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Report to the Chairman, Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, U.S. Senate

May 2004

HOMELAND SECURITY

DHS Needs a Strategy to Use DOE's Laboratories for Research on Nuclear, Biological, and Chemical Detection and Response Technologies

GAO-04-653

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Highlights

Highlights of GAO-04-653, a report to the Chairman, Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, U.S. Senate

Why GAO Did This Study

Success in the war against terrorism requires the United States to effectively research, develop, and deploy technologies to detect and respond to the use of nuclear, biological, and chemical weapons. The Homeland Security Act of 2002 gave the Department of Homeland Security (DHS) the ability to use laboratories owned by the Department of Energy (DOE) to conduct research and development (R&D) of these advanced technologies. GAO was asked to determine (1) whether DHS has completed a strategic R&D plan and coordinated its efforts with other federal agencies, (2) how DHS plans to use DOE's laboratories to carry out its R&D, and (3) what controls DHS is establishing to monitor projects at DOE's laboratories.

What GAO Recommends

GAO recommends that the Secretary of Homeland Security (1) complete a strategic R&D plan, (2) ensure that this plan is integrated with homeland security R&D conducted by other federal agencies, (3) develop criteria for distributing annual funding and for making long-term investments in laboratory capabilities, and (4) develop guidelines that detail how DOE's laboratories would compete for funding with private sector and academic entities. In commenting on the report, DHS agreed with our recommendation to complete a strategic R&D plan, but did not explicitly agree or disagree with our remaining recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-04-653.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Gene Aloise at (202) 512-3841 or aloisee@gao.gov.

What GAO Found

DHS has not yet completed a strategic plan to identify priorities, goals, objectives, and policies for the R&D of homeland security technologies, and some gaps remain in its coordination with other federal agencies. According to DHS officials, the department has not completed a research strategic plan because it has spent much of the time since its March 2003 creation organizing the Science and Technology Directorate, developing policies and procedures, and hiring necessary staff. DHS has worked with some interagency R&D groups and has signed a memorandum of agreement with DOE establishing policies for resolving priority conflicts at DOE's laboratories, but gaps remain in its efforts to coordinate and establish partnerships with other agencies conducting homeland security R&D. Failure to complete a strategic plan and to fully coordinate its research efforts may limit DHS's ability to leverage resources and could increase the potential for duplication of research.

DHS's research program has concentrated on funding projects at five DOE laboratories. These five laboratories—Los Alamos, Sandia, Lawrence Livermore, Pacific Northwest, and Oak Ridge National Laboratories—received over 96 percent of the $57 million DHS invested in research at DOE's laboratories in fiscal year 2003 and will receive almost 90 percent of the $201 million for fiscal year 2004. At the time of our review, the remaining DOE laboratories would receive DHS R&D funding primarily through competition with the private sector and academia. Although federal acquisition regulations generally prohibit DOE's laboratories from competing with the private sector and academia for federal funding, some competition can occur under specific circumstances. For example, DOE's laboratories can respond to R&D solicitations with the private sector and academia for broad scientific study for advancing the state of the art or for increasing knowledge. Some DOE laboratory officials feel that if DHS focuses on short-term, applied research, their laboratories' ability to attract and retain top scientific talent and build and maintain laboratory facilities may be threatened. In response to concerns from Members of Congress and officials from DOE's laboratories, DHS announced in March 2004 that it would review its policies for working with DOE's laboratories. DHS officials have also agreed that it is necessary to make long-term investments in laboratory capabilities in order to create an enduring R&D complex for homeland security.

DHS is making progress developing the project management tools it will use to monitor project costs, milestones, and deliverables. Monthly reports will discuss project accomplishments and concerns that could affect the execution of the project. Quantitative performance metrics are also being developed for these monthly reports to gauge differences between budgeted and actual cost and schedules of R&D work performed. Also, DHS plans to conduct regular peer reviews of projects to assess how technical approaches being followed by R&D projects match DHS's requirements.

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Abbreviations

DHS	Department of Homeland Security
DOE	Department of Energy
GAO	General Accounting Office
HHS	Department of Health and Human Services
HSARPA	Homeland Security Advanced Research Projects Agency
NNSA	National Nuclear Security Administration
PART	Program Assessment Rating Tool
R&D	research and development

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United States General Accounting Office
Washington, D.C. 20548

May 24, 2004

The Honorable Pat Roberts
Chairman
Subcommittee on Emerging Threats and Capabilities
Committee on Armed Services
United States Senate

Dear Mr. Chairman:

Success in the war against terrorism requires the United States to effectively research, develop, and deploy advanced technologies—or countermeasures—to detect and respond to the use of weapons of mass destruction. The Department of Homeland Security (DHS)—through its Science and Technology Directorate—conducts research, development, testing, and evaluation of new technologies that are intended to strengthen the United States' ability to prevent and respond to nuclear, biological, and chemical attacks. Created by Title III of the Homeland Security Act of 2002, the Science and Technology Directorate is responsible for, among other things, preparing a strategic plan for developing countermeasures to chemical, biological, radiological, nuclear, and other emerging terrorist threats. In addition, the act requires DHS to coordinate the federal government's efforts to identify and develop these countermeasures.

Before DHS was created in March 2003, much of the R&D of nuclear, radiological, biological, and chemical countermeasures was managed by the National Nuclear Security Administration's (NNSA) Nonproliferation and Verification Research and Development Program.[1] In August 2002, we reported that NNSA's program faced challenges balancing the short-term needs of the users of these technologies and looking beyond the horizon at advanced technologies.[2] Specifically, we noted that some users of technologies developed by NNSA's program were concerned that the

[1]NNSA was created under Title 32 of the National Defense Authorization Act for Fiscal Year 2000 as a separately organized agency within the Department of Energy. It is responsible for enhancing the safety, reliability, and performance of the nation's nuclear weapons; maintaining the nation's ability to design, produce, and test nuclear weapons; preventing the proliferation of weapons of mass destruction; and designing, building, and maintaining naval nuclear propulsion systems.

[2]U.S. General Accounting Office, *Nonproliferation R&D: NNSA's Program Develops Successful Technologies, but Project Management Can Be Strengthened*, GAO-02-904 (Washington, D.C.: Aug. 23, 2002).

program's focus was on long-term research, potentially ignoring immediate technology needs for the war on terrorism. We also reported that NNSA's program did not have adequate information on milestones, costs, and deliverables to monitor projects' progress. The Homeland Security Act of 2002 transferred the chemical and biological R&D work of NNSA's program to DHS, along with some of NNSA's nuclear smuggling R&D.[3] NNSA retains responsibility for R&D on remote sensing and other technologies that analyze the global spread of nuclear weapons and technology. Similarly, NNSA is responsible for R&D on space- and ground-based sensors that defense and intelligence agencies use to verify and monitor arms control treaties.

Much of the R&D work previously managed by NNSA and now managed by DHS occurs at laboratories owned by the Department of Energy (DOE). DOE is responsible for the world's largest laboratory system of its kind. The mission of these 22 government-owned and contractor-operated laboratories has evolved.[4] Originally created to design and build atomic bombs, DOE's laboratory system has since expanded to conduct basic and applied research in many disciplines, from high-energy physics to advanced computing. While federal, state, local, and private entities traditionally could use the capabilities of DOE's laboratories, DOE research had the highest priority. However, the Homeland Security Act of 2002 gave DHS the right to use DOE's laboratories, and the laboratories the right to accept and perform work for DHS, on an equal priority with DOE research. This parity has led to questions about how DOE and DHS will resolve conflicting priorities, if any, in the use of laboratory staff and resources for R&D.

Other federal agencies also conduct R&D related to homeland security. The Department of Health and Human Services (HHS) carries out basic and applied research on bioterrorism countermeasures through the National Institutes of Health and the Centers for Disease Control and Prevention. The Department of Defense conducts research on biological and chemical

[3]In addition, the act transferred DOE's Environmental Measurements Laboratory, the advanced scientific computing research program and activities at Lawrence Livermore National Laboratory, the National Bio-Weapons Defense Analysis Center of the Department of Defense, and the Plum Island Animal Disease Center of the Department of Agriculture to DHS.

[4]Nine of DOE's laboratories are large, multiprogram national laboratories that dominate DOE's science and technology activities. DOE also manages several other, generally smaller, laboratories that conduct specialized research in a particular program area or were created to pursue a single issue.

countermeasures, primarily for protection of military forces. The Technical Support Working Group, jointly operated by the departments of State and Defense, oversees an interagency R&D program to rapidly develop and deploy counterterrorism technologies for use by federal, state, and local agencies.

This report examines (1) whether DHS has completed a strategic R&D plan and coordinated its efforts with other federal agencies conducting homeland security R&D; (2) how DHS plans to use DOE's laboratories to carry out its responsibilities for R&D on nuclear, biological, and chemical detection and response technologies; and (3) what controls DHS is establishing to monitor project milestones, costs, and deliverables for R&D conducted at DOE's laboratories. In addition, you asked us to report on how NNSA's program has changed its project management controls since our August 2002 report. NNSA has made several improvements to its project management controls as a result of our August 2002 report. Information on these improvements is presented in appendix I.

Because DHS was undergoing its initial organization at the time of our review and still developing plans, policies, and procedures, our examination of DHS's strategic planning and coordination activities focused on interviews with officials from DHS, NNSA, and DOE's laboratories on their R&D activities and their interactions with one another. To determine how DHS plans to use DOE's laboratories, we obtained the R&D proposal guidance that DHS provided to DOE's laboratories and the criteria that DHS used to review these proposals. We also obtained the results of a DHS-sponsored peer review of DOE laboratory proposals. We reviewed federal acquisition regulations and statutory requirements governing the operation of DOE's laboratories. To obtain DOE's laboratories' views of DHS's plans, we conducted focus groups with program managers and researchers at seven DOE laboratories. We selected five DOE laboratories—Los Alamos, Sandia, Lawrence Livermore, Pacific Northwest, and Oak Ridge National Laboratories—because they accounted for most of the funding DHS distributed to DOE laboratories. We selected the remaining two laboratories—Argonne and Brookhaven National Laboratories—because they also conduct homeland security R&D for DHS, NNSA, or other federal agencies. Appendix II presents our scope and methodology in more detail. We conducted our review from August 2003 through April 2004 in accordance with generally accepted government auditing standards.

Results in Brief

DHS has not yet completed a strategic plan to identify priorities, goals, objectives, and policies for the R&D of homeland security technologies, and gaps remain in its efforts to coordinate with other federal agencies that conduct homeland security R&D. Specifically:

- According to DHS officials, since its March 2003 creation, the department has not completed a strategic plan for R&D because it has spent much of the time organizing the Science and Technology Directorate, developing policies and procedures, and hiring necessary staff. When DHS was first organized, many of the staff in the Science and Technology Directorate were personnel temporarily detailed from other executive branch agencies and from DOE's laboratories. According to DHS officials, they needed time to bring more permanent staff on board. In the absence of a strategic plan, DHS obligated money for R&D on nuclear, biological, and chemical countermeasures for fiscal years 2003 and 2004 and developed a budget request for fiscal year 2005 based on funding priorities established by DHS program managers, who relied on their knowledge of current threats and capabilities. DHS officials acknowledge that developing the department's plan for R&D is important for ensuring strategic direction and told us that information developed through their strategic planning process will be used to develop DHS's annual budget requests to the Congress.

- DHS has worked with some interagency R&D groups and has signed a memorandum of agreement with DOE establishing policies for resolving priority conflicts at DOE's laboratories, but gaps remain in its efforts to coordinate and establish partnerships with agencies such as NNSA, HHS, and the Department of Defense. For example, NNSA officials provided DHS with copies of the fiscal year 2004 project proposals that NNSA received from DOE's laboratories to develop radiological and nuclear countermeasures. However, DHS officials awarded 2003 and 2004 funding to DOE's laboratories without taking similar steps to coordinate with NNSA officials because they had limited time after the department's organization in March 2003 in which to decide on project funding. In some cases, DHS and NNSA may rely on the same capabilities at DOE's laboratories to conduct similar work on nuclear and radiological countermeasures. Consequently, failure to coordinate efforts may limit the agencies' ability to leverage resources and could increase the potential for duplicative research efforts. Furthermore, DHS officials told us the department needs closer partnerships with HHS agencies such as the Centers for Disease Control and Prevention

and the National Institutes of Health. These agencies are responsible for much of the basic biological research that DHS will depend upon to develop its technologies, especially biological countermeasures. The Department of Defense's programs to develop biological and chemical countermeasures may also be applicable to DHS's efforts.

We are recommending that DHS ensure that it completes its strategic plan and appropriately integrates the plan with research efforts conducted by other federal agencies so that governmentwide priorities can be established, gaps can be identified, duplication can be avoided, and resources can be leveraged.

DHS's research program has concentrated on funding projects at five DOE laboratories. These five laboratories—Los Alamos, Sandia, Lawrence Livermore, Pacific Northwest, and Oak Ridge National Laboratories—received over 96 percent of the $57 million DHS invested in research at DOE's laboratories in fiscal year 2003 and will receive almost 90 percent of the $201 million for research at DOE's laboratories for fiscal year 2004. At the time of our review, the remaining DOE laboratories were to receive R&D funding from DHS primarily through competition with companies and academia. Although federal acquisition regulations generally prohibit DOE's laboratories from competing with companies and academia for federal funding, some competition can occur under specific circumstances. For example, DOE's laboratories can respond to R&D solicitations with companies and academia for broad scientific study for advancing the state of the art or increasing knowledge. According to officials from some of DOE's laboratories, the relationship between their laboratories and DHS has been strained because of inadequate communication and DHS's lack of clear and well-defined criteria for designating the five DOE laboratories that receive most of DHS's funding. In response to these concerns, DHS's Under Secretary for Science and Technology stated in a March 2004 letter that DHS would conduct an internal review and convene an external panel to reconsider its policies surrounding DHS's interactions with DOE's laboratories. At the time of our review, it was unclear to what extent these reviews would affect DHS's policies for using DOE's laboratories. Like NNSA, DHS faces the challenge of balancing the immediate needs of users of homeland security technologies with R&D on advanced technologies for the future. DHS intends to focus much of its R&D efforts on short-term, applied research projects, although it will dedicate some funds to long-term advanced concepts research. Some DOE laboratory officials believe that a focus on short-term, applied research may threaten their long-term ability to attract and retain top scientific talent, build and maintain laboratory

facilities, and develop effective technologies. Furthermore, they are concerned that many of the successes in developing technologies in the short term at DOE's laboratories have relied upon substantial investments in facilities, personnel, and advanced concepts research over the long term. DHS officials agreed that it is necessary to make long-term investments in certain laboratory capabilities in order to create an enduring complex for homeland security R&D. We are recommending that DHS develop clear and well-defined criteria for distributing funding for long-term investments in laboratory capabilities and develop specific guidelines that detail the circumstances under which DOE's laboratories would compete for funding with private sector and academic entities.

DHS is making progress in developing the project management tools it will use to monitor project costs, milestones, and deliverables. DHS officials have told us that each laboratory will complete a monthly report for each of its R&D portfolios—such as nuclear and radiological countermeasures, chemical countermeasures, and biological countermeasures. These reports are to contain (1) data on project cost, schedule, and scope and (2) discussions of project accomplishments and concerns that could affect the execution of the project. DHS is developing quantitative performance metrics for these monthly reports to gauge differences between budgeted and actual cost and schedules of R&D work performed. DHS also plans to conduct regular scientific peer reviews of projects to assess how the technical approaches being followed by R&D projects match DHS's requirements.

We presented a draft of this report to DHS, NNSA, and the Department of Defense for comment. With regard to our recommendation to complete a strategic R&D plan, DHS agreed that such a plan is critical to the success of the department. DHS did not explicitly agree or disagree with our remaining recommendations, but provided additional information on its strategic planning and coordination activities and on its relationship with DOE's laboratories. NNSA had no comment on the draft report, but noted that it is in contact with DHS to assist the department in its coordination efforts related to the use of DOE's laboratories. The Department of Defense had no comments on the report.

Background

Title III of the Homeland Security Act of 2002 established a Directorate of Science and Technology within DHS that is headed by an Under Secretary for Science and Technology. Among other things, the directorate is responsible for:

- developing, in consultation with other appropriate agencies, a national policy and strategic plan for, identifying priorities, goals, objectives, and policies for, and coordinating the federal government's civilian efforts to identify and develop countermeasures to chemical, biological, radiological, nuclear, and other emerging terrorist threats;

- establishing priorities for, directing, funding, and conducting national basic and applied research, development, testing, evaluation, and procurement of technology and systems for, among other things, detecting and responding to terrorist attacks; and

- developing and overseeing the administration of guidelines for merit review of R&D projects throughout DHS.

The act requires the directorate to conduct its basic and applied research, development, testing, and evaluation through both "extramural" and "intramural" programs. Extramural programs consist of R&D activities conducted through grants, cooperative agreements, and contracts between DHS and colleges, universities, private research institutes, and/or companies. Intramural programs draw upon the expertise of federal laboratories. Under the act, the Secretary of Homeland Security may establish or contract with any federally funded research and development center. In addition, DHS may use the capabilities of DOE's laboratories through a joint sponsorship agreement between DHS and DOE, a direct contract between DHS and DOE's laboratory, a "work for others" basis,[5] or any other method provided by law. However, unlike a traditional "work for others" arrangement whereby DOE's laboratories can accept work only if it does not interfere with DOE missions, DOE's laboratories are authorized to accept and perform work for DHS on an equal basis with the laboratories' other missions.

In February 2003, DOE and DHS issued a memorandum of agreement that, among other things, (1) detailed the procedures under which DHS work would be conducted at DOE laboratories and sites, (2) specified that DHS will not pay more than DOE pays for administrative or personnel charges

[5]"Work for others" is the performance of work, on a reimbursable basis, for non-DOE entities by a DOE facility and/or DOE or contractor personnel. Work for others is intended, among other things, to provide assistance to other federal agencies and nonfederal entities in accomplishing goals that may otherwise be unattainable, to avoid the possible duplication of effort at federal facilities, and to provide access for non-DOE entities to highly specialized or unique DOE technical expertise.

for the work the laboratories conduct, (3) stated that DHS and DOE will establish appropriate mechanisms to resolve any issues relating to setting priorities when conflicts might arise at the site, and (4) stipulated that both departments would jointly determine what long-term arrangements best serve the needs of both departments with respect to DOE's laboratories.

DHS's Science and Technology Directorate is organized into the following four offices:

- *Office of Plans, Programs, and Budgets*. Establishes overall priorities, oversees R&D activities across the Science and Technology Directorate, and provides policy guidance for how the Science and Technology Directorate will interact with other DHS entities, such as Customs and Border Protection, the Coast Guard, and the Secret Service.

- *Office of Research and Development*. Manages and executes DHS's intramural R&D programs.

- *Homeland Security Advanced Research Projects Agency (HSARPA)*. Manages and executes DHS's extramural R&D programs through competitive, merit-reviewed grants, cooperative agreements, or contracts with public or private entities.

- *Office of System Engineering and Development.* Takes technologies developed by the Office of Research and Development or HSARPA and prepares deployment strategies to transfer technologies to federal, state, and/or local governmental users.

DHS Has Not Completed a Strategic Plan to Determine Its R&D Priorities, and Gaps Remain in Its Efforts to Coordinate with Other Federal Agencies

DHS has not completed a strategic plan to identify its research priorities for the R&D of homeland security technologies. Instead, to fund projects, DHS has relied upon its managers to set priorities based upon their knowledge of current threats and capabilities. In addition, gaps remain in DHS's efforts to coordinate with other federal agencies conducting homeland security R&D. Lack of coordination could increase the potential for duplication of research efforts and limit DHS's ability to leverage resources with other federal R&D activities.

DHS Is Still Developing Its Research Strategy

At the time of our review, DHS was still developing a strategic plan to identify priorities, goals, objectives, and policies for the R&D of countermeasures to nuclear, biological, chemical, and other emerging terrorist threats. According to DHS officials, this strategic plan will establish R&D priorities within and across federal programs and identify opportunities to leverage the R&D efforts of other agencies.

Completion of this strategic plan has been delayed because, these officials said, much of the time since DHS's March 2003 creation has been spent organizing the Science and Technology Directorate, developing policies and procedures, and hiring necessary staff. Unlike other parts of DHS, such as the Coast Guard, Customs Service, and Secret Service, the Science and Technology Directorate did not obtain staff from outside of the department when DHS was created. According to senior DHS officials, a team of only 12 federal employees was initially responsible for organizing the Science and Technology Directorate. As a result, the directorate initially relied on personnel temporarily detailed from other executive branch agencies and from DOE's laboratories to carry out day-to-day operations. As of January 2004, the Science and Technology Directorate had grown to a total of 212 staff: 100 DHS employees, 6 Public Health Service Officers, 59 contractors, and 57 employees temporarily detailed from other federal agencies and from DOE's laboratories.

The Science and Technology Directorate has organized its R&D around a number of research portfolios: four respond to specific terrorist threats, four address cross-cutting threats, and four support DHS's operational units. (See table 1.) In addition, DHS supports other R&D related activities, including a program that provides fellowships to university students pursuing careers in scientific research essential to homeland security and a program to develop capabilities to protect commercial aircraft against portable anti-aircraft missiles.

Table 1: DHS's Research Portfolios

Research portfolios focused on specific terrorist threats	Research portfolios focused on cross-cutting threats	Research portfolios supporting DHS operational units
Biological Countermeasures	Threat and Vulnerability Testing and Assessment	Border and Transportation Security
Chemical Countermeasures	Standards	Emergency Preparedness and Response
High Explosives Countermeasures	Emerging Threats	U.S. Coast Guard
Radiological and Nuclear Countermeasures	Rapid Prototyping	U.S. Secret Service

Source: DHS.

Note: In addition to these research portfolios, DHS's Science and Technology Directorate provides funding for university and fellowship programs and for research to counter portable anti-aircraft missiles.

In the absence of a strategic research plan, DHS obligated money for fiscal year 2003 and 2004 and developed a budget request for fiscal year 2005 based on the personal judgment of managers of each of the research portfolios from the Science and Technology Directorate's Office of Plans, Programs, and Budgets. (See table 2.) According to DHS officials, research portfolio managers are experts in their respective fields and relied on their knowledge of current threats and capabilities to independently determine priorities for research needs. In the future, these officials said, portfolio managers will team with staff from the Science and Technology Directorate's Office of Research and Development, HSARPA, and Office of System Engineering and Development to identify research needs, determine priorities, and help decide where the appropriate expertise resides to develop each technology—that is, within DOE's laboratories, companies, or academia. Within each research portfolio, a team will analyze current threats using information from intelligence assessments, identify gaps in available technology, and consider how DHS can take advantage of the R&D efforts of other federal agencies. The Science and Technology Directorate's senior management will ultimately set priorities for R&D needs across research portfolios and make final funding decisions.

Table 2: DHS R&D Funding Distribution, Fiscal Years 2003-2005

Dollars in millions			
Research portfolio	**2003**	**2004**	**2005 (requested)**
Biological countermeasures	$362.6	$285.0	$407.0
Radiological and nuclear countermeasures	75.0	126.3	129.3
Chemical countermeasures	7.0	52.0	53.0
High explosives countermeasures	0.0	9.5	9.7
Threat and vulnerability testing and assessment	36.1	100.1	101.9
Rapid prototyping	33.0	73.0	76.0
Standards	20.0	39.0	39.7
Emerging threats	16.8	21.0	21.0
R&D conducted for DHS operational units (e.g., Coast Guard, Secret Service)	0.0	34.0	34.0
Counter portable anti-aircraft missiles	0.0	60.0	61.0
University and fellowship programs	3.0	68.8	30.0
R&D consolidation transferred funds[a]	0.0	0.0	24.1
Total	**$553.5**	**$868.7**	**$986.7**

Source: GAO presentation of DHS data.

[a]As a result of a requirement in the fiscal year 2004 homeland security appropriations act, DHS's fiscal year 2005 budget request transfers $24.1 million from R&D activities conducted by other DHS entities, such as the Coast Guard, and consolidates these R&D activities within the Science and Technology Directorate.

Notes: In fiscal year 2003 and fiscal year 2004, DHS spent $44.2 million and $52.6 million, respectively, on employee salaries and overhead expenses.

This table is presented for background purposes only; therefore, we did not assess the reliability of these data.

DHS Has Coordinated Its R&D with Other Federal Agencies, but Gaps Remain

The Homeland Security Act of 2002 requires DHS to coordinate its research efforts with other federal agencies conducting homeland security R&D. DHS has coordinated with some interagency groups, including the National Security Council's Policy Coordinating Committee for Counterterrorism and National Preparedness. DHS also cochairs a standing committee on Homeland and National Security in the White House's Office of Science and Technology Policy. This committee identifies key areas requiring interagency coordination in the formulation of R&D agendas. DHS has also worked with the Technical Support Working Group—an interagency

working group of representatives from over 80 federal agencies that is jointly overseen by the departments of State and Defense. The Technical Support Working Group's mission is to facilitate interagency R&D for combating terrorism, primarily through rapid research, development, and prototyping. The Technical Support Working Group managed DHS's initial round of solicitations to private and academic researchers seeking proposals for chemical, biological, and radiological countermeasures.

DHS has also coordinated some of its R&D projects with other federal agencies. For example, DHS is now responsible for BioWatch, a federal program that monitors about 30 major cities for chemical and biological threats. BioWatch is executed jointly by DHS, DOE's laboratories, the Environmental Protection Agency, and the Centers for Disease Control and Prevention. According to DHS officials, DHS has also coordinated with the Department of Defense on BioNet, a federal program that links U.S. military installations with local communities in efforts to detect and respond to the use of biological agents. DOE and DHS have signed a memorandum of agreement that provides a framework for DHS to access the capabilities of DOE's laboratories and establishes policies for resolving conflicts over research priorities. DHS officials also noted that the Science and Technology Directorate has a liaison to DOE who worked for DOE and NNSA for over 20 years and is familiar with their programs.

Although coordination has occurred, gaps remain. The relationship between DHS and NNSA illustrates the potential gaps in coordination. NNSA officials provided DHS with copies of the fiscal year 2004 project proposals it received from DOE's laboratories to develop radiological and nuclear countermeasures. However, DHS officials did not provide NNSA with any feedback on these proposals, and it is unclear how they used this information during their own processes for reviewing and funding research proposals. Moreover, DHS officials awarded fiscal year 2003 and 2004 funding to DOE's laboratories without taking similar steps to coordinate and share proposal information with NNSA officials. Senior DHS officials told us that early efforts to coordinate and share information with NNSA were constrained because they had limited time after the department's organization in March 2003 in which to make project funding decisions. According to NNSA and DHS officials, although DHS's mission focuses on counterterrorism and NNSA concentrates more on nonproliferation, it is important that the two agencies collaborate and share information. Because both agencies may rely on the same capabilities of DOE's laboratories to conduct similar work, especially on radiological and nuclear countermeasures, the agencies need a stronger partnership in

order to leverage resources and minimize the potential for duplication of research efforts. In a May 12, 2004, letter commenting on our draft report, DHS noted that DHS and NNSA staff have had numerous meetings to discuss joint interests in various R&D topics and that NNSA staff participated in a meeting on DHS's fiscal year 2004 radiological and nuclear countermeasures program.

DHS still needs to establish formal partnerships with other federal agencies that conduct homeland security R&D, and DHS officials acknowledge the importance of coordinating and developing partnerships with these federal agencies, as well. For example, DHS officials told us that they will need to communicate with the Centers for Disease Control and Prevention and the National Institutes of Health, which will conduct basic research on biological agents in order to develop biological countermeasures. In its May 2004 letter to us, DHS stated that DHS biological countermeasures officials are coordinating with HHS's Office of Emergency Preparedness. Other R&D projects conducted by the Department of Defense—especially by the Defense Threat Reduction Agency and the Defense Advanced Research Projects Agency—to develop biological and chemical countermeasures and force protection technologies may also be applicable to DHS's efforts. In its May 2004 comments on our draft report, DHS noted that the Science and Technology Directorate works closely with the Department of Defense and other federal agencies to coordinate biodefense research efforts and critical biocontainment laboratory infrastructure at the National Interagency Biodefense Campus at Fort Detrick, Maryland.

DHS Faces Challenges Using DOE's Laboratories

DHS's research program has concentrated on funding projects at five DOE laboratories. At the time of our review, the remaining DOE laboratories were to receive DHS R&D funding primarily through competition with companies and academia. According to officials from some of DOE's laboratories, the relationship between their laboratory and DHS has been strained because of inadequate communication and the lack of clear and well-defined criteria for designating the five DOE laboratories that have received the majority of DHS's R&D funding. DHS also faces the challenge of balancing the immediate needs of users of homeland security technologies with the need to conduct R&D on advanced technologies for the future. DHS intends to focus much of its R&D efforts on short-term, applied research projects, although some funds will be dedicated to long-term advanced concepts research. Some laboratory officials believe that if DHS focuses on short-term, applied research, their laboratories' long-term

ability to attract and retain top scientific talent, build and maintain laboratory facilities, and develop effective technologies may be jeopardized.

DHS's Intramural R&D Efforts Are Concentrated at Five DOE National Laboratories

The Homeland Security Act of 2002 allows DHS to use any of DOE's laboratories; DHS's R&D program has focused on funding homeland security R&D projects at five "intramural" DOE laboratories: Los Alamos, Sandia, Lawrence Livermore, Pacific Northwest, and Oak Ridge National Laboratories. The intramural program is designed to draw upon the resources of the federal government to conduct work that is inherently the federal government's responsibility. Such work includes threat characterization and analysis using classified intelligence information and R&D work using special nuclear materials such as plutonium and highly enriched uranium. In these areas of inherent federal responsibility, the private sector lacks the interest or capability to perform certain R&D tasks.

The five intramural laboratories received over 96 percent of the $57 million DHS invested in homeland security research at DOE's laboratories in fiscal year 2003 and will receive almost 90 percent of the $201 million for fiscal year 2004. (See table 3.)

Table 3: DHS R&D Funding Distribution to DOE's Laboratories, Fiscal Years 2003 and 2004

DOE laboratory	Fiscal year 2003	Fiscal year 2004
Argonne National Laboratory	$1,324,185	$2,000,000
Brookhaven National Laboratory	400,000	1,400,000
Idaho National Engineering and Environmental Laboratory	0	1,750,000
Lawrence Berkeley National Laboratory	0	2,300,000
Lawrence Livermore National Laboratory	18,300,000	89,500,000
Los Alamos National Laboratory	17,100,000	35,200,000
Oak Ridge National Laboratory	13,100,000	6,900,000
Pacific Northwest National Laboratory	2,300,000	12,200,000
Remote Sensing Laboratory (Bechtel Nevada)	0	13,000,000
Sandia National Laboratories	4,900,000	36,400,000
Savannah River Technology Center	200,000	500,000
Total	**$57,624,175**	**$201,150,000**

Source: GAO presentation of DHS data.

Note: Total for fiscal year 2004 based on $233,300,000 available. As of February 10, 2004, $32,200,000 had not been obligated to any laboratory.

The Office of Research and Development is responsible for managing DHS's intramural program and will coordinate all work that DHS conducts at DOE's laboratories. DHS officials told us that, in the future, R&D with the intramural laboratories would be primarily focused on scientific-based threat and vulnerability characterizations, in addition to analysis and design of integrated technology systems. For example, intramural laboratories may conduct R&D on tools to assist the intelligence community develop and identify information on emerging threats. An intramural laboratory may also help identify gaps in current detection and response technologies and provide information that DHS and other agencies can incorporate into their R&D programs. DHS officials told us that they also intend to use the intramural laboratories as technical advisers to assist with internal strategic planning and program development. As a result, intramural laboratories will have access to, and may help shape, internal DHS planning documents. In an effort to guard against organizational conflicts of interest and inappropriate use of insider information, the intramural laboratories will be prohibited from responding to any competitive solicitations that DHS may sponsor.

DHS designed its extramural program primarily to capitalize on the strengths of the nonfederal sector. HSARPA and the Office of System Engineering and Development will manage DHS's extramural R&D efforts through competitive solicitations. DHS's original plans called for the remaining DOE laboratories to compete with companies and academia for contracts under DHS's extramural R&D program. However, federal acquisition regulations generally prohibit federally funded research and development centers, such as DOE's laboratories, from competing with the private sector for federal contracts. According to DOE laboratory officials, when DHS decided to include some DOE laboratories in its extramural program, it initially did not provide guidance to the laboratories that detailed the restrictions on them competing with the private sector for DHS R&D contracts. However, in a March 2004 letter to DOE's laboratories, DHS stated that federal acquisition regulations prohibiting DOE laboratories from competing with companies and academia will apply to DHS's extramural program. Accordingly, DOE laboratories are not permitted to directly respond to or participate as a team member in response to a request for proposals.

Nonetheless, DHS noted that the laboratories will have opportunities to participate in its R&D efforts. In its March 2004 letter, DHS stated that federal regulations do allow DOE laboratories to respond to certain kinds of R&D solicitations—known as broad agency announcements. Under federal acquisition regulations, agencies may use broad agency announcements to fulfill their requirements for scientific study and experimentation directed toward advancing the state of the art or increasing knowledge, rather than focusing on a specific system or hardware solution to a particular need. DHS officials told us that the majority of solicitations through the extramural program would be conducted through broad agency announcements, thereby allowing DOE and other federal laboratories to participate. DOE's laboratories, as well as other federal laboratories, companies, and academia typically respond to broad agency announcements with "white papers" that detail a specific research proposal. DHS would then competitively evaluate these white papers and determine whether DOE's laboratory, a company, or academia best fulfills a specific R&D need.

Some extramural DOE laboratory officials we spoke with expressed concern with DHS's decision to split DOE's laboratories into intramural and extramural groups. Extramural DOE laboratory officials warned that their laboratories may not be able to maintain certain research capabilities that could contribute to homeland security R&D if they could not receive

intramural funding. In addition, the officials were concerned that competition with the private sector could result in their laboratories receiving limited homeland security R&D funding. Laboratory officials also said that their particular laboratories should have been included in the intramural program because of their unique capabilities and history of successfully developing national security technologies that could be applied to DHS's missions. Moreover, DHS failed to provide them with any well-defined criteria that it used to determine which laboratories would participate in the intramural program. Laboratory officials questioned whether DHS officials' decisions were influenced by personnel temporarily detailed from DOE's laboratories, pointing out that the laboratories that sent most of the personnel temporarily detailed to the Science and Technology Directorate during DHS's initial organization were the same laboratories that were later selected to participate in the intramural program.

DHS officials we spoke with disagreed with these views, stating that the presence of employees from certain laboratories had no bearing on the selection of those laboratories for the intramural program. Instead, decisions regarding which laboratories would become part of the intramural program were made based on DHS's understanding of each DOE laboratory's core competencies and the laboratory's ability to help meet the intramural program's mission requirements. DHS officials told us that they also considered R&D project proposals that a number of DOE laboratories submitted based on the laboratories' initial understanding of DHS's needs and program requirements. DHS officials added that the decision to split DOE's laboratories into intramural and extramural groups was a natural choice, given the relative capabilities and expertise of some laboratories over others. Finally, DHS officials told us that the extramural laboratories may receive direct funding for certain tasks or projects if DHS determines that the laboratory has a critical or unique expertise or capability that fulfills a specific R&D need. For example, Brookhaven National Laboratory received $1.4 million from DHS in fiscal year 2004 primarily for R&D on radiological and nuclear countermeasures even though it is an extramural laboratory.

In letters to the Secretary of Homeland Security, Members of Congress from Idaho and New York—states where two extramural laboratories (Idaho National Engineering and Environmental Laboratory and Brookhaven National Laboratory) are located—expressed concern that DHS's plan to exclude these laboratories from its intramural R&D activities would not effectively use each of the laboratories' particular capabilities in

developing homeland security technologies. In response to the these concerns, DHS's Under Secretary for Science and Technology indicated in a March 4, 2004, letter to a Member of Congress that DHS would allow each DOE laboratory to choose whether it wished to be designated as an intramural or extramural laboratory. In addition, DHS would conduct an internal and external review of its policies for working with DOE's laboratories. DHS recently conducted, in conjunction with DOE, an internal review of these policies. Additionally, the newly created Homeland Security Science and Technology Advisory Committee, consisting of experts in homeland security issues, is assessing these policies. At the time of our review, it was unclear to what extent these reviews would affect DHS's policies for using DOE's laboratories and whether any of DOE's laboratories would choose to change their designation as an intramural or an extramural laboratory.

Some Laboratory Officials Believe that a Focus on Short-Term, Applied Research May Threaten the Development of Technologies Over the Long Term

To effectively use DOE's laboratories, DHS has to balance the immediate needs of users of homeland security technologies with the future needs for advanced technologies. DHS officials acknowledged that their initial efforts have focused on near-term applied R&D and helping homeland security end users (e.g., state and local first responders and federal agencies such as the Coast Guard) receive existing technologies in a timely manner. DHS has directed most of its support for long-term R&D through investments in university programs and fellowships to university students to increase their interest in pursuing careers in homeland security R&D. According to senior DHS officials, much of the Science and Technology Directorate's funding for homeland security R&D will be channeled through HSARPA and the Office of System Engineering and Development. Both of these offices intend to focus their efforts on short-term applied R&D and testing and evaluation of technologies. HSARPA plans to spend up to 10 percent of its R&D funds supporting revolutionary advanced concepts research devoted to developing breakthrough homeland security technologies, with the rest of its funding dedicated to developing prototypes of homeland security technologies with a 6-month to 2-year development horizon. The Office of Research and Development will conduct both short- and long-term R&D under its intramural program. However, even long-term projects will be required to provide short- and medium-term status reports that can be used to assess a project's progress.

DOE laboratory officials pointed out that, traditionally, DOE's laboratories have specialized in higher risk, longer-term work. They were concerned that DHS is focusing on a short- to medium-term development schedule,

which some of DOE's laboratories are not accustomed to. Some laboratories, especially those in DHS's extramural program, which will work primarily with HSARPA, may find it challenging to meet these shorter time frames for R&D.

Some laboratory officials are also concerned with what they believe is DHS's focus on short-term applied research. These officials believe that a short-term focus may threaten their long-term ability to attract and retain top scientific talent, build and maintain laboratory facilities, and develop effective homeland security technologies. These officials said that as DHS implements its R&D strategy, it must recognize the need to make long-term investments at DOE's laboratories. Furthermore, many of their laboratories' past successes in developing technologies in the short term have relied upon substantial investments in facilities, personnel, and advanced concepts research over the long term. These officials pointed out that reaching a scientific breakthrough has often required many years of funding to develop, test, and refine technologies. In addition, their success in attracting top scientific talent has depended on their laboratory's ability to provide for job sustainability, sufficient research resources, sophisticated research facilities, and opportunities to do ground-breaking science over the long term. They are therefore concerned that if DHS is focusing on short-term research, this could jeopardize their ability to create an attractive work environment for recruiting and retaining top talent to work on homeland security R&D. Some laboratory officials pointed out that it is expensive to maintain facilities to conduct homeland security R&D, especially for chemical countermeasures. They warned that without adequate investment from DHS, their laboratories may need to focus on other activities and perform work for other agencies in order to support their laboratory capabilities and personnel, perhaps reducing the personnel and facilities available for DHS R&D projects.

DHS officials agreed that it is necessary to make long-term investments in certain laboratory capabilities in order to create an enduring R&D complex for federal homeland security. Officials from the Office of Research and Development told us that they intend to use up to 20 percent of their intramural program funds to make long-term investments at DOE and other federal laboratories. Through targeted investments in personnel and research facilities, they hope to create an intellectual base dedicated to homeland security R&D that the nation can depend upon. DHS recently created the Office of Enduring Stewardship within the Science and Technology Directorate to consider DHS's long-term investments throughout DOE's laboratory complex. According to DHS officials, this

office will help determine which capabilities at DOE's laboratories will require long-term stewardship from DHS.

DHS Is Making Progress in Developing Controls to Manage Its Research Efforts at DOE's Laboratories

To determine whether a project's goals are being met and resources are being used effectively and efficiently, standards for internal control in the federal government require that program managers have access to relevant, reliable, and timely operational and financial data. For example, managers need (1) operational data to determine whether an agency is in compliance with various laws and regulations and (2) financial information to develop financial statements for periodic external reporting, and, on a day-to-day basis, to make operating decisions, monitor performance, and allocate resources. Internal control standards require such operational and financial information to be identified, captured, and distributed in a form and time frame that permits staff to perform their duties efficiently.

In this context, DHS's Science and Technology Directorate is developing management tools to monitor project milestones, costs, and deliverables for its R&D projects. Using standards developed by the Project Management Institute,[6] DHS's objectives for these project management tools are to, among other things,

- inform DHS managers and other stakeholders of the status of R&D projects during their execution;
- provide a standard, regular channel of communications between DHS and researchers in such a way as to establish trust and transparency between them;
- facilitate DHS's and researchers' ability to anticipate and manage change;
- contribute to DHS's assessment of the overall performance of researchers; and
- serve as a formal mechanism to ensure effective and efficient use of taxpayer funds.

[6]See Project Management Institute, *A Guide to the Project Management Body of Knowledg*e (Newtown Square, Pa.: 2000). This guide has been approved by the American National Standards Institute.

Each laboratory conducting R&D for DHS will complete a monthly report for each research portfolio in which it is engaged. For example, a laboratory conducting research in the research portfolios for both nuclear and radiological and chemical countermeasures would produce two separate monthly reports. In addition, an overall report for all of a laboratory's efforts will be produced. DHS is providing funding to organize Centers for Homeland Security that will house administrative support personnel at DOE's laboratories to help researchers track their projects.

The monthly reports are to contain summary information on a project's costs, schedule, and scope. While the exact form this summary information will take is still being developed, DHS officials told us that one way the information could be portrayed is as a red/yellow/green traffic light for cost, schedule, and scope status. For example, costs would be portrayed as (1) green, if the laboratory's estimate of the project's total cost is less than or equal to the project's total budget, (2) yellow, if the laboratory's estimate of the project's total cost is greater than the project's budget and a corrective action plan has been approved and implemented, and (3) red, if the project's estimated total cost is greater than its budget and no corrective action plan has been approved. Similar status designations would be made for project schedule and scope.

Quantitative performance metrics are also being developed in a number of areas and will be used in reports to track differences between the budgeted and actual costs of the R&D work performed and will measure schedule variances. In addition, the reports are to describe (1) the reasons for cost, schedule, and/or scope variances and any corrective actions underway; (2) important accomplishments during the reporting period; and (3) issues that could affect the execution of a project.

DHS plans to conduct regular merit reviews on a portfolio-by-portfolio basis—initially twice a year and eventually once a year. For each review, DHS will charter a panel that will include the cognizant portfolio manager as well as others, such as members of the Homeland Security Science and Technology Advisory Committee that was created by the Homeland Security Act of 2002. These review panels will assess how the technical approach being followed by R&D projects matches the research portfolio's requirements, the projects' progress to date, and remaining risk and ways of mitigating any identified risk.

Conclusions

The creation of DHS represents the largest reorganization of the federal government in more than 50 years. While we acknowledge DHS officials' concerns that they have had limited time since the department's initial organization in March 2003, it is important for DHS to complete its strategic plan and identify and set priorities for its R&D efforts as required by the Homeland Security Act of 2002. The act also requires that DHS coordinate the federal government's homeland security R&D efforts. More effective integration of research efforts between DHS, NNSA, and other agencies during DHS's strategic planning and its annual selection and setting of priorities for R&D projects could increase opportunities to leverage research efforts and identify gaps in the federal government's efforts to develop appropriate homeland security technologies. Effective integration is especially important for chemical and biological countermeasures, where DHS will depend upon basic research conducted by the Centers for Disease Control and Prevention, the National Institutes of Health, and others. Effective coordination between DHS and DOE is all the more critical because the departments must share the capabilities of the extensive DOE laboratory complex equally, and their mechanism for resolving priority conflicts at the laboratories has yet to be tested.

We are concerned that DHS's approach to funding R&D efforts may hinder its ability to use the full capabilities of the entire DOE laboratory system. Although DHS's decision to target its long-term investments towards a limited group of DOE laboratories has been explained as a strategic decision to maximize limited resources, we believe that annual project funding decisions and long-term investments in laboratory capabilities should be based on using and supporting the best science available. These funding decisions should be made using well-defined criteria that are clearly communicated to every potential contributor. In addition, while DHS has made clear that DOE's laboratories are allowed to compete for funding with private and academic researchers under specific circumstances, the laboratories may need additional guidance that details how they can comply with federal acquisition regulations and other restrictions that generally prohibit competition between federal and private research entities. We are encouraged by DHS's March 2004 decision to review its policies for working with DOE's laboratories, but the extent to which these reviews will affect DHS's R&D activities remains unclear.

Recommendations for Executive Action

To ensure that DHS appropriately integrates its R&D of homeland security technologies with complementary R&D efforts conducted across the federal government and that the extensive capabilities of DOE's laboratories can be brought to bear on the R&D of nuclear, biological, and chemical countermeasures, we recommend that the Secretary of Homeland Security direct the Under Secretary for Science and Technology to take the following four actions:

- Consistent with the Homeland Security Act of 2002, complete a strategic R&D plan that identifies priorities, goals, and objectives to identify and develop countermeasures to chemical, biological, radiological, nuclear, and other emerging terrorist threats.

- Ensure that this strategic plan is integrated with homeland security R&D efforts conducted by other federal agencies, such as NNSA, HHS, and the Department of Defense. This integrated strategic plan should detail how DHS will work with these agencies to establish governmentwide priorities, identify research gaps, avoid duplication of effort, and leverage resources.

- Develop and communicate to DOE's laboratories and other potential contributors to homeland security R&D efforts well-defined criteria for distributing annual project funding and for making long-term investments in laboratory capabilities for homeland security R&D.

- Develop, in cooperation with DOE, specific guidelines that detail the circumstances under which DOE laboratories and other federal R&D programs would compete for contracts with private sector and academic entities. These guidelines should describe the criteria used to select proposals, detail the method of evaluation, and contain procedures DOE's laboratories should use to ensure compliance with federal acquisition regulations and statutory requirements.

Agency Comments and Our Evaluation

We provided NNSA, the Department of Defense, and DHS with draft copies of this report for their review and comment. DHS's written comments are presented as appendix III. NNSA had no comments on the draft report, but noted that NNSA is in contact with DHS to assist it in its coordination efforts related to the use of DOE's laboratories. NNSA's letter is presented as appendix IV. The Department of Defense had no comments on the draft report.

DHS agreed with our recommendation to create a strategic R&D plan and noted that such a plan is critical to the success of the department. DHS stated that its Science and Technology Directorate has launched a formal, structured strategic planning process that will determine specific goals for the next 5 years, threats and vulnerabilities, and a list of prioritized deliverables for fiscal year 2005 through fiscal year 2010. DHS stated that it expected this plan to be completed in the early summer of 2004 and that the plan will be reviewed and updated annually.

DHS did not explicitly agree or disagree with our recommendation that this plan be integrated with homeland security R&D conducted by other agencies. However, DHS did provide information on the ongoing development of a national plan for homeland security science and technology by the Homeland Security Council, the National Security Council, the Office of Science and Technology Policy, and DHS. According to DHS, this national plan will highlight the high-priority areas for homeland security in the short-, mid-, and long-term, as well as lay out the roles and responsibilities for each federal department and agency with homeland security R&D programs. DHS also provided additional information on its interactions with NNSA, HHS, and the Department of Defense that we incorporated into the report as appropriate. We are encouraged that DHS is taking steps to work with other federal agencies and interagency groups to develop an integrated national plan for homeland security R&D.

DHS also provided information on its strategic planning for long-term investments in DOE's laboratories. For example, as was stated in our draft report, DHS noted that it requested that the newly formed Homeland Security Science and Technology Advisory Committee review DHS's policies for using DOE's laboratories and make recommendations on the most effective long-term policy. However, DHS did not respond directly to our recommendation that DHS should develop and communicate to DOE's laboratories well-defined criteria for distributing annual project funding. We continue to believe that communicating the criteria that will be used to make funding decisions to DOE's laboratories and other potential contributors to homeland security R&D efforts would assist them in developing proposals that would best meet DHS's requirements.

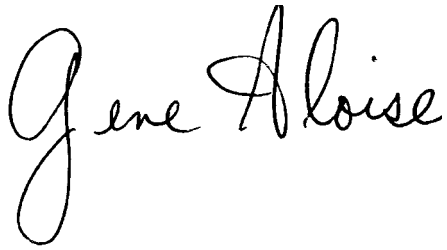
Finally, DHS did not agree or disagree with our recommendation to develop guidelines that detail how DOE's laboratories would compete for contracts with private sector and academic entities. As our draft report stated, DHS noted that it asked each laboratory to decide whether to participate in the

Science and Technology Directorate's strategic planning and program development processes as an intramural laboratory or to respond to broad agency announcements open to the private sector as an extramural laboratory. According to DHS, Argonne National Laboratory, Bechtel Nevada, Brookhaven National Laboratory, Idaho National Engineering and Environmental Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, and Sandia National Laboratories have since decided to participate in DHS R&D activities as intramural laboratories. DHS stated in its comments that current regulations cover inclusion of the remaining DOE laboratories and other federal laboratories in normal solicitation processes. We agree with DHS, and our draft report stated, that federal acquisition regulations permit DOE and other federal laboratories to respond to broad agency announcements. However, laboratory officials told us throughout our review that they have little experience responding to these types of solicitations. Therefore, we continue to believe that specific guidelines detailing how the laboratories should respond to DHS's broad agency announcements would help ensure that regulatory requirements governing competition between federal laboratories and private sector researchers are met.

We are sending copies of this report to the Secretary of Homeland Security; the Secretary of Defense; the Secretary of Energy; the Administrator, NNSA; the Director, Office of Management and Budget; appropriate congressional committees; and other interested parties. We will also make copies available to others upon request. In addition, the 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. Key contributors to this report were Ryan T. Coles, Jonathan G. Nash, F. James Shafer, Jr., and Ann M. Ulrich.

Sincerely yours,



Gene Aloise
Acting Director, Natural Resources and Environment

NNSA Has Strengthened Its Project Management Controls

This appendix discusses changes the National Nuclear Security Administration's (NNSA) Nonproliferation and Verification Research and Development Program has made to the controls it uses to monitor project milestones, costs, and deliverables for R&D conducted at the Department of Energy's (DOE) laboratories since our August 2002 report.[1]

The mission of NNSA's program is to conduct needs-driven research, development, testing, and evaluation of new technologies that are intended to strengthen the United States' ability to detect and analyze the global spread of nuclear weapons and technology. DOE's laboratories carry out most of the program's research, while officials at NNSA's headquarters and operations offices provide general oversight and contracting support and serve as liaisons to users of the technologies developed. The program manages R&D of space- and ground-based remote sensing and other technologies used by defense and intelligence agencies to verify and monitor arms control treaties.

The program is currently divided into two specific research areas:

- *Nuclear Explosion Monitoring.* Develops and manufactures ground- and satellite-based sensors and computer software for detecting, locating, identifying, and characterizing nuclear explosions when they occur underground, underwater, in the atmosphere, or in space.

- *Proliferation Detection.* Develops, demonstrates, and delivers long- and short-range sensor technologies to detect the spread of nuclear, chemical, and biological weapons, materials, and technologies worldwide.

NNSA and its R&D program are key players in the United States' nonproliferation efforts. NNSA derives its important role from its unique understanding and expertise related to nuclear weapons and nuclear power, based in large measure on the world-class research, design, and engineering capabilities found at DOE's laboratories. Some examples of successful research projects conducted by NNSA's Nonproliferation and Verification R&D Program include:

[1]U.S. General Accounting Office, *Nonproliferation R&D: NNSA's Program Develops Successful Technologies, but Project Management Can Be Strengthened*, GAO-02-904 (Washington, D.C.: Aug. 23, 2002).

- The development of ground-based technology for detecting in real time short-lived radioactive gases released during nuclear explosions and satellite-based sensors that are sensitive to x-ray, gamma-ray, and neutron emissions.

- Detection equipment that was fitted into an aircraft and flown over the World Trade Center site following the September 11, 2001, terrorist attacks to monitor air samples for hazardous chemicals.

- A decontamination formulation that was used to assist the cleanup of congressional office buildings contaminated with anthrax and equipment to detect the presence of chemical agents in the Washington, D.C., Metro subway system.

The Homeland Security Act of 2002 transferred the chemical and biological R&D work of NNSA's program to the Department of Homeland Security (DHS), along with some of NNSA's counter-nuclear smuggling R&D.

To monitor the progress of NNSA R&D projects by headquarters program managers, participating laboratories are required to submit, on an annual basis, project life-cycle plans. These plans are to contain detailed statements of work that describe the project's contributions to overall program goals, scientific and technical merit, and the specific tasks to be accomplished. In addition, laboratories are required to submit quarterly reports that indicate all projects' progress to date, issues and problems encountered, milestones and schedules, and cost data. However, we reported in August 2002 that plans and reports were often missing these data, and the program management information system used by the program was not designed to track whether projects are on time or within budget, eliminating an important tool that could be used to track projects, improve communications across the program, and provide transparency to other agencies and to the Congress.

Since our August 2002 report, NNSA has improved the controls it uses to provide the operational and financial data that its managers use to monitor project costs, milestones, and deliverables. The program has implemented a Web-based project management information system that is designed to contain the information needed for proposal evaluation, budget planning, funding decisions, preparation of work authorizations, responses to congressional inquiries, and other reports on the status and costs of R&D projects managed by the program. In addition, the program has emphasized the importance of performance metrics and the use of the Office of

Management and Budget's Program Assessment Rating Tool (PART). PART is a series of diagnostic questions designed to provide a consistent approach to rating federal programs. Drawing upon available performance and evaluation information, the PART questionnaire attempts to determine the strengths and weaknesses of federal programs with a particular focus on individual program results. PART asks, for example, whether a program's long-term goals are specific, ambitious, and focused on outcomes, and whether annual goals demonstrate progress toward achieving long-term goals.[2]

NNSA's R&D program is also making increased use of project reviews. Program managers and potential users of technologies developed by the program conduct regular reviews of each project before key decisions are made, such as whether to proceed from exploratory research into product development. The reviews examine how well the project is linked to user needs, the strength of the researchers' scientific or technical approach, and the researchers' ability to carry out the project effectively and efficiently. The reviews also involve outside experts from the academic or private sector communities with a strong relevant science background.

DOE is in the process of developing a departmentwide project management system called the E-Government Corporate R&D Electronic Portfolio Management Environment. This system will, according to DOE, consolidate information currently contained in a myriad of existing program management systems and provide critical project proposal, fund distribution, and performance data to track research projects from proposal submission to project closeout. By the end of fiscal year 2004, DOE plans to deploy a module of the project management system that will allow DOE's laboratories to electronically submit proposals for new and ongoing R&D. This module will also give DOE managers the ability to receive, review, and respond to those proposals electronically. The remaining module of the project management system that will provide for, among other things, electronic merit reviews; project tracking and reporting; and program planning, analysis, and evaluation is scheduled to be deployed by the end of fiscal year 2006.

[2]For more information on PART, see U.S. General Accounting Office, *Performance Budgeting: Observations on the Use of OMB's Program Assessment Rating Tool for the Fiscal Year 2004 Budget*, GAO-04-174 (Washington, D.C.: Jan. 30, 2004).

Objectives, Scope, and Methodology

This report examines (1) whether DHS has completed a strategic R&D plan and coordinated its efforts with other federal agencies conducting homeland security R&D; (2) how DHS plans to use DOE's laboratories to carry out its responsibilities for R&D on nuclear, biological, and chemical detection and response technologies; and (3) what controls DHS is establishing to monitor project milestones, costs, and deliverables for R&D conducted at DOE's laboratories. In addition, we report on how NNSA's Nonproliferation and Verification Research and Development program has changed its project management controls since our August 2002 report.[1]

To determine whether DHS has completed a strategic R&D plan and coordinated its efforts with other federal agencies conducting homeland security R&D, we interviewed officials from DHS, DOE, and NNSA. We also received written responses to questions provided to the Office of Science and Technology Policy in the Executive Office of the President. Because DHS was undergoing its initial organization at the time of our review, and documented plans, policies, and procedures were still being developed, our examination of DHS's strategic planning and coordination activities focused on interviews with agency officials and reviewing DHS's preliminary planning documents. When officials provided their views and opinions on various issues as representatives for their agencies, we attempted to corroborate the information with other agency officials. In addition, we considered testimony and statements made by several senior DHS officials during congressional hearings on the status of DHS's R&D programs. We reviewed the relevant sections of the Homeland Security Act of 2002 that established the responsibilities of the Directorate of Science and Technology. To better understand DHS's relationship with DOE, we reviewed a memorandum of agreement between the two agencies and other documentation that governs DHS's access to DOE's laboratories. We also interviewed Department of State officials overseeing the Technology Support Working Group to better understand DHS's relationship and coordination with this interagency group.

To determine how DHS plans to use DOE's laboratories, we obtained R&D proposal guidance that DHS provided to DOE's laboratories and the criteria that DHS used to review these proposals. We also obtained the results of a DHS-sponsored peer review of DOE laboratory proposals. We reviewed

[1]U.S. General Accounting Office, *Nonproliferation R&D: NNSA's Program Develops Successful Technologies, but Project Management Can Be Strengthened*, GAO-02-904 (Washington, D.C.: Aug. 23, 2002).

federal acquisition regulations and statutory requirements governing the operation of DOE's laboratories to determine the laboratories' ability to engage in openly competitive solicitations with companies and academia. We collected and analyzed documents and correspondence between Science and Technology Directorate officials and DOE's laboratories that detailed DHS's plans for using DOE's laboratories. Additionally, we obtained correspondence between Members of Congress and senior DHS staff concerning the DHS use of DOE's laboratories. We examined budget information for the Science and Technology Directorate's R&D portfolios for fiscal years 2003 and 2004 and its budget request for fiscal year 2005. Additionally, we analyzed the amount of funding each DOE laboratory received from DHS for fiscal years 2003 and 2004. To assess the reliability of the budgetary information used in this report, we obtained responses from key DHS database officials to a series of questions focused on data reliability, covering issues such as data entry access, internal control procedures, and the accuracy and completeness of the data. We added follow-up questions whenever necessary. We also corroborated the budgetary data with other sources, such as congressional testimony from DHS officials, whenever possible. We found no discrepancies with the data DHS provided. Based on our work, we determined that these data were sufficiently reliable for the purposes of this report.

To obtain the views of DOE's laboratories on DHS's plans, we conducted focus groups with program managers and individual project researchers at seven DOE laboratories. We selected five DOE laboratories—Sandia, Los Alamos, Lawrence Livermore, Pacific Northwest, and Oak Ridge National Laboratories—because they received the majority of all funding DHS distributed to DOE laboratories and were designated by DHS to participate in its intramural program. We selected the remaining two laboratories—Argonne and Brookhaven National Laboratories—because they also conduct homeland security R&D for DHS, NNSA, or other federal agencies and, at the time of our review, were designated by DHS to participate in its extramural program. For the focus groups with the program managers, we selected laboratory officials responsible for overseeing R&D on chemical, biological, radiological, and nuclear countermeasures for NNSA, DHS, and other agencies. We relied upon laboratory directors and program managers to help identify appropriate individuals to participate in our focus groups with researchers. Those selected to participate in the focus groups tended to be senior principal project investigators responsible for developing homeland security and nonproliferation technologies at their laboratories. During each focus group, we asked targeted questions in order to generate discussion on various issues related to this review, including questions on

the laboratory proposal development processes, the means of obtaining user input to the R&D process, short-term versus long-term research, and researchers' views on appropriate levels of monitoring/oversight/coordination between the laboratories, DHS, and NNSA. In order to solicit open and candid responses to our questions, we conducted the focus groups for the researchers separately from the focus groups with the program managers. More than 90 individuals participated in these focus groups.

To determine what controls DHS is establishing to monitor project milestones, costs, and deliverables for R&D, we examined documents that outline DHS's plans to oversee R&D conducted at DOE's laboratories. We compared these plans to standards laid out in GAO's *Standards for Internal Control in the Federal Government* (GAO/AIMD-00-21.3.1, November 1999). We analyzed DHS's guidelines for developing R&D execution plans and related documentation on DHS's proposed use of quantitative performance metrics and merit reviews. To determine how NNSA's program has changed its project management controls since our August 2002 report, we interviewed NNSA officials and examined various polices, procedures, and documents related to NNSA's project management systems. We considered how NNSA has incorporated the use of performance metrics and the Office of Management and Budget's Program Assessment Rating Tool. In addition, we examined NNSA's plans to use DOE's departmentwide project management system—the E-Government Corporate R&D Electronic Portfolio Management Environment.

We conducted our review from August 2003 through April 2004 in accordance with generally accepted government auditing standards.

Comments from the Department of Homeland Security

Homeland Security

May 12, 2004

Mr. Norman J. Rabkin
Managing Director, Homeland Security
and Justice
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Rabkin:

The Department of Homeland Security (DHS) appreciates the opportunity to review the United States General Accounting Office (GAO) draft report entitled "DHS Needs a Strategy to Use DOE's Laboratories for Research on Nuclear, Biological, and Chemical Detection and Response Technologies," GAO-04-653, May 2004, a report to the Chairman, Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, United States Senate.

The GAO was asked to determine: (1) whether DHS has completed a strategic research and development (R&D) plan and coordinated its efforts with other Federal agencies; (2) how DHS plans to use DOE's laboratories to carry out its R&D; and (3) what controls DHS is establishing to monitor projects at DOE's laboratories. Based on its review, conducted from August 2003 through April 2004, the GAO recommends that the Secretary of Homeland Security

1) Complete a strategic R&D plan;
2) Ensure that this plan is integrated with homeland security R&D conducted by other Federal agencies;
3) Develop criteria for distributing annual funding and for making long-term investments in laboratory capabilities; and
4) Develop guidelines that detail how DOE's laboratories would compete for funding with private sector and academic entities.

The Department offers the following comments regarding these recommendations.

(1) Complete a strategic R&D plan: The Department of Homeland Security agrees that a strategic plan for research, development, testing and evaluation (RDT&E) is critical to the success of the Department. Since the initiation of the GAO's review, the Department's Science and Technology (S&T) Directorate has launched a formal,

requirements, national guidance, operational end-user needs, and the subject matter expertise of the S&T Directorate's staff. The S&T Directorate's strategic planning process determines mission space, strategic goals for the next five years, threats and vulnerabilities, and a list of prioritized deliverables for FY 2005 through FY 2010. The output of this process, expected to be completed in early summer 2004, will be used to guide RDT&E investment decisions for the next five years. The strategic RDT&E plan will be reviewed and updated annually.

(2) Ensure that this plan is integrated with homeland security R&D conducted by other Federal agencies: The Department of Homeland Security, Science and Technology Directorate, covers a wide range of homeland security-relevant research and development. The Department of Homeland Security fully recognizes, however, that the S&T Directorate does not and cannot cover every aspect of homeland security RDT&E. Many organizations across the U.S. Government contribute to the science and technology base needed to enhance the nation's capabilities to protect itself, thwart terrorist acts and fully support the conventional missions of the operational components of the Department. In the Homeland Security Act of 2002, Congress directed that "The Secretary, acting through the Under Secretary for Science and Technology, shall have the responsibility for...developing, in consultation with other appropriate executive agencies, a national policy and strategic plan for, identifying priorities, goals, objectives and policies for, and coordinating the Federal Government's civilian efforts to identify and develop countermeasures to chemical, biological, radiological, nuclear, and other emerging terrorist threats, including the development of comprehensive, research-based definable goals for such efforts and development of annual measurable objectives and specific targets to accomplish and evaluate the goals for such efforts."

The development of this National Plan for Homeland Security Science and Technology is currently underway under the auspices of the Homeland Security Council (HSC), the National Security Council (NSC), the Office of Science and Technology Policy (OSTP) and the Department of Homeland Security. This National Plan will highlight the high priority areas and scientific innovations for homeland security in the short-, mid- and long-term time periods as well as laying out the roles and responsibilities for each Federal Department and agency with homeland security-related RDT&E programs.

The National Plan for Homeland Security Science and Technology will incorporate much of the strategic planning described in the preceding paragraphs as well as significant interagency input. Numerous interagency groups, including the Counterproliferation Technology Coordinating Committee (CTCC) and the Office of Science and Technology Policy (OSTP) National Science and Technology Council, have already conducted gap analyses and strategic planning in some areas of homeland security-related RDT&E across the U.S. Government. The National Plan, which will ensure integration of DHS S&T programs with those of other Departments and agencies, is scheduled to be completed by late summer 2004.

The Report specifically addresses gaps in DHS efforts to coordinate and establish partnerships with the Department of Energy's (DOE's) National Nuclear Security

the Department of Defense (DoD). Interagency communication is fostered in the working groups of both the Counterproliferation Technology Coordinating Committee (CTCC) and the Office of Science and Technology Policy's National Science and Technology Council (NSTC). S&T personnel are active participants in several of these interagency working groups and have begun to take leadership roles in these groups as appropriate.

In addition, DHS and DOE/NNSA staff members working in radiological/nuclear countermeasures have met fourteen times between July 2003 and May 2004 to discuss joint interests in various RDT&E topics. DOE/NNSA staff participated in the DHS kick off meeting for the radiological/nuclear countermeasures FY 2004 program. In coordination with the HHS Office of Emergency Preparedness, DHS Biological Countermeasures personnel have developed a material threat determination process to support the HHS Bioshield program. DHS S&T Directorate works closely with the Department of Defense and other Federal agencies to coordinate biodefense research efforts and critical biocontainment laboratory infrastructure at the National Interagency Biodefense Campus at Fort Detrick.

(3) Develop criteria for distributing annual funding and for making long-term investments in laboratory capabilities: Strategic planning in the S&T Directorate is centered around Integrated Product Teams (IPTs), which are made up of membership from each of the S&T Offices – Office of Plans, Programs and Budgets (PPB); Office of Research and Development (ORD); Homeland Security Advanced Research Projects Agency (HSARPA); and the Office of Systems Engineering and Development (SED) – with expertise in the particular program or portfolio. The membership of each IPT works as a team to develop mission space, strategic goals, and a prioritized list of deliverables. The members of the IPT work together to determine which entities can best provide the required RDT&E, National or Federal Laboratories, private industry or academia. All funding awards are based on technical merit and relevance to the DHS mission.

The Department of Homeland Security has also requested that the newly formed Homeland Security Science and Technology Advisory Committee (HSSTAC) review the current policy for accessing the DOE National Laboratory capabilities and make recommendations on the most effective long term DHS policy. The policy that has evolved takes into consideration potential conflict of interest issues, creating an enduring long term Federal stewardship program where R&D facilities and trained staff remain top priorities, and coordination of activities occurs through the Department of Energy. DHS requests a broad, unconstrained view of all potential options or models to access DOE national laboratory scientists.

While the current DHS R&D focus is on near term technical solutions for DHS high priority missions, DOE and DHS have recently formed an interagency working group to discuss the long term basic science research needs of both agencies. The DOE Office of Science will examine its basic research programs that currently address DOE mission requirements to determine whether any basic research already underway might also be relevant to DHS long term needs. DHS/S&T will be conducting an initial review in the

fourth quarter of FY 2004 of the DOE Laboratory Directed Research and Development funding. These projects are funded in part by DHS program dollars and thus must support DHS mission requirements. Based on these findings, S&T will set policy and criteria for long term investments in laboratory capabilities.

(4) Develop guidelines that detail how DOE's laboratories would compete for funding with private sector and academic entities: The Department of Homeland Security, through Section 309 of the Homeland Security Act of 2002, is provided access to the National Laboratories and sites managed by the Department of Energy to carry out the missions of DHS. All laboratories and sites are eligible to execute DHS mission-directed projects through the Office of Research and Development consistent with S&T mission requirements. All funds allocated to these entities are performance-based. They will be reviewed annually to assess technical competency, mission and user-relevancy, and management effectiveness.

The DHS Science and Technology Directorate, wishing to make the best use of each of these laboratories and sites in consonance with statute, regulation, and policy, asked laboratories and sites to make a decision regarding their desired mode of interaction with the Directorate – to participate in S&T's internal strategic planning and program development processes or, if otherwise permissible under applicable law, regulation, contract, and DOE policy, to respond to certain types of S&T solicitations open to the private sector.

On March 31, 2004, the following national laboratories communicated their decision to Under Secretary McQueary to participate in S&T's internal strategic planning and program development processes: Argonne National Laboratory; Bechtel Nevada; Brookhaven National Laboratory; Idaho National Engineering and Environmental Laboratory; Lawrence Livermore National Laboratory; Los Alamos National Laboratory; Oak Ridge National Laboratory; Pacific Northwest National Laboratory; and the Sandia National Laboratories. A consequence communicated to the national laboratory directors in advance of their decision is that, as a result of such participation, a national laboratory will be ineligible to participate in open solicitations to the private sector for a period of three years after it ceases engagement in the S&T strategic planning and program development processes.

The remaining Federal and National Laboratories and sites are able to submit proposals to S&T solicitations that do not involve direct competition amongst proposers. Current regulations cover inclusion of these entities in the normal solicitation process.

We also have a suggested editorial change. For accuracy, the first full sentence on the top of page 18 should read ". . . radiological and nuclear countermeasures . . ." based on the mission of the Brookhaven National Laboratory.

Thank you again for the opportunity to comment on the draft report "DHS Needs a Strategy to Use DOE's Laboratories for Research on Nuclear, Biological, and Chemical

Detection and Response Technologies," GAO-04-653, May 2004. If you have questions or need clarification regarding our comments, please contact Mr. Thomas Krones, (202) 401-5861, or e-mail: thomas.krones@dhs.gov.

Mary Ann Alderman

Anna F. Dixon
Director, Bankcard Programs
and GAO/OIG Liaison

Comments from the National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

MAY 0 6 2004

Mr. Gene Aloise
Acting Director
Natural Resources and Environment
General Accounting Office
Washington DC 20548

Dear Mr. Aloise:

The National Nuclear Security Administration (NNSA) appreciates the opportunity to have reviewed the General Accounting Office's (GAO) draft report, "HOMELAND SECURITY: DHS Needs a Strategy to Use DOE's Laboratories for Research on Nuclear, Biological, and Chemical Detection and Response Technologies." We understand that GAO was asked to determine whether DHS has completed a strategic Research and Development plan and coordinated their efforts with other federal agencies; how to utilize our laboratories; and, what controls are in place to monitor projects at out laboratories.

NNSA has no comment regarding the report. However, we are in contact with DHS to assist them in their coordination efforts related to the use of our laboratories. We stand ready to assist DHS in achieving their Research and Development goals.

Should you have any questions related to this response, please contact Mr. Richard Speidel, Director, Policy and Internal Controls Management. He may be contacted at 202-586-5009.

Sincerely yours,

Michael C. Kane
Associate Administrator
for Management and Administration

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