (2) peer review
- a sample of factors to be considered for each objective; for example, some of those listed for Goal 1 include the impact of results on SC or other customer missions, delivery on proposed research plans, and significant awards or invited talks

The expectations for lab performance as set forth in the goals and objectives are evaluated against each lab’s individual workload and mission. Work authorizations, the contract, and other management documents set forth those details, and SC headquarters and site office staff monitor and evaluate the lab against those more specific requirements.

As noted above, in FY 2013, NNSA began implementing an evaluation model similar to SC’s, using a “strategic performance evaluation plan.” Officials noted that the prior system did not allow comparisons across labs and made it difficult to ensure evaluations were fair and consistent. These “strategic” evaluation plans have been incorporated into each of the M&O contracts for FY 2013.

⁵² Only EM is not considering changing its evaluation approach (for EM’s portion of the SRNL work) at this time.

Other lab sponsoring organizations also are considering moving to this more outcome-based approach. The Office of the Undersecretary for Energy has stated its intention to change the evaluation plans for NREL and INL, though work to do so had not yet begun. Both of these labs' sponsors (EERE and NE) indicated that their evaluation plans already are modeled in part on SC's approach. For example, both sponsoring organizations have created categories of objectives, assigned weights to them, and provided definitions for scores and grades beyond those included in the Federal Acquisition Regulation (FAR). However, as noted earlier, both also still base evaluations primarily on many very output-specific task assessments. SRNL's evaluation plan includes goals and objectives from NNSA and EM; the NNSA part of the plan for FY 2013 uses the NNSA-wide strategic evaluation plan; the EM section continues EM's traditional task-specific approach.⁵³

Transition Challenges

The outcome-based approach maintains subjectivity in DOE's lab assessments and mirrors the less transactional, more performance-based management DOE has been trying to implement and the Panel believes is appropriate for lab management. It focuses on the most important things—mission and quality of work—and less on specific task completion. SC officials noted, however, that moving to this approach required a major culture shift within SC and that it has taken several years to be fully effective.

SC site office, program office, and lab officials Academy staff spoke to were satisfied with the system, saw it as fair, and said they clearly understood SC priorities. But several lab officials cautioned that effective implementation requires open communication between the lab and DOE. Comments from lab officials indicated that while some program offices communicated very effectively, others did not. Consequently, although the labs had a good idea of what was expected, there were times when the evaluations were somewhat of a surprise or were not, lab officials thought, clearly explained to them. Academy staff did not delve deeper into these concerns, which could be, for example, the result of poor communication on both sides or could really represent a disagreement on the evaluation given. But such concerns, articulated for a mature system, demonstrate the need for caution in implementing this highly subjective evaluation approach.

Several factors are critical to the effectiveness of this approach. First, as suggested above, there must be trust and effective, ongoing communication between the sponsoring organizations and the labs. Otherwise, labs will not know how DOE is interpreting their performance against the general criteria and may not understand sponsor priorities.

⁵³ SRNL does not have a separate evaluation plan; instead SRNL performance expectations are co-mingled in the plan with the contractor's other responsibilities, and there are 2 parts to the evaluation plan, 1 for EM and 1 for NNSA. Officials at the Savannah River Site had not yet assessed what impact, if any, using this new approach only for NNSA's portion of the overall Savannah River Site evaluation would have on their overall evaluation process.

Secondly, there must be a process by which the sponsor works to ensure that the general criteria are being consistently and fairly interpreted across the labs and programs. The SC evaluation process includes 2 meetings at headquarters—1 involving all of the program heads and 1 for all of the site office managers—to help ensure consistency by comparing all the labs’ scores and the rationale behind them. The goal is to clearly articulate differences in grades and ensure guidance is consistently interpreted. Officials noted that after several years, the extent to which those meetings identify inconsistent evaluations has been reduced significantly as SC staff became more familiar with, and confident in, the criteria and the system.

NNSA and the other lab sponsors may face additional challenges. Their labs do more applied work—compared to SC labs’ more basic science—which often requires identifying more specific outputs, meeting milestones, and producing deliverables. Both DOE and lab officials are used to focusing on these specifics, which will still be important, and they may have a more difficult time assessing progress on the higher level goals of the strategic evaluation plans. Additionally, NNSA is implementing this new evaluation approach as part of an overall change in governance; more change means more potential problems. Likewise, EERE is in the midst of revising its office-wide management practices and also may face the added challenges presented by implementing multiple changes. Additionally, many officials in headquarters and the field noted that significant turnover in EERE headquarters program managers has hampered effective oversight and evaluation. These challenges may heighten difficulties EERE faces in implementing a new outcome-based evaluation model.

NNSA headquarters and site office officials expressed other concerns. While most officials at the labs and site offices Academy staff visited supported moving to a more streamlined evaluation, some expressed concerns about the almost totally subjective nature of the new evaluation, as well as concern that the importance of operational factors seem to be reduced, limited to only 1 of the 5 major performance objectives. And 1 NNSA official noted the potential difficulty of justifying the relatively large (compared to SC) NNSA lab award fees with less detailed evaluation criteria.

NNSA officials recognized that cultural change at all levels of the organization is needed for the new approach to be effective. NNSA was developing the process and interpretive guidance necessary for the program offices, site offices, labs, and production facilities to effectively implement this new approach, but that guidance was not complete at the time of the Panel’s work. Officials planned to do a mid-year assessment using the new approach as a pilot to identify any major implementation issues and to address them before the annual evaluation process begins.

Conclusions and Recommendations

The outcome-based approach to the annual lab evaluation—moving away from a task-specific evaluation—appropriately supports the non-transactional management approach DOE is adopting. As NNSA, INL and NE move toward this more high-level, outcome-based evaluation approach, they should be aware of potential pitfalls in changing long-standing cultural mindsets. Clearly, significant effort will be needed for NNSA and the other lab sponsoring organizations to achieve cultural change and ensure that both contractors and staff are comfortable with the new

process. The lab sponsoring organizations will need to provide clear guidance and take steps to ensure consistency and fairness as the transition progresses. Also, given the extent of the change being undertaken in NNSA, the challenges to achieving such significant cultural change, and the level of congressional concern about the performance of DOE labs, especially NNSA labs, these organizations would be well-served to keep key congressional stakeholders informed of the intent of the changes and progress made.

The SC and NNSA outcome-based approaches should help ensure consistency in evaluations among each sponsor's labs. However, if and when all labs evaluations are outcome-based, differences will continue to remain among the various sponsors' evaluation methods. The Panel does not believe these differences will significantly impede DOE's efforts to use the labs as an integrated national asset and, to the extent that the evaluations more fully address each lab's contribution to DOE's mission, they should further those efforts.

The Panel recommends that DOE encourage all lab sponsoring organizations to adopt the more outcome-based evaluation approach to better reinforce efforts to move away from transactional oversight; help ensure that labs are evaluated on work that is most important to DOE's mission and to national priorities; and attain more consistent evaluations. DOE should ensure that NNSA and other lab sponsoring organizations 1) issue clear guidance to define and interpret the new, subjective, outcome-based evaluation criteria, and 2) take meaningful actions to accomplish the cultural change needed to effectively transition to this new approach. The Panel also recommends that NNSA keep key congressional stakeholders updated on the progress and success of its new strategic evaluation process, and that the other sponsoring organizations do the same once they begin making similar transitions.

EVALUATION SCOPE DOES NOT INCLUDE ALL LAB RESPONSIBILITIES

Some DOE labs perform a significant amount of work for non-sponsor DOE programs and other agencies. These non-sponsor efforts are not treated equally in the lab evaluation processes.

Weighting Priorities in Outcome-Based Evaluations

As noted above, SC modified its evaluation plans to include a limited number of lab-unique metrics. Officials said this was, in part, at the request of the labs who wanted more concrete guidance. Since 2010, SC has been including "notable outcomes" unique to each lab for some or all of the objectives in the evaluation. They can be fairly specific, for example, "[e]nsure the successful implementation of the Laboratory Compensation System action plan milestones by the mutually agreed upon date;" or fairly broad, for example, "[d]emonstrate progress in broadening the customer base in areas of strategic importance to the lab." According to the SC guidance, "[n]otable outcomes are intended to focus the laboratory leadership team on the specific items that the members of the SC leadership team believe are the most important initiatives and/or highest risk issues the laboratory must address in the coming year." These notable outcomes are evaluated on a pass/fail basis. For 2012, the highest number of notable

outcomes for an individual SC lab was 18, covering all 8 goals; the lowest was 6, covering 5 of the 8 goals.

The new NNSA strategic evaluation process also includes a limited number of site-specific outcomes to identify NNSA priorities for each lab. The FY 2013 evaluation plans include 34 site-specific outcomes across the 3 NNSA labs.

At the SC labs the Academy staff visited, officials understood that the notable outcomes were important. Often, when asked what milestones they were held accountable for, they pointed to the notable outcomes. However, they also emphasized that notable outcomes did not represent all the labs' priorities, and that just because something wasn't specifically in the evaluation plan didn't mean it wasn't important.

Both SC and NNSA have established policies that are intended to hold labs accountable for not meeting the priorities expressed as notable or site-specific outcomes. In SC, achieving a notable outcome is the minimum needed to "meet expectations." If a lab fails to meet an SC notable outcome for any given objective, it cannot "meet expectations" for that objective. The impact of this requirement is lessened, however, where multiple programs have notable outcomes for any given objective. In that case, it is only the evaluation score for the specific program that is lowered. So, if the lab meets the outcomes for other programs, and if those programs have combined higher weights attached to the objective, the lab can still achieve a "meets expectations" or better. SC officials believe this policy appropriately recognizes that labs perform work for many customers, and poor performance in one area should not necessarily result in an overall poor evaluation, and reduced fee, if work in other areas meets or exceeds expectations.

NNSA has established a similar practice in its strategic evaluation. If an NNSA lab fails to achieve a site-specific outcome, the lab cannot receive an "excellent" rating for that objective, effectively limiting the portion of at-risk fee awarded for that objective to a maximum of 90%.

Evaluations Do Not Fully Assess the Entire Lab Portfolio

As discussed in Chapter 2, the labs conduct a significant amount of work for programs and agencies other than their sponsors. DOE lab sponsoring organizations have procedures, formal or informal, to obtain assessment input from other DOE offices that fund the labs, but not always for non-DOE funders.

SC has developed an electronic system and database into which both SC and other DOE lab funders input evaluation information against the SC-specified evaluation goals and objectives. Each office that funds significant levels⁵⁴ of work in a lab weights the goals and objectives in accordance with their individual priorities. Their input is then weighted through a formula that takes into account the ratio of each office's funding to the lab's total funding as well as each

⁵⁴ SC evaluation guidance states that: "Any customer whose cost is equal to or greater than 1% of the laboratory's operating cost, or \$5 million, whichever is higher, should be considered for inclusion in the [performance evaluation plan]. These numbers are provided as general guidelines. The [site office manager] should also consider the overall importance/impact of a particular program/project to the laboratory and/or DOE's mission...."

office's relative weight for each goal. Final ratings are calculated based on these multiple inputs and weights, and all of the individual program narrative explanations for the scores given are included in the final evaluation report. EERE also has an electronic system and database used by program offices to input lab evaluations and to weight multiple program inputs by funding ratios to develop combined lab scores. This system was not used, however, in FY 2012, although officials said multiple program inputs were weighted according to funding ratios.

For NNSA and the other lab sponsors, the program office and/or site office staff responsible for assessing the quality and impact of the lab's work reach out to other DOE funders informally to obtain evaluation input. The various individual program inputs are weighted subjectively in developing the overall evaluation.

The Panel notes 2 areas in which non-sponsor work could be more fully evaluated. First, SC does not allow non-SC work to be included as a notable outcome. Officials at 2 labs Academy staff visited thought it would be appropriate to have a non-SC notable outcome because of the significance of that work to the labs' overall portfolios and missions. SC officials explained that, at least in part, this policy stems from congressional concerns that labs should focus on their primary mission, as well as SC officials' intention to make clear to labs that although they can do other work, their primary responsibility is DOE work, and especially SC work. Officials were concerned that setting notable outcomes for non-SC programs at SC labs could create the perception that the labs were inappropriately emphasizing non-SC work.

In contrast to SC's policy, NNSA allows site-specific outcomes related to non-NNSA work. In FY 2013, for example, 1 of the 11 site-specific outcomes for the Sandia National Lab related to meeting the delivery schedule for an Air Force project. Also, the evaluations for both NREL and INL—which list significant numbers of specific tasks under a limited number of objectives and establish priorities by weighting the objectives—include other DOE work in ways that establish their priority within the evaluation. In the NREL FY 2012 evaluation plan, for example, other DOE sponsors—in this case various SC program offices—are listed as points of contact for 9 of 11 targets set for one of the objectives related to advancing science and technology. That objective accounts for one-third of the overall programmatic part of the evaluation. Similarly, in the FY 2011 INL evaluation plan, meeting “other-DOE” milestones accounted for 7% of the overall evaluation rating.

The Panel also notes that the evaluations do not consistently include assessment input from the non-DOE lab funders. This is questionable given the significant and increasing level of work for others at some DOE labs. SC officials said they do not routinely seek out evaluation input from non-DOE lab funders.⁵⁵ Likewise, NNSA policies do not require obtaining evaluation input from non-DOE funders. However, officials at 1 NNSA lab said they were developing a customer survey to use with non-DOE customers; officials at another NNSA lab said they do reach out to non-DOE customers. Although some officials in other sponsoring agencies also said they informally reach out to non-DOE customers, officials from SC, NNSA, NE, and EERE said

⁵⁵ SC does obtain input from Department of Homeland Security (DHS) lab funders because DHS is given special status with regard to DOE labs by the Homeland Security Act of 2002 (6 U.S.C 189). SC also obtains input from the Nuclear Regulatory Commission in preparing the evaluations of Oak Ridge National Laboratory (ORNL), because the Commission funds major work at that lab.

that these non-DOE customers can “speak with their feet,” that is, they can choose not to come back to a particular lab for work if they are not satisfied with the quality or cost of the lab’s efforts. Academy staff did not determine the extent to which this is true, but the Panel is not sure how to balance the expectation that FFRDCs offer unique capabilities—in which case other agencies would be limited in options—with the increasingly overlapping capabilities of labs, which may, indeed, allow agencies to find other labs to do their work.

Non-DOE FFRDCs Use Significantly Different Assessment Models

The non-DOE FFRDCs benchmarked are not subject to the kind of comprehensive annual lab evaluations that DOE does. The non-DOE FFRDC sponsors generally request lab project funders to assess the quality of the work at the completion of each project. These project assessments are obtained from all work sponsors, not only those from the sponsoring organization. In addition, some of the sponsors with multiple labs conduct an annual survey of major customers to obtain more general assessments of the labs’ performance. For example, the DoD sponsors for Lincoln Labs and the National Defense Research Institute ask each major customer to provide a scalar rating of performance on a number of specific areas related to the FFRDCs’ work. Topics include how well the customer’s need was met, technical quality, timeliness, and whether the lab brought expertise and a fresh perspective to the issues addressed.

Annual assessment of overall lab performance is much more informal for non-DOE FFRDCs. No comprehensive written evaluation is prepared and no overall, or summary, score is given. There is limited or no guidance on evaluation standards or criteria. Instead, the individual project assessments, sometimes supplemented with more general customer surveys, provide sponsors with an overall view of performance. The information is used at annual or semi-annual meetings of the FFRDC oversight boards, discussed in Chapter 4, to review and evaluate overall performance and approve new FFRDC proposed long-range research and development plans.

The non-DOE FFRDC lab sponsors do not formally assess operational performance annually.⁵⁶ Instead, a FFRDC’s programmatic and operational performance, along with a broader view of its contribution to sponsor mission, generally are assessed once every 5 years to support the renewal of the 5-year sponsoring agreement.

Conclusions and Recommendations

As discussed in Chapter 2, the Panel strongly urges DOE to take steps to look more strategically and globally at the lab complex. DOE should be assessing how the national labs meet the needs of the Nation, not just DOE or the major program offices that “own” the labs. All the work done in a lab should be included in the annual lab evaluation plan. Also, the level of significance should reflect the priority of the work in the lab, including its value to DOE mission and national goals. Priorities related to non-sponsor lab funders—both other DOE offices and non-DOE agencies—should be included in the evaluation plans if they are, indeed, lab priorities and are not inconsistent with DOE and national priorities.

⁵⁶ The Frederick National Cancer Research Lab is the exception. The site office and lab both have staff that perform operational reviews. As discussed in earlier chapters, this FFRDC is operated under a somewhat different structure than the other FFRDCs the Academy benchmarked.

Finally, all programs and agencies that have significant work at a lab should have input into the lab's evaluation. Obtaining input from non-DOE agencies may require some negotiation and cooperation at the department levels. One way to more easily facilitate input might be to use the non-DOE FFRDC model and, rather than seek overall end-of-year evaluations, seek limited project-specific input from these non-DOE agencies. In any case, relying on "after the fact" actions by dissatisfied customers to take future work elsewhere offers limited usefulness as an evaluation tool, and is especially questionable as an evaluation approach where a significant portion of a lab's work is done for these non-DOE agencies.

The Panel recommends that:

- **DOE include priorities in lab evaluation plans for work performed for non-sponsoring organizations (both other DOE programs and other agencies) if that work is a lab priority and consistent with DOE and national priorities**
- **priorities set in the evaluation plans (e.g., notable outcomes in SC and site-specific outcomes in NNSA) be treated as DOE and lab priorities, not just individual program office priorities. Failure to meet any one notable outcome for an objective should negatively impact the evaluation score and fee calculation.**
- **non-DOE agencies that fund significant work at a lab have input into the evaluation of the lab's performance**

EVALUATIONS HELP HOLD LABS ACCOUNTABLE FOR THEIR PERFORMANCE

The annual lab evaluations play an important role in motivating the labs' performance and in holding them accountable for that performance. The evaluations are not, however, the only motivational or accountability mechanism. And, in some cases, the lab sponsoring organizations' approaches to accountability could be improved.

Evaluations Are a Key Factor in Accountability

Those the Academy staff talked to throughout DOE and the labs identified many important uses for the evaluations. Most broadly, the evaluations foster communication and feedback to help ensure lab activities meet DOE needs. Beyond communications, DOE uses the annual lab evaluations to hold labs accountable for their performance in 3 key ways:

- The evaluation results are publicized. There was near unanimous agreement that pride in performance and accomplishment—a desire to maintain the lab's reputation—is the major motivator of the scientists and others working in the labs and that they care very much about those scores. Local area papers report the scores and labs monitor scores of other labs, always striving to be the best.
- In many of the labs, the evaluation results are used to determine eligibility for award term (1- to 3-year contract extensions for up to 15 additional years). Again, there was agreement that these contract extensions are important to everyone because they ensure stability in management, which in turn contributes to things like employee morale and

success in recruitment. Labs have been denied award term for failing to meet necessary performance criteria.

- Evaluation results also are the primary determinant of the award fee paid to the contractor each year. However, the annual performance evaluations are not the only criteria on which fees are based. Through other provisions in the contract, performance in matters not directly assessed in the evaluation can impact fee or otherwise penalize or reward the contractor. And as discussed below, the fee, while important, is not seen as a major motivator, and consequently, it has a limited role in accountability.

There are other motivational and accountability factors beyond the annual evaluations. Most of those the Academy staff spoke to cited a role for competition in holding labs accountable. When labs compete among themselves for work, they are motivated to maintain high standards, and they recognize that poor performance can reduce the likelihood of attaining more work through competition.

Award Fee Is Not a Major Factor in Accountability

Interviews with lab personnel and DOE staff call into question the importance of award (at-risk) fee as a factor in driving lab performance or in holding the labs accountable for performance. The managing entities for the laboratories and their parent companies do take fee seriously. However, most of the lab officials interviewed by Academy staff said that award fees were not the most important incentive.

The managing contractors and their parent companies that run the NNSA labs are “for-profit” companies and, consequently, do care about the amount of award fee they receive. Beyond that, officials at all of the labs consider some element of fee essential to pay lab officials’ bonuses and to fund additional lab directed research, pay increases, and other costs. Some lab directors and officials also are concerned about fees because the percentage of award fee earned represents the score the lab receives; everyone knows what 94% or 85% of fee means. And at least 1 parent company associated with multiple labs uses the award fee to assess the official responsible for the parent company’s oversight of the lab contractors.

However, the award fee, as currently administered in DOE contracts, appears to the Panel to have little impact in accountability or motivation in most cases. In all cases, the available award fee is small relative to the total lab budget. Further, in practice, as demonstrated in Table 5-3 for FY 2011, which is typical for most years, all labs get most of their award fee, and only a small portion appears to be really “at risk.”

**Table 5-3: DOE Available Fee and Awarded Fee
(FY 2011 Data for Labs Visited)**

Site	Available Fee	Awarded Fee (millions)	Portion of Fee Awarded
Argonne	\$5.3	\$5.0	94%
Berkeley	\$4.5	\$4.2	94%
Fermi	\$3.9	\$3.6	94%
INL	\$18.7	\$17.4	94.3%/92.6% ^a
Lawrence Livermore	\$29.8	\$26.3	88%
NREL	7.8	\$7.2	93%
Oak Ridge	\$11.2	\$10.5	94%
Sandia	\$9.9	\$8.5	85%

^a The fee calculated against the evaluation criteria was 94.3% of the total available award fee; because of a safety incident, the fee was reduced to 92.6%.

The relatively small size of the available award fee; the expectation that most of it will always be awarded (absent a major performance breakdown); and the fact that the labs generally place more importance on published scores, contract extensions, and obtaining more ongoing work, render the award fee a relatively weak factor in accountability and motivation.

However, “relative” is an important term in this context. Even a small percentage of the overall contract can be significant if the contract itself is large and, as can be seen in the table above, some labs are eligible for and receive fairly significant award fees. The extent that these fees do motivate the contractors raises concerns. The Panel, as well as many in DOE and at the labs, believes it is inadvisable to allow fees to in any way motivate the important national security decisions and actions for which the contractors are responsible. Establishing a reasonable fixed fee can eliminate fee as a possible motivator but still provide an element of needed profit to promote investment in the labs and an element of protection against exposure to litigation and other risks faced by lab M&O contractors. The amount of these fixed fees should vary by laboratory. For example, under Department of Energy Acquisition Regulation provisions, for-profit contractors face greater exposure to litigation than nonprofits. This and other factors may lead to the establishment of a larger fixed fee than would otherwise be the case.

Eliminating award fee and replacing it with a combination of a nominal fixed fee and award term incentive would:

- retain the benefits of providing a fee component to fund expenses that otherwise would not be reimbursable under the contracts
- save some costs by establishing fixed fees that would generally be less than the award fees or combination of award and fixed fees available under the current system
- allow for simplification of current performance evaluations by eliminating the fee allocation and calculation components
- emphasize those factors that are true motivators of performance
- establish the award term incentive as the key mechanism to hold the contractors accountable for meeting key mission and operational objectives

However, these benefits may not be immediately available. DOE will face issues of timing as well as possible resistance to the change, such as:

- the need to modify existing contracts that in many cases provide for no fixed fee and/or have provisions for earning award fee
- the need to await a re-competition to provide award terms for labs that do not currently have those provisions in their contracts
- possible resistance among contractors who perceive the combination of changes as resulting in less incentive for performing the work
- resistance among DOE staff, some of whom may continue to believe that award fee represents a significant incentive

Non-DOE FFRDCs' Contracts Do Not Include Award Fees

Most of the non-DOE FFRDC contracts do not include provisions for award fees, but instead are cost plus fixed fee contracts. Sponsors of these labs rely on the lab contractors' concern about maintaining their reputation, desire for contract renewal, and success in competing for work as key factors holding the contractors accountable and motivating them to achieve high levels of performance.

Like the DOE lab officials, the non-DOE FFRDC officials indicated that award fees are not a significant motivator of lab performance. One of these labs—Lincoln Labs—receives no fees. Another, the Jet Propulsion Laboratory, and its sponsoring agency NASA, agreed to stop using award fee because they believed the evaluation process to support the fee award was not worth the effort. Some DOE lab and site office staff also suggested that the evaluations were too time and resource intensive, though other labs and site offices did not believe the evaluations were inappropriately costly.

The non-DOE FFRDC contractors use the fixed fees in the contracts the way most DOE labs use their award fees, to pay lab officials' bonuses and to fund additional lab directed research, pay increases, and other costs.

Conclusions and Recommendations

Award term provisions motivate lab performance. Continuing their use, or adding them to contracts that have not included them in the past, provides for a sound, performance-based approach for ensuring continuity of performance by well-performing lab contractors. Controls should be established to ensure that the provisions do not preclude re-competition of the contract within reasonable timeframes. Conventional contracts, under the Federal Acquisition Regulation, have a maximum performance period of 5 years. Allowing award term provisions to possibly extend performance for an additional 10 years provides a reasonable balance between ensuring a long-term relationship with a well-performing M&O contractor and the need to reevaluate and re-compete the scope of the contract and consider a competitive marketplace that may well have changed in 15 years.

The Panel believes that award fees are inappropriate for lab contracts. Interviews with DOE lab officials and DOE staff have established that award fees are not major drivers of laboratory performance. In addition, the relatively small amount of “at-risk” fee and the historical likelihood that most of that fee will be awarded further reduce the value of the award fee as a motivating influence on performance and a mechanism for accountability.

The Panel recommends that DOE move to a system for the national labs that uses cost plus a nominal fixed fee M&O contracts with a 5-year base period and award term provisions. DOE also should establish strict justification requirements for any new contract that would provide more than 10 years of award term availability.

The Panel recognizes that moving from award fee to fixed fee contracts poses some challenges. The Panel encourages sponsoring organizations, when establishing the fixed fee amounts, to carefully analyze the financial risks and other liabilities the contractor assumes under the contract and DOE’s ability to attract qualified contractors, organizations, and institutions.⁵⁷ The Panel believes that a phased-in approach should allow DOE to examine all relevant issues such as those listed earlier. For example, if existing contracts are within 2 years of being re-competed, modification of the existing contract may not be worth the effort. Likewise, contracts without award terms should not be modified because the recommended combination of fixed fee and award term cannot be available until there is a re-competition. The application of sound change management principles should mitigate the organizational cultural resistance to the new approach.

PERFORMANCE ON MAJOR CONSTRUCTION PROJECTS OR PROGRAMS IS NOT TRANSPARENT IN EVALUATIONS

A major concern of congressional staff mandating this study was that poor performance on major construction or programs had not resulted in appropriate reductions in DOE fee determinations. Academy staff interviews and data collected revealed that many of the projects raising concerns were not laboratory efforts, but those of other DOE contractors. However, an examination of how such major efforts are treated in lab evaluations shows variations in how these projects are addressed, and that the subjective nature of the evaluations can obscure the impact poor performance on any one project has on a lab’s overall evaluation and the fee determination.

One of 3 science and technology (program/mission) goals in the SC evaluation addresses the efficient and effective design, fabrication, construction, and operation of research facilities. In accordance with SC evaluation policy, each program with an interest in these aspects of a research facility at a lab has input into the evaluation of this goal. SC weights programs’ input based on relative funding level and importance associated with this goal for each program. Another of the 3 goals in the program/mission category addresses program performance in much the same way. The evaluation plan does not identify specific projects or programs—unless they are designated as a notable outcome—and does not associate them with any specific amount of award fee. SC officials believe this method appropriately weights major projects and programs

⁵⁷ See also Department of Energy Acquisition Regulation Part 970, 1504 1-3, Special Considerations: Laboratory Management and Operation for factors to be considered in determining the appropriateness of fee for laboratory contracts.

for purposes of evaluation and fee determination. They note that poor performance in one project or program should not overshadow a lab's overall performance if, in fact, that project or program is outweighed in importance by other efforts. With regard to projects, they also point to SC's success in bringing construction projects in on time and on budget as evidence that their evaluation approach is sound.

In NNSA evaluations prior to FY 2013, some major individual projects and programs were identified in the evaluation plans and, in some cases, a specific maximum available award fee was associated with them. For example, the Academy staff determined that evaluation scores and fees for 2 of the programs about which the Committee was concerned were lowered based on NNSA's subjective evaluation of the lab's performance. Whether the reductions adequately reflected the level of performance can be debated.

In NNSA's new evaluation process, one contributing factor for Performance Objective 4—Security, Infrastructure, Environmental Stewardship, and Institutional Management—is “Line item construction projects will be accomplished in accordance with the budget profile, scope, cost, schedule and risk negotiated with the program sponsors or partners, achieving the expected level of quality.” None of NNSA's 3 labs have site-specific outcomes related to major construction in the FY 2013 evaluation.

For the last few years, EERE has included a separate goal related to construction in NREL's evaluation plan. It reads: “[Contractor] acquires new, compelling science and technology infrastructure assets and completes all construction projects in accordance with approved cost, scope, and schedule baselines.” EERE officials told Academy staff that the factor has been included because of significant construction activity at the lab, and that they probably will no longer include this goal when the construction is completed. They reported that NREL had an excellent record in managing those projects.

NE's FY 2012 evaluation plan for INL contains a number of major projects with construction-related milestones under Goal 3, “Develop Capabilities for the Future.” Although EM's FY 2012 PEMP for Savannah River includes a number of major projects, none of them relate to SRNL, which is only a part of the M&O contractor's site responsibilities.

All of the evaluations are highly subjective; even those with specific objective criteria have significant subjective components, and the move to the outcome-based evaluations increases the subjectivity of the assessments. Each evaluation considers many efforts. The SC approach to weighting program input may sufficiently ensure that performance on major projects and programs impacts the final score (and fee if there is an award fee). However, unless it is designated as a notable outcome, the performance assessment of a given project/program and its impact, if any, on the final evaluation are not transparent. Additionally, even if there is poor performance on a project or program designated as a notable outcome for an objective, if there are other notable outcomes for that same objective that are successfully met, those scores may offset the failure in the final evaluation score.

Policies for the new NNSA strategic evaluation are still being developed. It is not clear how individual projects/programs will be weighted against other lab efforts or, where appropriate,

how different program interests will be considered. The impact of failing to achieve a site-specific outcome, should major projects/programs be so designated, may not be major, however. If an outcome is not met, the only impact is that the score awarded for the objective can be no higher than “very good” (next to top rating on the 5-point scale), for which as much as 90% of the award fee allocated to that objective can be awarded. The other lab sponsoring organizations have not yet begun to revise their evaluation systems; therefore, the Panel cannot know how major projects and programs will be addressed.⁵⁸

Conclusions and Recommendations

Although major construction projects and major program efforts are assessed during the course of DOE evaluations of lab performance, the manner in which they are included and the subjective nature of the evaluations obscure the impact of success or failure on final evaluation ratings and fees. The Panel believes that these projects and programs should have greater transparency in the evaluations.

The Panel recommends that DOE require that major construction projects and highly important programs be assessed under stand-alone evaluation factors with predetermined measures, clearly weighted in the evaluation, that cannot be offset by performance in other areas.

SUMMARY

The Academy was asked to examine 3 aspects of DOE’s annual lab evaluations:

- if the performance metrics measure critical aspects of the labs’ performance
- the extent to which performance data are used to hold labs accountable for performance
- whether metrics are applied in a consistent manner across labs

With only one exception, all of the lab evaluations cover the main categories of performance: mission, operations, and leadership, which are the appropriate areas to assess the labs’ M&O contracts. Differences are the result of decisions by lab sponsors in terms of focus and emphasis.

The evaluations play an important role in motivating and holding the labs accountable for their performance. For a variety of reasons, however, the performance-based fee, which is primarily based on the evaluations, does not seem to be a significant accountability factor. And all of the contracts include provisions beyond the evaluations through which labs can be held accountable, especially in cases of poor performance.

There are significant inconsistencies among the DOE lab sponsors’ approaches to lab evaluations. However, most of the sponsors have moved, or intend to move, away from task-oriented evaluations and, instead, use outcome-based assessments. The Panel sees this as an

⁵⁸Similarly, in SC, up to 90% of at-risk fee also can be awarded for scores below “meets expectations.” The scores are applied at the performance category level, not at the objective or goal level.

important step in support of a new management model for DOE, one that focuses on achieving DOE missions and relies less on transactional oversight.

NNSA and the other lab sponsoring organizations will need to move carefully, however, and keep a close eye on implementation of what is a significantly different evaluation model. But once the model is successfully implemented, the increased consistency in approach and the increased focus on lab contributions to DOE mission should better support DOE's ability to view and manage the lab complex as a national asset.

CHAPTER 6: FINAL THOUGHTS

For almost a decade, DOE's management and oversight of the national labs has been in transition. As performance-based contracts have been put in place and the labs have developed Contractor Assurance Systems (CASs), DOE's lab sponsoring organizations have been moving away from transaction-based oversight and evaluation to a management approach that focuses on outcomes and mission achievement. As expected, however, some offices within the Department are further along in the process than others.

The Panel strongly supports DOE's efforts to adopt performance-based management practices for the labs and has offered recommendations to strengthen DOE's transition to this operating model. But it also wants to emphasize the importance of the change process itself and the challenges it presents. If DOE is to successfully transition to a CAS-based oversight model and a more outcome-based evaluation approach, DOE staff in both headquarters and the site offices must change the way they conduct business. They must step back from overseeing and evaluating the labs at the transaction level and embrace a systems approach to managing the labs, including looking beyond just DOE's utilization of the laboratory complex to how the labs can best serve the Nation. The benchmarking of non-DOE FFRDC's has reinforced and strengthened the Panel's conclusions in this regard.

These changes in roles and responsibilities have to be clearly defined. But for a culture change of this magnitude, it is not enough to merely issue new directives or standard operating procedures or to convene a few meetings. To achieve the necessary changes in attitudes that are critical to transforming behaviors and fully implementing this new operating model, DOE leadership must find ways to involve the staff in their planning and implementation. The political leadership and career leadership must work together to develop and train the rest of the organization. Such change will only succeed when actively led by the most senior executives in the Department. The Panel believes that it is essential that the Deputy Secretary, as DOE's Chief Operating Officer (COO), fulfill this role. The Panel recognizes that the Deputy Secretary already has a very full agenda. But as the COO, a critical responsibility is the internal operations of the Department. The Panel believes that few things are more important to the Department's successful mission achievement than its national laboratories. Implementing an outcome-based, complex-wide management model to oversee and evaluate the labs should be the Deputy Secretary's highest priority.

Finally, to properly manage the laboratory complex, the Department must continually reassess not only how it uses the labs, but how this national asset can best serve the Nation. To do so, the Panel believes that it is critical that the Secretary benefit from the insights of external experts about the strategic future of the labs. And once again, any changes to DOE's management of the labs resulting from an external assessment of the labs' utilization will require strong leadership from the Deputy Secretary.

ATTACHMENT 1: PANEL AND STAFF**PANEL**

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**Academy Fellow*

ATTACHMENT 2: REPORT RECOMMENDATIONS

CHAPTER 2

The Panel recommends that the Department of Energy (DOE) build upon existing efforts to integrate laboratory capabilities, such as the Office of Science's planning process, the Quadrennial Energy Review, and peer reviews, to strengthen the Department's strategic planning capabilities for the future use of its national labs.

The Panel recommends that Congress direct the Secretary of DOE to engage an external commission for 2 years to perform an assessment of the strategic future of the national labs that focuses on whether DOE is sufficiently integrating the labs' capabilities and optimizing their value to the Nation. As part of its assessment, the commission should examine the work of the Mission Executive Council and any other groups focused on multi-program/multi-agency strategic planning for the labs. The commission should advise the Secretary and provide its report to Congress, and Congress should fund the costs of the assessment. Congress should extend the life of the commission if, after 2 years, it believes that DOE has not progressed sufficiently with developing its internal planning capacity. If Congress does not take action to authorize the commission, the Secretary should initiate action to establish a presidential commission.

The Panel recommends that the commission charged with assessing the strategic future of the labs establish a subcommittee to determine DOE's current and long-term infrastructure requirements. The subcommittee also should examine the authorities available to construct/modernize national laboratory facilities using third-party financing; research the objections/concerns about using third-party financing; explore other avenues for financing the national laboratories' infrastructure requirements; and develop recommendations for the Secretary's consideration.

CHAPTER 3

The Panel recommends that DOE:

- issue written direction that requires work authorizations to conform to established performance-based concepts. The direction should be supported by templates and examples that clearly illustrate the correct approach as well as training for staff in these new approaches.
- require site contracting officers to monitor implementation of this policy and, if appropriate, withhold their approval of work authorizations that do not conform to the direction

The Panel recommends that once process improvements to DOE's work for others procedures are implemented, the Department should assess whether the changes have improved the timeframes for processing work for others requests and make further refinements to the process, as necessary.

The Panel recommends that as DOE works to improve its funds distribution system, it should consider not only the technical operation of the system, but how program offices' fund allocation processes can be modified to minimize the number of "funding buckets" and small, incremental funding allotments.

The Panel recommends that DOE:

- annually assess the impact of current competition and cost-sharing on the labs
- take steps to address the negative impacts identified by the assessment, including obtaining appropriate waivers from cost-sharing requirements

CHAPTER 4

The Panel recommends for each lab with multiple DOE major funding sponsors, that the lab sponsoring organization strengthen its planning and programmatic oversight process for that lab by formally including all major DOE funding sponsors in that process, to at least annually: 1) review the effectiveness of the lab's research and development (R&D) program activity in meeting DOE's long-term R&D needs, and 2) approve the lab's proposed long-term R&D program plan.

The Panel recommends that DOE evaluate the staffing, skill mix, and oversight practices of its offices and identify the changes required to rely primarily on Contractor Assurance Systems (CASs) and risk management practices for operational oversight of individual labs.

The Panel recommends that DOE revise its current order on CAS, as necessary, to provide explicit guidance on the requirements needed for a mature CAS; the types of information and data sharing expected to ensure sufficient transparency; the timeframe for contractors to develop and site offices to review and approve a mature CAS; and incentives for accomplishing this.

The Panel recommends that DOE designate site offices as the official contact points and coordinators of all DOE operational reviews and audits of lab operational systems and activities, and require the site offices to develop a consolidated annual plan or master review schedule for such audits and reviews.

CHAPTER 5

The Panel recommends that DOE encourage all lab sponsoring organizations to adopt the more outcome-based evaluation approach to better reinforce efforts to move away from transactional oversight; help ensure labs are evaluated on work that is most important to DOE's mission and to national priorities; and attain more consistent evaluations. DOE should ensure that the National Nuclear Security Administration (NNSA) and other lab sponsors 1) issue clear guidance to define and interpret the new, subjective, outcome-based evaluation criteria, and 2) take meaningful actions to accomplish the cultural change

needed to effectively transition to this new approach. The Panel also recommends that NNSA keep key congressional stakeholders updated on the progress and success of its new strategic evaluation process, and that the other sponsoring organizations do the same once they begin making similar transitions.

The Panel recommends that:

- DOE include priorities in lab evaluation plans for work performed for non-sponsoring organizations (both other DOE programs and other agencies) if that work is a lab priority and consistent with DOE and national priorities
- priorities set in the evaluation plans (e.g., notable outcomes in the Office of Science and site-specific outcomes in NNSA) be treated as DOE and lab priorities, not just individual program office priorities. Failure to meet any one notable outcome for an objective should negatively impact the evaluation score and fee calculation.
- non-DOE agencies that fund significant work at a lab have input into the evaluation of the lab's performance

The Panel recommends that DOE move to a system for the national labs that uses cost plus nominal fixed fee management and operating contracts with 5 year base periods and award term provisions. DOE also should establish strict justification requirements for any new contract that would provide more than 10 years of award term availability.

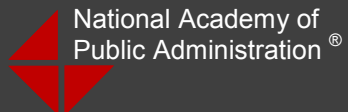
The Panel recommends that DOE require that major construction projects and highly important programs be assessed under stand-alone evaluation factors with predetermined measures that are clearly weighted in the evaluation and cannot be offset by performance in other areas.

COVER IMAGE CREDITS

Image is of the Saturn Accelerator, Sandia National Laboratories (Photo credit: Randy Montoya, Sandia National Laboratories)

Description: The Saturn accelerator is a modular, high-power, variable-spectrum, x-ray simulation source. Saturn is used to simulate the radiation effects of nuclear countermeasures on electronic and material components, as a pulsed-power and radiation source, and as a diagnostic test bed.

Source: “Pulsed Power Facilities: Saturn Accelerator,” Sandia National Laboratories. 2010 Sandia Corporation <<http://www.sandia.gov/pulsedpower/facilities/saturn.html>>



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