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United States Government Accountability Office  
Washington, DC 20548

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January 10, 2008

The Honorable Peter J. Visclosky  
Chairman  
The Honorable David L. Hobson  
Ranking Member  
Subcommittee on Energy and Water Development  
Committee on Appropriations  
House of Representatives

Subject: *Los Alamos National Laboratory: Information on Security of Classified Data, Nuclear Material Controls, Nuclear and Worker Safety, and Project Management Weaknesses*

The Los Alamos National Laboratory (LANL),<sup>1</sup> which is operated by the National Nuclear Security Administration (NNSA),<sup>2</sup> is responsible for, among other things, designing nuclear weapons. Over the past decade, we have documented numerous security, safety, and project management weaknesses at NNSA's nuclear weapons complex, including LANL. In particular, LANL has experienced a series of high-profile security incidents that have drawn attention to the laboratory's inability to account for and control classified information and maintain a safe work environment.

In July 2004, LANL's director declared a suspension—or stand-down—of laboratory operations to address immediate concerns, including the loss of classified computer disks. During the stand-down, laboratory teams identified more than 3,400 security and safety issues.

As a result of systemic management concerns, and the fact that the laboratory contractor—the University of California—did not adequately address these problems,

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<sup>1</sup>The laboratory operates and manages numerous nuclear facilities and operations. Critical activities include plutonium, uranium, and tritium processing; research and development operations with special nuclear material; high-energy radiography; radiation measurement; packaging of nuclear materials; and radioactive and hazardous waste management. The laboratory covers 40 square miles, including 2,700 buildings covering an area of 9.4 million square feet, and employs more than 12,000 personnel. It has an annual operating budget of approximately \$2 billion.

<sup>2</sup>NNSA was established in 2000 in response to management difficulties with the Department of Energy's nuclear weapons program. These difficulties included security problems at the department's national laboratories and significant cost overruns in the management of projects. NNSA is a separately organized agency within the department with responsibility for the nation's nuclear weapons, nonproliferation, and naval reactors programs.

the Department of Energy (DOE) decided in 2003 to allow other organizations to compete for the management contract at LANL. The University of California, which had been the exclusive management and operating contractor since the 1940s, was replaced in June 2006 by Los Alamos National Security, LLC, (LANS). LANS is a consortium of contractors that includes Bechtel National, Inc.; the University of California; BWX Technologies, Inc.; and the Washington Group International, Inc.

In this context, you asked us to provide information detailing recent security, safety, and management problems at LANL. We provided your staffs with information on these issues. This report summarizes and formally transmits the information provided to your staffs (see enc. I). As requested, this report provides information on (1) security incidents that compromised or potentially compromised classified information, (2) incidents involving the loss of or failure to properly account for special nuclear material (highly enriched uranium or plutonium) and radiological material, (3) nuclear safety concerns at the laboratory, (4) safety accidents involving LANL employees or contractor personnel, and (5) project management weaknesses that may have resulted in significant cost overruns.

To document security incidents relating to classified information, we obtained and analyzed data from LANL's Office of Safeguards and Security and DOE's Incident Tracking and Analysis Capability (ITAC) database. We relied on security incident data provided by ITAC because it is DOE's primary repository for tracking security incidents. To assess the reliability of these data, we interviewed DOE security officials responsible for compiling these data and performed reasonableness checks on the data. Regarding incidents involving the loss of or failure to properly account for special nuclear or radiological material, we met with departmental program officials, analyzed data from ITAC, and obtained and analyzed reports on material control and accountability from DOE's Office of Independent Oversight and the DOE Inspector General. Regarding nuclear safety concerns, we obtained information from DOE and LANL, and interviewed Defense Nuclear Facilities Safety Board (Safety Board) representatives at Los Alamos. Regarding safety accidents, we obtained and analyzed accident investigation reports from DOE's Office of Health, Safety and Security and the Los Alamos Site Office,<sup>3</sup> including federal and contractor-led investigations from October 1, 2002, through June 30, 2007. In addition, we confirmed with DOE officials that we had obtained the complete list of accident investigations conducted during this period. To document project management weaknesses that resulted in significant cost overruns, we reviewed pertinent project information and interviewed project management officials at DOE headquarters and at Oak Ridge National Laboratory (ORNL). We also reviewed contract requirements and LANL's annual performance appraisals for fiscal years 2003 through 2006. To ensure consistency and comparability of the data, we obtained and analyzed information, to the extent possible, from October 1, 2002, through June 30, 2007. We determined that the data we obtained were sufficiently reliable for the purposes of this report. We conducted this performance audit from August 2007 through January 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence

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<sup>3</sup>The Los Alamos Site Office is responsible for administering LANL's contract, providing oversight, and managing federal activities.

to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In summary, LANL experienced 57 reported security incidents involving the compromise or potential compromise of classified information from October 1, 2002, through June 30, 2007, according to DOE's ITAC database. Thirty-seven (or 65 percent) of these reported incidents posed the most serious threat to U.S. national security interests.<sup>4</sup> Of the remaining 20 incidents, 9 involved the confirmed or suspected unauthorized disclosure of secret information, which posed a significant threat to U.S. national security interests. The remaining 11 reported security incidents involved the confirmed or suspected unauthorized disclosure of confidential information, which posed threats to DOE security interests. Examples of the most serious types of security incidents reported by DOE include the following:

- LANL could not account for nine classified removable electronic media items, including data disks, during the relocation of these items to a different on-site facility. DOE concluded that these items were likely destroyed prior to their relocation (November 2003).
- A law enforcement search of a LANL subcontractor's home in Los Alamos, New Mexico, recovered classified information in the form of a USB "thumb drive" and documents. The subcontractor, who possessed a DOE security clearance, had removed the information from a highly classified facility at the laboratory (October 2006). In response to this incident, in July 2007, enforcement actions were taken by DOE, including the issuance of (1) a preliminary notice of violation to the University of California with a proposed civil penalty in the amount of \$3 million, (2) a separate preliminary notice of violation to LANS with a proposed civil penalty in the amount of \$300,000, and (3) a Secretarial Compliance Order to LANS. The preliminary notice of violation cited both the University of California and LANS for serious violations of DOE's classified information and cyber security requirements.

In response to security weaknesses in the handling and processing of classified data, LANL officials told us they have implemented a number of measures to strengthen controls since June 2006, including the following:

- destroying an estimated 1.4 million "legacy" classified documents,

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<sup>4</sup>DOE has established four categories of security incidents on the basis of the relative severity of the incident. These categories are identified by an impact measurement index (IMI) number. IMI-1 incidents involve events that pose the most serious threats to U.S. national security interests and/or critical DOE assets, create serious security situations, or could result in deaths in the workforce or general public; IMI-2 incidents involve events that pose threats to U.S. national security interests and/or critical DOE assets or that potentially create dangerous situations; IMI-3 incidents involve events that pose threats to DOE security interests or potentially degrade the overall effectiveness of DOE's safeguards and security program; and IMI-4 incidents involve events that could pose threats to DOE by adversely affecting the ability of organizations to protect DOE safeguards and security interests.

- reducing the number of accountable electronic classified items from 87,000 to 4,472,
- reducing the number of vaults and vault-type rooms holding classified data from 142 to 114, and
- consolidating classified material and classified processing operations into a “Super Vault Type Room.”

There were no reported incidents involving the loss or diversion of special nuclear or radiological material from LANL from October 1, 2002, through June 30, 2007. However, a number of security concerns with the inventory and accounting of these materials have been documented, most recently in a DOE Inspector General report issued in September 2007.<sup>5</sup> Although the Inspector General concluded that, in general, LANL provides timely and accurate information on its inventory of accountable nuclear material,<sup>6</sup> it highlighted several areas of concern, including the following:

- Several inventories of nuclear materials were not completed in a timely manner.
- A storage vault containing over 11,000 individual containers of accountable nuclear material had not undergone a 100 percent inventory in over a decade.
- The creation of a new container of accountable nuclear material was not documented within the required time frame. This nuclear material could have been diverted without any record showing that it had ever existed.

Concerns about nuclear safety at LANL are long-standing. Problems include the following:

- Criticality concerns.<sup>7</sup> For example, since 2003, the laboratory reported 19 incidents raising nuclear criticality concerns, such as storage or transportation of dangerous material in quantities that exceeded or potentially exceeded criticality limits. In the plutonium facility (TA-55) in July 2007, for example, an area of the facility containing spent trichloroethylene exceeded the criticality safety limit for such material by 40 percent. As recently as September 2007, operations were suspended in the plutonium facility over nuclear safety concerns.

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<sup>5</sup>DOE Inspector General, *Material Control and Accountability at Los Alamos National Laboratory*, DOE/IG-0774, Sept. 2007.

<sup>6</sup>This refers to nuclear material that LANL is required to account for and control according to its strategic and monetary importance and the consequences of its loss.

<sup>7</sup>Criticality involves an inadvertent nuclear chain reaction. To prevent such an occurrence from happening, DOE’s regulations and directive require contractors to evaluate potential accident conditions and put in place appropriate controls and safety measures.

- Noncompliant safety documentation. The laboratory has been out of compliance with safety documentation requirements, which require developing and annually updating an analysis of hazards and mitigating controls. Under a new contract with LANS, which went into effect in June 2006, LANL committed to having all but one of its nuclear facilities operating under compliant safety documentation by the end of 2007. However, only 2 of the laboratories' 19 nuclear facilities are currently under compliant safety documentation as of November 2007.
- Inadequate safety systems. The Safety Board and DOE have raised concerns about the inadequacies of safety systems at the laboratory, including weak or missing drawings for important safety system, missing procedures that systems should be operating under, and failure to properly maintain these systems to ensure they will work in an emergency. The Safety Board stated it lacks confidence in the laboratory's efforts to improve the reliability of safety systems.
- Radiological exposures. Since fiscal year 2003, the laboratory has reported 21 incidents involving exposure to radiological materials, including contamination of face, hands, or other body parts from working in situations such as glove boxes; unusually high, unexplained dosage reading for workers; and unanticipated intake of contaminants, such as plutonium, from inadvertent release.
- Nuclear safety violation enforcement actions. Since fiscal year 2003, LANL has received four enforcement actions containing civil penalties totaling nearly \$2.5 million for significant violations of nuclear safety requirements. The enforcement actions include a June 2004 penalty of \$770,000 for violations that resulted in two workers being exposed to radiation doses exceeding annual allowable limits, and a February 2007 penalty of \$1.1 million for 15 separate violations of nuclear safety rules, reflecting continuing safety performance deficiencies over the past several years.

From October 1, 2002, through June 30, 2007, LANL experienced 23 reported safety accidents serious enough to warrant investigation.<sup>8</sup> Although no fatalities occurred

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<sup>8</sup>DOE categorizes safety accidents according to their severity. Type A is the most serious type of incident, involving one or more of the following: a fatality; three or more injured workers or members of the public; radiation exposure of 25 rem or more; property damage equal to or exceeding \$2.5 million. Type B is a serious incident which includes at least one of the following: one or more injured workers or members of the public; radiation exposure of greater than 10 roentgen equivalent man (rem)—the absorbed dose of radiation adjusted for the relative biological effect of the type of radiation—but less than 25 rem; or property damage of more than \$1 million but less than \$2.5 million. We included all Type A and Type B accident investigations conducted by DOE, as well as the most serious accidents investigated by LANL contractors. We included all investigations of events resulting in injury or property damage as well as those considered near misses that were serious enough to warrant an investigation. If one investigation included more than one incident, we counted each incident separately.

during this period, workers involved in these accidents were seriously injured.<sup>9</sup> Examples of safety accidents include the following:

- A package in which plutonium-238 residues had been stored since 1996 degraded and ruptured when being handled, releasing airborne plutonium. Two workers were each exposed to about one-half of DOE's annual allowable radiation dose for occupationally exposed workers (August 2003).
- A student was partially blinded after receiving a laser flash to her eye during an experiment because a LANL researcher in charge failed to ensure that the student was wearing required eye protection (July 2004).
- After opening a package of radioactive material contaminated during shipping, a LANL employee contaminated himself and his clothing. Over the next few days, the worker spread contamination to his home, to relatives' homes in Kansas and Colorado, and to other sites at LANL. The contamination went undetected for 11 days (July 2005).
- Laboratory workers were exposed to plutonium on two occasions while performing routine operations inside protective glove boxes that contained sharp tools (January 2007).

Weaknesses in project management have affected or threatened to affect project cost and schedules at LANL. NNSA and others have expressed concern for years about the adequacy of project management at the laboratory. In January 2001, when the contract for the laboratory was extended, new contract provisions stressed five key areas that needed improvement, including project management. In response, the University of California implemented DOE's new project management order and requirements and standardized formats for monthly reporting on projects. Despite these changes, LANL has continued to have project management problems. From fiscal year 2003 to fiscal year 2005, the laboratory has only achieved a "satisfactory" rating in overall project management.

Project management weaknesses at LANL have led to problems on projects.<sup>10</sup> We identified one project in particular at LANL—the Dual Axis Radiographic Hydrodynamic Test (DARHT) program—that has experienced significant cost overruns, and has been the subject of a DOE Inspector General report<sup>11</sup> and an NNSA "lessons learned" evaluation.<sup>12</sup> DARHT will be the nation's first hydrodynamic test

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<sup>9</sup>For further information on worker safety at LANL, see GAO, *Nuclear and Worker Safety: Actions Needed to Determine the Effectiveness of Safety Improvement Efforts at NNSA's Weapons Laboratories*, [GAO-08-73](#) (Washington, D.C.: Oct. 31, 2007).

<sup>10</sup>In January 2007, we reported on other NNSA-wide project management weaknesses. See GAO, *National Nuclear Security Administration: Additional Actions Needed to Improve Management of the Nation's Nuclear Programs*, [GAO-07-36](#) (Washington, D.C.: Jan. 19, 2007).

<sup>11</sup>DOE Inspector General, *Dual Axis Radiographic Hydrodynamic Test Facility*, DOE/IG-0599, May 2003.

<sup>12</sup>National Nuclear Security Administration, *DARHT Construction Project Lessons Learned Report*, March 2005.

facility capable of producing three-dimensional X-ray photographs of a nuclear weapon and is expected to play an important role in DOE's Stockpile Stewardship Program. Original plans for DARHT's construction called for the development of two single-pulse axes with similar capabilities. The original estimated cost of the project, in 1998, ranged between \$30 million and \$54 million.

The first axis was completed following the original design and has been operational for 5 years. However, with DOE approval, LANL changed the scope of the second axis, and subsequently, major problems have occurred with its design and construction. In May 2003, the DOE Inspector General reported that DARHT's budget estimates were not realistic given the project's technical complexity. Furthermore, the Inspector General reported that the project's contingency fund was insufficient and at least \$57.5 million in actual project costs had been transferred to other DOE programs or projects, which made it appear that DARHT was within budget when it was not. DOE then estimated that the costs for the Second Axis Recovery and Commissioning Project to complete the second axis totaled about \$90 million. The project is scheduled to be completed in May 2008.

Project management weaknesses at LANL also threatened schedule delays on a multilab project led by ORNL, called the Spallation Neutron Source project. LANL was responsible for two portions of this project, specifically, the linear accelerator and a low-level radio-frequency control system. Due to fabrication problems in 2002 with the linear accelerator, including leaky tubing, rework was required, and resulted in a cost impact of approximately \$8 million (which was funded through \$1.8 million in contingency and the remainder in offsets). LANL's design problems with the radio-frequency control system resulted in potential schedule delays. As a result, ORNL took over management of this project and, using a simpler design already in use at one of the other DOE laboratories, brought the project in within cost and schedule. The former ORNL Spallation Neutron Source program manager, who is now the laboratory director, told us that problems with these two projects led by LANL could have significantly delayed the overall project.

### **Agency Comments and Our Evaluation**

We requested comments on a draft of this report from LANL, DOE, and NNSA. In response, we received oral comments from LANL officials, including the Deputy Division Leader, Environment, Safety, Health and Quality; the Deputy Division Leader, Office of Safeguards and Security; the DARHT Second Axis Project Director; and the Deputy Division Leader, Technical Cyber Security. Although LANL officials generally agreed with the facts as presented in this report, they noted that the new management and operations contractor—LANS—has taken actions to improve security at the laboratory since June 2006, including reducing the number of individual classified items at the site and consolidating classified material and classified operations. We added this information to our report based on these comments. In addition, LANL officials noted our report showed that the number of security incidents that compromised or potentially compromised classified information had declined from fiscal year 2006 through June 30, 2007, thus demonstrating progress in improving the security of classified information at the site. In our view, this short period of time is not sufficient to provide a basis for meaningful trend analysis. Consequently, it is too soon to tell if this decline in

security incidents is more than temporary. LANL officials also provided technical comments, which we included as appropriate. We also received oral comments from DOE's Director, Office of Security Evaluations, and NNSA's Director, Policy and Internal Control Management. These comments were technical in nature, and we incorporated them in the report where appropriate.

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As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Secretary of Energy, the Administrator of NNSA, the Director of LANL, appropriate congressional committees, and other interested parties. We will also make copies available to others on request. In addition, this report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at 202-512-3841 or [aloisee@gao.gov](mailto:aloisee@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report include Allison B. Bawden, Carole J. Blackwell, Nancy L. Crothers, A. Donald Cowan, Janet E. Frisch, Preston S. Heard, Lisa Nicole Henson, Nancy K. Kintner-Meyer, Glen Levis, James D. Noel, and Rachael A. Schacherer.

A handwritten signature in black ink that reads "Gene Aloise". The signature is written in a cursive style with a large, looping initial "G".

Gene Aloise  
Director, Natural Resources  
and Environment

Enclosure

Enclosure I: Briefing to the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives



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**Los Alamos National Laboratory: Security of Classified Data, Nuclear Material Controls, Nuclear and Worker Safety, and Project Management Weaknesses**

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**Briefing to the  
Subcommittee on Energy and Water  
Development  
Committee on Appropriations  
U.S. House of Representatives**

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## Objectives

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Provide the following information on problems at Los Alamos National Laboratory (LANL) for October 1, 2002, through June 30, 2007:

- security incidents that compromised or potentially compromised classified information,
  - incidents involving the loss or failure to properly account for special nuclear material (highly enriched uranium or plutonium) or radiological material,
  - nuclear safety concerns at the laboratory,
  - safety accidents involving LANL employees or contractor personnel, and
  - project management weaknesses that may have resulted in significant cost overruns.
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## Scope and Methodology

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- We obtained and analyzed data on security incidents that compromised or potentially compromised classified information from LANL's Office of Safeguards and Security. In addition, we obtained data from the Department of Energy's (DOE) Incident Tracking and Analysis Capability (ITAC) database. We relied on security incident data provided by ITAC because it is DOE's primary repository for tracking security incidents. To assess the reliability of these data, we interviewed DOE security officials who were responsible for compiling these data and performed reasonableness checks of the data.
  - We met with officials from the Los Alamos Site Office, analyzed data from ITAC, and obtained and analyzed reports on special nuclear and radiological material control and accountability from DOE's Office of Independent Oversight and the DOE Inspector General.
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## Scope and Methodology

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- We obtained information on nuclear safety issues by reviewing documents from DOE and LANL. We also reviewed weekly staff reports and correspondence from the Defense Nuclear Facilities Safety Board (Safety Board) and interviewed Safety Board representatives at LANL.
  - We obtained and analyzed safety accident investigation reports from DOE's Office of Health, Safety and Security and the Los Alamos Site Office, including federal and contractor-led investigations. We also reviewed the information contained in these reports and confirmed with DOE officials that we had obtained all accident investigation reports.
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## Scope and Methodology

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- We interviewed project management officials at DOE headquarters and at the Oak Ridge National Laboratory (ORNL) and reviewed pertinent project management information. We also reviewed contract requirements and LANL's annual performance appraisals for fiscal years 2003 through 2006.
  - We did not analyze trends to determine whether the security and safety incidents were increasing or decreasing over time.
  - To ensure the consistency and comparability of the data in this report, we obtained and analyzed information, to the extent possible, from October 1, 2002, through June 30, 2007. We determined that the data were sufficiently reliable for our purposes. We conducted our review from August 2007 through January 2008, in accordance with generally accepted government auditing standards.
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## Summary

Since fiscal year 2003, LANL has experienced a number of problems:

- Fifty-seven reported security incidents involving the compromise or potential compromise of classified information, with 37 (or 65 percent) of these incidents posing the most serious threat to U.S. national security interests, according to DOE.
- Identification of a number of security concerns involving the inventory and accounting of special nuclear or radiological material.
- Nuclear safety concerns, including incidents in which criticality safety standards were exceeded, and facilities were operating without proper safety documentation.
- Twenty-three reported safety accidents serious enough to warrant investigation by DOE or the laboratory contractor.
- Significant cost overruns on at least one major project, the Dual Axis Radiographic Hydrodynamic Test (DARHT) program and continued problems in project management overall. DARHT will be the nation's first hydrodynamic test facility capable of producing three-dimensional X-ray photographs of a nuclear weapon and is expected to play an important role in DOE's Stockpile Stewardship Program.

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## Background

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- LANL is a multidisciplinary national security laboratory whose core missions are to:
    - ensure the safety, security, and reliability of the nuclear weapons stockpile, and
    - reduce the threat of weapons of mass destruction, nuclear proliferation, and terrorism worldwide.
  - LANL manages numerous nuclear facilities and operations. Activities include plutonium, uranium, and tritium processing; research and development operations with special nuclear material; high-energy radiography; radiation measurement; packaging of nuclear materials; and radioactive and hazardous waste management.
  - LANL's facilities cover over 40 square miles and include 2,700 buildings covering an area of 9.4 million square feet. LANL has more than 12,000 employees and an annual operating budget of approximately \$2 billion.
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## Background

- Over the past decade, numerous security, safety, and project management weaknesses have occurred throughout DOE's nuclear weapons complex. Among the highest-profile security incidents was the Wen Ho Lee case at LANL in 1999.
- In response to these collective problems with DOE management, in 2000, the Congress established the National Nuclear Security Administration (NNSA) as a separately organized agency within DOE and made NNSA responsible for the management and security of the nation's nuclear weapons programs.
- Subsequent to the creation of NNSA, LANL has experienced a significant number of high-profile security incidents as a result of its inability to account for and control classified information.
- LANL has also had difficulty ensuring the safety of workers, the public, and the environment.
- Although LANL has made improvements in response to identified weaknesses, numerous investigations by GAO, the DOE Inspector General, the DOE Office of Independent Oversight, and the Los Alamos Site Office have shown that the improvement efforts have not been sustained, allowing many of the weaknesses to recur.

## Background

- In July 2004, LANL's Director declared a suspension—or stand-down—of laboratory operations to address immediate security and safety concerns. All activities associated with laboratory operations were approved for full resumption in May 2005.
- The stand-down followed a decline in laboratory security and safety, including a security incident in the weeks before the stand-down in which two classified computer disks were reported missing.
- During the stand-down, laboratory teams identified more than 3,400 security and safety concerns.
- As a result of systemic management concerns, and the fact that the laboratory contractor—the University of California—did not adequately address these problems, DOE decided in 2003 to allow other organizations to compete for the management contract at LANL.
- The University of California, which had been the exclusive management and operating contractor since the 1940s, was replaced in June 2006 by Los Alamos National Security, LLC, (LANS). LANS is a consortium of contractors that includes Bechtel National, Inc.; the University of California; BWX Technologies, Inc.; and the Washington Group International, Inc.

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## **Security Incidents Compromising or Potentially Compromising Classified Information at LANL**

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According to DOE, there have been 57 reported security incidents involving the compromise or potential compromise of classified information from October 1, 2002, through June 30, 2007. Thirty-seven (or 65 percent) of these incidents posed the most serious threat to U.S. national security interests.

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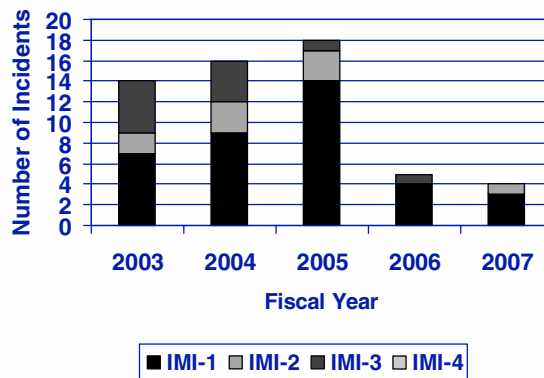
## Security Incidents Compromising or Potentially Compromising Classified Information at LANL

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- DOE ranks security incidents according to their potential to cause serious damage or to place safeguards and security interests and activities at risk.
  - DOE has established four categories of security incidents on the basis of the relative severity of the incident. These categories are identified by an impact measurement index (IMI) number.
    - **IMI-1:** Events that pose the most serious threats to U.S. national security interests and/or critical DOE assets, create serious security situations, or could result in deaths in the workforce or general public.
    - **IMI-2:** Events that pose threats to U.S. national security interests and/or critical DOE assets or that potentially create dangerous situations.
    - **IMI-3:** Events that pose threats to DOE security interests or potentially degrade the overall effectiveness of DOE's safeguards and security program.
    - **IMI-4:** Events that could pose threats to DOE by adversely affecting the ability of organizations to protect DOE safeguards and security interests.
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## Security Incidents Compromising or Potentially Compromising Classified Information at LANL

- LANL experienced 57 reported security incidents involving the compromise or potential compromise of classified information from October 1, 2002, through June 30, 2007.



Source: GAO analysis of DOE security incident data.

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## Security Incidents Compromising or Potentially Compromising Classified Information at LANL

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- Of the 57 reported security incidents, 37 (or 65 percent) involved the confirmed or suspected unauthorized disclosure of weapons data, which posed the most serious threat to U.S. national security interests (IMI-1). Of the remaining 20 reported incidents,
    - nine involved the confirmed or suspected unauthorized disclosure of secret information, which posed a significant threat to U.S. national security interests (IMI-2), and
    - eleven involved the confirmed or suspected unauthorized disclosure of confidential information, which posed a moderate threat to DOE security interests (IMI-3).
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## Security Incidents Compromising or Potentially Compromising Classified Information at LANL

- Examples of security incidents include the following:
  - Nine classified removable electronic media items were unaccounted for during the relocation of these items to a different on-site facility. DOE concluded that these items were likely destroyed prior to their relocation (November 2003).
  - LANL determined that it could not account for a single piece of classified removable electronic media. DOE determined that the item was most likely destroyed without proper disposition documentation (May 2004).
  - A law enforcement search of a LANL subcontractor's home in Los Alamos, New Mexico, recovered classified information in the form of a USB "thumb drive" and documents. The subcontractor, who possessed a DOE security clearance, removed the information from a highly classified facility at the laboratory (October 2006).

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## Security Incidents Compromising or Potentially Compromising Classified Information at LANL

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- In response to the October 2006 event, enforcement actions were taken by DOE that cited both the University of California and LANS for serious violations of DOE's classified information and cybersecurity requirements and included the issuance of:
  - a notice of violation to the University of California with a civil penalty in the amount of \$3 million (the largest civil penalty assessed by DOE since the enforcement program began in 1996);
  - a separate notice of violation to LANS with a civil penalty in the amount of \$300,000; and
  - a Secretarial Compliance Order to LANS requiring a comprehensive review of deficiencies in the laboratory's classified information security and cybersecurity programs and an integrated corrective action plan. Violation of the compliance order could result in additional civil penalties up to \$100,000 per violation per day.

## Security Incidents Compromising or Potentially Compromising Classified Information at LANL

- According to LANL officials, in response to security weaknesses involving the handling and processing of classified data, LANL has implemented a number of measures to strengthen controls. LANL officials told us that since June 2006, the laboratory has:
  - destroyed an estimated 1.4 million “legacy” classified documents;
  - reduced the number of accountable electronic classified items from 87,000 to 4,472;
  - reduced the number of vaults and vault-type rooms holding classified data from 142 to 114; and
  - consolidated classified material and classified processing operations into a “Super Vault Type Room.”

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## **Control and Accountability for Special Nuclear and Radiological Material at LANL**

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No incidents involving the loss or diversion of special nuclear or radiological material were reported from October 1, 2002, through June 30, 2007. However, a number of security concerns involving the inventory and accounting of these materials have been identified.

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## Control and Accountability for Special Nuclear and Radiological Material at LANL

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- The Materials Control and Accountability Program at LANL encompasses systems and measures to establish and track nuclear and radiological material inventories, control access, and detect the loss or diversion of these materials.
  - LANL's activities require the maintenance of inventories of Category I, II, III, and IV nuclear material.
  - Categories I and II are the most attractive to an adversary intent on theft or diversion and generally include weapon components as well as other high-grade materials containing significant quantities of plutonium and uranium.
  - Categories III and IV materials contain smaller quantities of plutonium, uranium, and other radiological materials and are considered less attractive for theft and diversion.
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## Control and Accountability for Special Nuclear and Radiological Material at LANL

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- There have been no incidents involving the loss or diversion of special nuclear or radiological material from October 1, 2002, through June 30, 2007.
- In 2006, DOE's Office of Independent Oversight inspected LANL's control and accountability of special nuclear and radiological material and concluded that LANL's program was effective.
- However, our review of DOE's Office of Independent Oversight inspection reports and Los Alamos Site Office annual survey assessments from 2000 to 2006 found that LANL has been cited for security concerns related to its material control and accountability, including:
  - inconsistent inventory and measurement oversight,
  - deficiencies in identifying incidents of security concern because they fall below the reporting threshold established in DOE directives, and
  - inadequate training and documentation.

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## Control and Accountability for Special Nuclear and Radiological Material at LANL

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- According to a Los Alamos Site Office official, concerns also exist about the adequacy of the Materials Accounting and Safeguards System (MASS) that LANL uses to account for material. MASS is
  - very old, difficult to update, and does not receive adequate funding to support needed improvements, and
  - cannot account for the movement or location of specific items within a facility.

## Control and Accountability for Special Nuclear and Radiological Material at LANL

- The DOE Inspector General concluded in its September 2007 report on LANL's Material Control and Accountability Program<sup>1</sup> that, in general, LANL provides timely and accurate information but made the following observations:
  - Since December 2005, several inventories were not completed in a timely manner because of problems performing verification measurements within specified time frames.
  - A storage vault containing over 11,000 individual containers of accountable nuclear material<sup>2</sup> had not undergone a 100 percent inventory in over a decade.
    - Although DOE does not require a 100 percent inventory, LANL officials recognize its value and plan to complete such an inventory by January 2008.

<sup>1</sup>DOE Inspector General, *Material Control and Accountability at Los Alamos National Laboratory*, DOE/IG-0774, Sept. 2007.

<sup>2</sup> This refers to nuclear material that LANL is required to account for and control according to its strategic and monetary importance and the consequence of its loss.

## Control and Accountability for Special Nuclear and Radiological Material at LANL

- Multiple items of accountable nuclear material were included in MASS as single items, contrary to LANL's accounting procedures.
- In some cases, LANL did not maintain separation of duties when shipping and receiving accountable nuclear material, which violated DOE requirements.
- In one case, the creation of a new container of accountable nuclear material was not documented within the required time frame. According to the DOE Inspector General, this nuclear material could have been diverted without any record showing that it had ever existed.
- According to LANL officials, since June 2006, LANL has consolidated its holdings of Category I special nuclear material from nine locations to one single facility.

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# Nuclear Safety Concerns

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Concerns about nuclear safety at LANL are long-standing. Problems include 19 occasions since 2003 where criticality safety requirements were violated, such as storing materials in quantities higher than safety limits allow, 17 of 19 of the site's nuclear facilities operating without proper safety documentation, reported inadequacies in safety systems, radiological releases, and four enforcement actions for significant violations of nuclear safety rules.

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## Nuclear Safety Concerns

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- To ensure safe operation of nuclear facilities, DOE regulations and directives require contractors to develop, maintain, and annually update documentation, called a documented safety analysis, that
    - describes the work to be performed;
    - evaluates all potential hazards and accident conditions;
    - contains appropriate controls, including technical requirements, to eliminate or minimize the risk of hazards; and
    - delineates procedures and practices for safe operations.
  - DOE regulations also require that radiation doses to workers at DOE facilities be maintained within prescribed limits.
  - Violations of nuclear safety rules are enforced through DOE's Office of Enforcement, which levies civil penalties for serious offenses.
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## Nuclear Safety Concerns

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- Independent reports have raised concerns about nuclear safety at LANL, including reports by DOE's Office of Independent Oversight and Performance Assurance and the Safety Board. Topics of concern include:
  - criticality safety (which involves an inadvertent nuclear chain reaction),
  - safety documentation, and
  - safety systems.
- In addition, DOE's Office of Enforcement has
  - raised concerns about radiological contamination and
  - issued enforcement actions.

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## Nuclear Safety Concerns

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### Criticality safety:

- In 2005 and 2006, respectively, NNSA and the Safety Board reported that LANL's nuclear criticality safety program was out of compliance, and the laboratory had not fully put in place interim measures to reduce the risk of a criticality event until the program could be brought into compliance.
  - Since 2003, the laboratory has reported 19 incidents raising nuclear criticality concerns, such as storage or transportation of dangerous materials in quantities that exceeded or potentially exceeded criticality limits. In the plutonium facility (TA-55) in July 2007, for example, an area of the facility containing spent trichloroethylene exceeded the criticality safety limit for such material by 40 percent.
  - Twelve of the 19 reported incidents took place at the laboratory's plutonium facility.
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## Nuclear Safety Concerns

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Criticality concerns have persisted:

- In September 2007, operations were suspended at TA-55 over concerns that radiation shielding in the vault containing plutonium and other materials might not be sufficient to prevent a criticality event. Radiation shielding is important because it prevents inadvertent chain reactions in the nuclear material.
- In October 2007, nearly 60 drums containing transuranic waste stored in Area G at the laboratory were found to be overloaded beyond criticality safety limits acceptable at the repository where the drums will be stored. However, because all but 6 of the drums were originally certified as being below criticality safety limits, the laboratory determined that it needed to address only the 6 drums.

## Nuclear Safety Concerns

### Documented safety analyses:

- The laboratory has been out of compliance with safety documentation requirements, which require annually updating analysis of hazards and mitigating controls and, since 2001, has not met contract requirements to bring safety documentation into compliance.
- In May 2004, the Safety Board noted that many of the laboratory's high-risk facilities were operating with out-of-date safety documentation, including four high-risk facilities operating under documentation that had not been updated for 5-8 years. Under a new contract with LANS, which went into effect in June 2006, the laboratory committed to having all but one of its nuclear facilities operating under compliant safety documentation by the end of fiscal year 2007.
- Nevertheless, as of November 2007, only 2 of LANL's 19 nuclear facilities were operating under compliant safety documentation.

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## Nuclear Safety Concerns

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Safety systems:

- Safety systems, such as for ventilation and fire suppression, are vital to ensure that nuclear facilities operate to protect workers and the public.
- Concerns have been raised by the Safety Board and DOE about the inadequacies of safety systems at the laboratory, including:
  - weak or missing drawings for important safety systems,
  - incomplete or inadequate descriptions of system functions,
  - missing procedures under which systems should be operating, and
  - failure to maintain systems properly to ensure they will work in an emergency.
- Because of these inadequacies, the Safety Board stated that it lacks confidence in LANL's efforts to improve the reliability of safety systems.

## Nuclear Safety Concerns

### Radiological incidents:

- Since fiscal year 2003, the laboratory has reported 21 incidents involving exposure to radiological materials, including:
  - contamination of face, hands, or other body parts from working in situations such as glove boxes;
  - unusually high, unexplained dosage readings for workers; and
  - unanticipated intake of contaminants, such as plutonium, from inadvertent releases.
- For example, in a November 2006 event, a plutonium-239 sample popped from its mount in TA-55, striking and contaminating an employee on the arm and chest before it fell to the floor.
- The laboratory has had a history of significant radiological intakes, in which workers have inhaled quantities of airborne radiological materials.

## Nuclear Safety Concerns

### Nuclear safety violation enforcement actions:

- Since fiscal year 2003, LANL has received four enforcement actions containing civil penalties totaling nearly \$2.5 million.<sup>3</sup>
- These enforcement actions describe significant violations of nuclear safety requirements, including:
  - December 2002: violations leading to operating an unauthorized nuclear facility for 5 years and storing radioactive waste without proper controls (penalties assessed, \$220,000).
  - April 2003: violations including failure to operate nuclear facilities in accordance with safety documentation and numerous violations of radiological work procedures, resulting in exposure of workers to radioactive material (penalties assessed, \$385,000).

<sup>3</sup>Because of an exemption under section 234A(d) of the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2282a, under the contractor at the time, the laboratory did not pay the penalties associated with the enforcement actions levied against it.

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## Nuclear Safety Concerns

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Nuclear safety violation enforcement actions (continued):

- June 2004: work control violations that exposed two workers to radiation doses exposures exceeding annual allowable limits (penalties assessed, \$770,000).
- February 2007: 15 separate violations of nuclear safety rules, reflecting continuing safety performance deficiencies over the past several years (penalties assessed, \$1,100,000).

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## Safety Accidents at LANL

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From October 1, 2002, through June 30, 2007, LANL experienced 23 safety accidents serious enough to warrant investigation by DOE or the laboratory contractor. Although no fatalities occurred, workers involved in these accidents were seriously injured.

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Note: For the purposes of this report, we included all investigations of safety accidents resulting in injury or property damage as well as those near misses that were serious enough to warrant an investigation. If an investigation included more than one incident, we counted each incident separately.

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## Safety Accidents at LANL

- DOE categorizes safety accidents according to their severity.
- **Type A, most serious:** The investigation team is appointed by DOE's Chief Health, Safety and Security Officer and is led by staff from DOE headquarters. Threshold criteria for a type A investigation include the following:
  - occurrence of a fatality;
  - three or more injured workers or members of the public requiring hospitalization for more than 48 hours and sustaining serious bodily damage, such as nerve damage;
  - single, individual radiation exposure of 25 rem or more;<sup>4</sup> or
  - property damage equal to or exceeding \$2.5 million.

<sup>4</sup>Rem = Roentgen equivalent man, which is the absorbed dose of radiation adjusted for the relative biological effect of the type of radiation.

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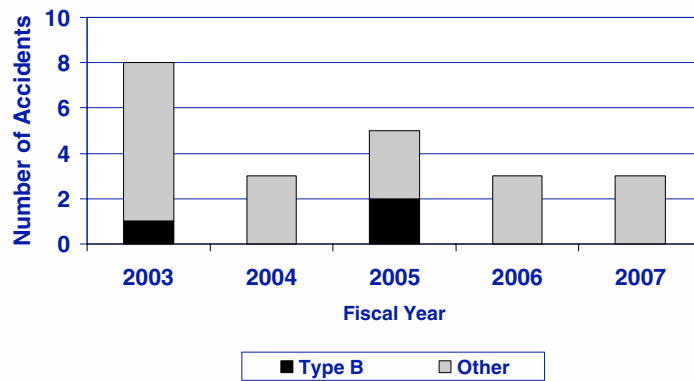
## Safety Accidents at LANL

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- **Type B, serious:** The investigation is led by Los Alamos Site Office staff. Threshold criteria for a type B investigation includes the following:
  - one or more injured workers or members of the public requiring hospitalization for 5 consecutive days or more;
  - single, individual radiation exposure of greater than 10 rem, but less than 25 rem; or
  - property damage of more than \$1 million but less than \$2.5 million.
- **Other investigations:** Investigation of a less serious event is initiated by LANL's management and operations contractor according to significance, severity, or risk associated with the occurrence.

## Safety Accidents at LANL

LANL experienced 23 safety accidents resulting in formal investigation from October 1, 2002, through June 30, 2007, none of which were classified as type A.



Source: GAO analysis of DOE safety investigation reports.

## Safety Accidents at LANL

Examples of safety accidents include the following:

- A package in which plutonium-238 residues had been stored since 1996 degraded and ruptured when handled, releasing airborne plutonium. Two workers were each exposed to about one-half of DOE's annual allowable radiation dose for occupationally exposed workers (August 2003).
- Two technicians were exposed to a neutron radiation field of about twice the threshold for a high-radiation area while performing maintenance in an experimental area where atomic particle beams were active (March 2004).
- A student was partially blinded after receiving a laser flash to her eye during an experiment because the laboratory researcher in charge failed to ensure that the student was wearing required eye protection. The researcher was reported as having followed poor safety practices for a number of years (July 2004).

## Safety Accidents at LANL

- Two postdoctoral employees inhaled acid vapors when using a mixture of hydrochloric and nitric acids to clean laboratory glassware. One employee was later hospitalized for a lung injury attributable to the accident (June 2005).
- After opening a package of radioactive material contaminated during shipping, a LANL employee contaminated himself and his clothing. Over the next few days, the worker spread contamination to his home, to relatives' homes in Kansas and Colorado, and to other sites at LANL. The contamination went undetected for 11 days (July 2005).
- A subcontractor employee sustained serious injuries to his leg and pelvis when a metal stairway, being hoisted by a crane, slipped from its rigging. The worker's injuries were so serious that he had to be airlifted out of the area for treatment (June 2006).
- Laboratory workers were exposed to plutonium on two occasions while performing routine operations inside protective glove boxes that contained sharp tools (January 2007).

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## Project Management Weaknesses at LANL

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Weaknesses in project management have affected or threatened to affect project cost and schedule. Examples include actual cost overruns on the Dual Axis Radiographic Hydrodynamic Test Program (DARHT), and potential schedule delays on the Spallation Neutron Source (SNS) project, led by ORNL.

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## Project Management Weaknesses at LANL

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- NNSA and others have expressed concern for years about the adequacy of project management at the laboratory.
- In January 2001, when the contract for the laboratory was extended, new contract provisions stressed five key areas that needed improvement, including project management.
- In response, the University of California implemented DOE's new project management order and requirements and standardized formats for monthly reporting on projects to make it easier to identify negative performance trends.

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## Project Management Weaknesses at LANL

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- Despite these changes, LANL has continued to have problems with project management. Starting in fiscal year 2003, one of the annual performance objectives for the laboratory has been to “achieve successful completion of projects and development of user facilities.”
  - Contractor performance is evaluated annually against the performance objectives in the contract to determine the fee earned. Rating adjectives range from a low of “unsatisfactory” to a high of “outstanding”—“satisfactory” is in the middle of the range. No fee is earned for ratings below satisfactory.
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## Project Management Weaknesses at LANL

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- In the fiscal year 2003 performance appraisal, NNSA rated the laboratory's performance for this objective only as "satisfactory."
  - NNSA reviewed cost, schedule, and scope performance on 16 active line-item projects. Approximately one-third of the projects performed in the marginal rating area. Project management issues included a lack of well-managed integrated project teams, poor planning early in the project in the area of authorization basis integration, and lack of support for operational readiness assessments.

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## Project Management Weaknesses at LANL

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- In the fiscal year 2004 performance appraisal, NNSA rated the laboratory's performance for this objective as "satisfactory."
- The July 2004 stand-down adversely affected project performance. Because of the unique nature and inherent hazards associated with construction activities, an operations panel conducted an institutional evaluation of the laboratory's construction portfolio.
  - Individual construction project safety, security, and compliance risks were assessed, and the panel provided restart recommendations. The only two projects allowed to continue work during the stand-down were the National Security Sciences Building and the High Power Detonator Facility.

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## Project Management Weaknesses at LANL

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- For fiscal year 2005, NNSA evaluated construction project management against three major factors:
  - planning projects in accordance with NNSA planning protocols;
  - executing projects in a manner consistent with plans and approved baselines; and
  - tracking performance against the plans and baselines, reporting performance, and taking appropriate corrective actions when needed.
- NNSA determined that line-item construction projects made adequate progress but nevertheless the rating in this area did not improve beyond “satisfactory” for the project management objective.

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## Project Management Weaknesses at LANL

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- Project management weaknesses at LANL have led to problems on projects, including:
  - DARHT—Inaccurate budget projections, due in part to inadequate contingency planning, which resulted in cost overruns.
  - SNS—Design and fabrication problems, which threatened schedule milestones.

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## Project Management Weaknesses at LANL

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- DARHT will be the nation's first hydrodynamic test facility capable of producing three-dimensional X-ray photographs of a nuclear weapon and is expected to play an important role in DOE's Stockpile Stewardship Program.
  - The original plans for the construction of DARHT called for the development of two single-pulse axes with similar capabilities. The original cost to complete DARHT was estimated in 1998 to be between \$30 million and \$54 million.
  - The first axis was completed following the original design and has been operational since 1999.
  - With DOE approval, LANL changed the scope and redesigned the capability of the second axis. Subsequently, design and construction of the second axis have been plagued by cost overruns.
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## Project Management Weaknesses at LANL

- In May 2003, the DOE Inspector General issued a report on the DARHT project,<sup>5</sup> finding, among other things, that:
  - Budget estimates were not realistic, given the project's technical complexity.
  - The contingency fund was insufficient.
  - The project lacked a viable baseline.
  - At least \$57.5 million in DARHT project costs had been transferred to other programs or projects, which gave the appearance that the total project cost was within budget when it was not.
- In December 2004, DOE estimated the total project costs to complete the second axis at about \$90 million.

<sup>5</sup>DOE Inspector General, *Dual Axis Radiographic Hydrodynamic Test Facility*, DOE/IG-0599, May 2003.

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## Project Management Weaknesses at LANL— DARHT

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- A March 2005 NNSA study<sup>6</sup> of the DARHT Construction Project, which included the redesigned second axis, found, among other things, that:
  - Senior LANL officials did not treat DARHT as a priority.
  - DOE did not require clear project definition and performance requirements.
  - DOE rescoped the project using unproven technology.
  - DOE failed to establish clear completion criteria.
  - DOE used poor design practices for the second axis.
- The Second Axis Recovery and Commissioning project is scheduled to be completed in May 2008.

<sup>6</sup>National Nuclear Security Administration, *DARHT Construction Project Lessons Learned Report*, March 2005.

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## Project Management Weaknesses at LANL

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- LANL was responsible for portions of the SNS project led by ORNL. Specifically, LANL was responsible for the linear accelerator and a low-level radio-frequency control system.
  - Fabrication problems in 2002 with the linear accelerator, including leaky tubing, required rework and resulted in a cost impact of approximately \$8 million (which was funded through \$1.8 million in contingency funds and the remainder in offsets).
  - Design problems with the radio-frequency control system resulted in potential schedule delays; as a result, ORNL took over management of this project, and completed it within cost and schedule estimates. As part of the corrective action, according to the ORNL laboratory director, ORNL decided to use a less complex radio-frequency control system already developed by the Lawrence Berkeley National Laboratory.
  - The former SNS program manager at ORNL, who is now the laboratory director, told us that these two problems could have significantly delayed the overall project.
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## Related GAO Products

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- *Nuclear and Worker Safety: Actions Needed to Determine the Effectiveness of Safety Improvement Efforts at NNSA's Weapons Laboratories*, GAO-08-73 (Washington, D.C.: October 31, 2007).
  - *Department of Energy: Consistent Application of Requirements Needed to Improve Project Management*, GAO-07-518 (Washington, D.C.: May 11, 2007).
  - *National Nuclear Security Administration: Additional Actions Needed to Improve Management of the Nation's Nuclear Programs*, GAO-07-36 (Washington, D.C.: January 19, 2007).
  - *Stand-down of Los Alamos National Laboratory: Total Costs Uncertain; Almost All Mission-Critical Programs Were Affected but Have Recovered*, GAO-06-83 (Washington, D.C.: November 18, 2005).
  - *Department of Energy: Mission Support Challenges Remain at Los Alamos and Lawrence Livermore National Laboratories*, GAO-04-370 (Washington, D.C.: February 27, 2004).
  - *Contract Reform: DOE's Policies and Practices in Competing Research Laboratory Contracts*, GAO-03-932 (Washington, D.C.: July 10, 2003).
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## Related GAO Products

- *Nuclear Security: NNSA Needs to Better Manage Its Safeguards and Security Program*, GAO-03-471 (Washington, D.C.: May 30, 2003).
- *Nuclear Security: Lessons to Be Learned from Implementing NNSA's Security Enhancements*, GAO-02-358 (Washington, D.C.: March 29, 2002).
- *Department of Energy: Fundamental Reassessment Needed to Address Major Mission, Structure, and Accountability Problems*, GAO-02-51 (Washington, D.C.: December 21, 2001).
- *National Laboratories: Better Performance Reporting Could Aid Oversight of Laboratory-Directed R&D Program*, GAO-01-927 (Washington, D.C.: September 28, 2001).
- *Nuclear Security: DOE Needs to Improve Control over Classified Information*, GAO-01-806 (Washington, D.C.: August 24, 2001).
- *National Laboratories: DOE Needs to Assess the Impact of Using Performance-Based Contracts*, GAO/RCED-99-141 (Washington, D.C.: May 7, 1999).
- *Department of Energy: Key Factors Underlying Security Problems at DOE Facilities*, GAO/T-RCED-99-159 (Washington, D.C.: April 20, 1999).

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