

**Statement of K. David Nokes  
Sandia National Laboratories**

**United States House of Representatives  
Committee on Energy and Commerce  
Subcommittee on Oversight and Investigations**

**July 9, 2002**

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**SUMMARY OF MAJOR POINTS**

- A robust and comprehensive science and technology (S&T) portfolio within the Department of Homeland Security (DHS) will be essential.
- Urgent problems can be at least partially solved by putting existing, known technology into the hands of the people in the field who have day-to-day responsibility for homeland security.
- Sandia has demonstrated equipment that would have a high probability of detecting clandestine nuclear weapons and radiological dispersal devices if properly deployed.
- Substantial work is needed to protect large urban areas from clandestine nuclear weapons, radiological dispersal devices, and chemical and biological weapons.
- Each Under Secretary of Homeland Security should have authority for “conducting a national scientific research and development program to support the missions of the Department” for which he or she is responsible, “. . . including directing, funding, and conducting research and development relating to the same” (as per Sec. 301 (2) of the President’s bill).
- Each Under Secretary of Homeland Security should appoint a Director of Research and Development with authority to immediately create networked laboratory systems (“virtual national laboratories”) through cooperative arrangements.
- The Directors of Research and Development reporting to the Under Secretaries for Homeland Security should be assisted by Laboratory Liaison Councils with representation from the institutions of their networked laboratory systems.
- Directors of Research and Development should have authority and appropriated funding to originate and award Cooperative R&D Agreements (CRADAs) and other technology transfer mechanisms between virtual national laboratories and industry on an expedited basis.
- DHS legislation should authorize all relevant federally funded R&D institutions to accept direct tasking from the DHS, rather than going through a work-for-others procurement process.
- An essential first step for the S&T portfolio at DHS will be developing strategic planning and prioritization of the S&T investments of the Department. As recommended by the National Research Council, an office of “Under Secretary for Technology” should be created, reporting to the Secretary, to perform this and other coordinating functions.

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Mr. Chairman and distinguished members, it is my pleasure to appear again before this committee. I am David Nokes, Director of the Systems Assessment and Research Center and Coordinator for Sandia National Laboratories' homeland security and combating terrorism activities. My statement is an addendum to the one I provided at your June 25 hearing.

I would like to provide Sandia's views on the role of Science and Technology (S&T) within the new Department of Homeland Security (DHS) and some thoughts on how S&T might be organized.

We believe that a robust and comprehensive S&T portfolio within DHS is absolutely essential if this country is to achieve the breakthrough improvements that it must achieve in homeland security performance. Furthermore, the S&T program must address a range of very different needs. It is important to recognize that the S&T needs of DHS are a continuum ranging from off-the-shelf items to the fundamental research necessary to solve exceptionally difficult problems.

We must first address the urgent, pressing problems that can at least be partially solved by putting existing, known technology into the hands of the people in the field who have the day-to-day responsibility for homeland security. This task is largely one of quickly establishing performance requirements and then transferring the technology to commercial entities for efficient production.

An example of this class of problem is the detection of clandestine nuclear weapons and Radiological Dispersal Devices (RDDs), so-called "dirty bombs," crossing into the United States at legal points of entry. Sandia has demonstrated equipment that, within this constrained environment, has a very high probability of detecting such devices, even when shielded, and alerting officials in real time. We have demonstrated a very low rate

of false and nuisance alarms. I believe that we are well-positioned to move beyond the demonstration stage and implement widespread deployment at ports of entry.

Among the challenges that require substantial additional work are detection systems for chemical and especially biological attacks. Although point sensors for some agents exist and limited demonstrations of area sensors have been performed, much developmental work will be required to broaden the spectrum of agents that are detectable, lower the false alarm rate, and ensure continuous operation. In addition, the command and control architecture to network these sensors into an effective and affordable system that can protect large urban areas has not been designed.

Detecting clandestine nuclear weapons or RDDs in large urban areas (as opposed to ports of entry) is a problem that also needs substantial research. Although, unlike chemical or biological devices, radiological weapons all have a detectable signature prior to use, the limitations of physics prevent individual sensors from affording a large detection range. The problem becomes command and control of networks of sensors and developing a strategy that optimizes performance and cost.

An essential first step for the S&T portfolio at DHS will be developing strategic planning and prioritization of the S&T investments of the Department. This must be driven by threat and vulnerability analyses that identify the areas with greatest need.

The S&T needs of the DHS are exceptionally diverse because of the great variety of the individual elements of its mission. Each Under Secretary of Homeland Security will have unique R&D requirements. Clearly, the Under Secretary for Chemical, Biological, Radiological, and Nuclear Countermeasures will need access to a substantially different set of R&D resources than the Under Secretary for Border and Transportation Security.

We recommend that each Under Secretary create a laboratory network tailored for his or her missions by directly tasking existing institutions that possess the required competencies. We call this entity a “Virtual National Laboratory,” and it has already been tried and proven as an effective model for multi-institutional programs involving research and technology development. Virtual national laboratories may be of permanent or limited duration and can be reconfigured as necessary for evolving requirements.

To illustrate, the Under Secretary for Chemical, Biological, Radiological, and Nuclear Countermeasures may design one or more matrixed laboratory systems specific to his needs that include representation from the National Institutes of Health, some DOE/NNSA labs, leading research universities, and the pharmaceutical industry. The Under Secretary for Border and Transportation Security may design one or more matrixed laboratory systems specific to her needs that include representation from the Naval Research Laboratory and other DoD labs, DOE/NNSA, industry, and universities.

Each of these “virtual national laboratories” would have a defined organizational structure with a laboratory director and program directors, although it would own no real property. The laboratory director would manage a Laboratory Liaison Council (LLC) with representation from the constituent institutions. The LLC would be the Under Secretary’s vehicle for direct access to the national laboratory system. He would not have to go through each institution’s sponsoring federal agency in a “work-for-others” procurement process. This structure is illustrated in the diagram attached as supplemental material to my statement.

A significant advantage of this concept is that it encourages competition of the right sort—competition of ideas (not direct competition of labs for money)—and cooperation on results, pulling together the right resources for a particular mission focus. It encourages rapid transition of the fruits of research into application, and helps avoid the “valley of death” that often prevents promising research from being developed and deployed.

Specific suggestions follow:

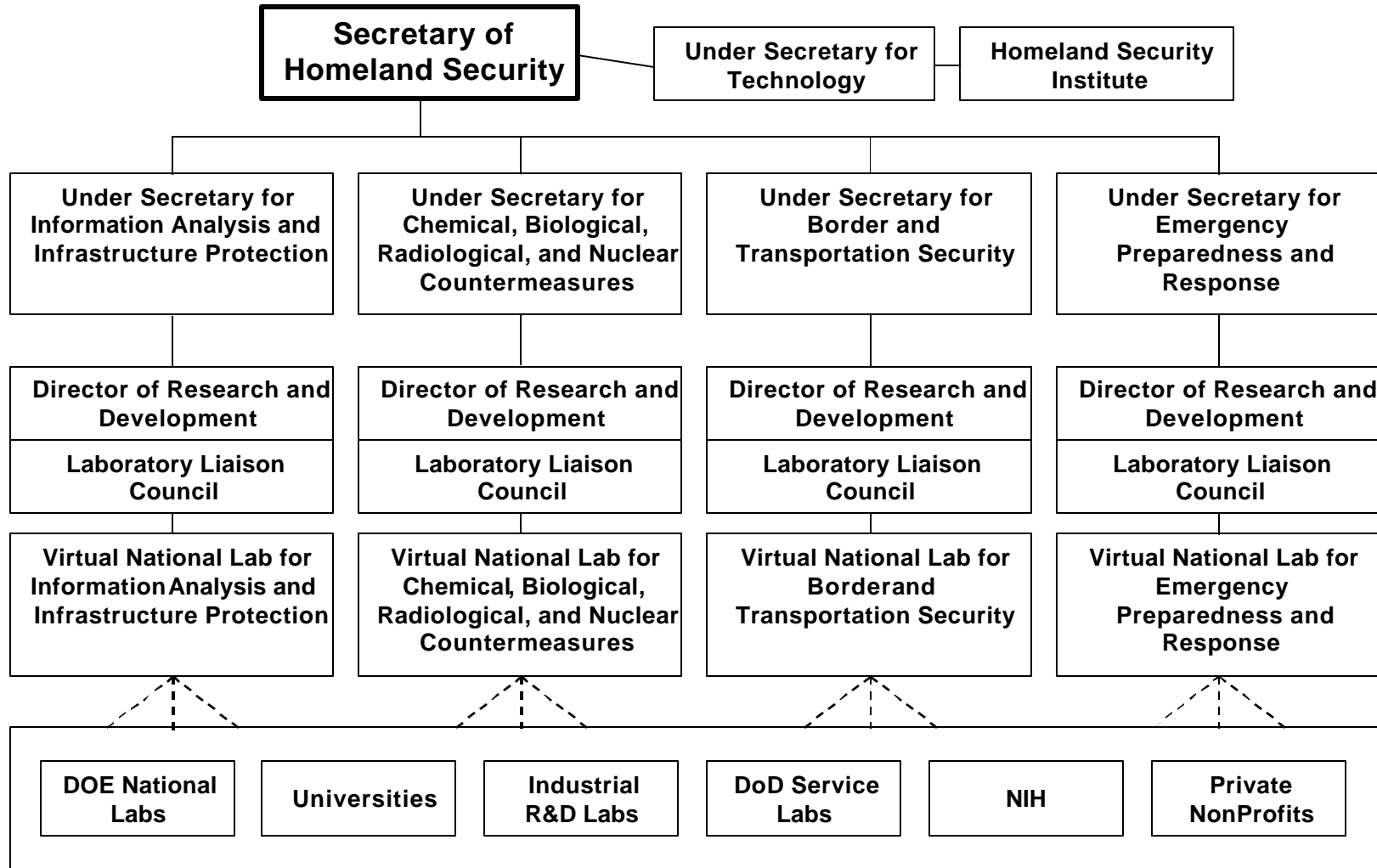
- Each Under Secretary should have authority for “conducting a national scientific research and development program to support the missions of the Department” for which he or she is responsible, “. . . including directing, funding, and conducting research and development relating to the same” (as per Sec. 301 (2) of the President’s bill).
- In addition, each Under Secretary should appoint a Director of Research and Development with authority to immediately create networked laboratory systems (virtual national laboratories) through cooperative arrangements with federal, academic, and private research institutions. Appropriate funding will be required.

- Directors of Research and Development will be assisted by Laboratory Liaison Councils with representation from the institutions of the virtual national laboratory.
- Directors of Research and Development should have authority and appropriated funding to originate and award Cooperative Research and Development Agreements (CRADAs) and other technology transfer mechanisms between virtual national laboratories and industry on an expedited basis.
- DHS legislation should authorize all relevant federally funded R&D institutions to accept direct tasking from the DHS and should instruct “landlord” agencies to facilitate DHS taskings of institutions under their sponsorship.
- At least initially, DHS should rely on the established great laboratories of the nation rather than creating new ones for its science and technology (S&T) program. There is insufficient time to establish a “green field” laboratory that can make contributions on the scale required in a timely manner.
- Thought must be given to ensure that S&T activities are agile and not encumbered with bureaucratic processes that stifle the imaginative and innovative work required if we are to be successful. New processes will be necessary in some cases, rather than importing existing ones from organizations brought into the new department.
- As recommended by the National Research Council in their recent report, *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism*, an office of “Under Secretary for Technology” should be created, reporting to the Secretary (p. 12–6). This office will manage a strategic, peer-reviewed research program with universities, national laboratories, and industry. Sustained funding at the mission level will be required.
- Also as recommended by the National Research Council (p. 12–7), a Homeland Security Institute should be established as a Federally Funded Research and Development Center (FFRDC) under the direction of the Under Secretary for Technology. This entity should perform policy and systems analysis, help define standards and metrics, and assist agencies with evaluating technologies for deployment.

The creation of the new DHS will be an enormous undertaking, and we appreciate your hard work helping to achieve an effective structure for securing our homeland. Sandia is committed to contributing to this urgent undertaking.

Thank you, Mr. Chairman. I look forward to your questions.

# Department of Homeland Security Proposed Science and Technology Structure





## WITNESS DISCLOSURE INFORMATION

**Witness name:** K. David Nokes

**Capacity in which appearing:** Representative of a non-government entity

**Name of entity being represented:** Sandia National Laboratories (GOCO)

**Position held:** Director, Systems Assessment and Research Center

**Parent organization (managing contractor):** Lockheed Martin Corporation

**Federal contract:** Management and operating contract between Sandia Corporation and U.S. Department of Energy, DE-AC04-94AL85000.

FY2000 cost: \$1,540,019,000; negotiated fee: \$16,110,000.

FY2001 cost: \$1,580,187,000; negotiated fee: \$16,300,000.

FY2002 cost: \$1,684,552,000; negotiated fee: \$17,270,000.

### **Career biography:**

K. David Nokes is Director of the Systems Assessment and Research Center at Sandia National Laboratories in Albuquerque, New Mexico, which performs analysis and design activities in support of the Intelligence Community. Effective July 2002, Mr. Nokes was appointed Vice President of Sandia's National Security & Arms Control Division with responsibility for the laboratory's arms control, threat assessment, security technology, nonproliferation, and international programs.

Mr. Nokes was a member of Sandia National Laboratories' nuclear weapons program from 1960 to 1989. He designed various electro-mechanical and explosive systems for both conventional and nuclear weapon systems. In 1982, he was named Supervisor of the W81 Standard Missile 2 (SM2) Navy Tactical Warhead Development Division. In 1984, he was assigned as supervisor of Sandia Albuquerque's Phase I and 2 Division, managing all nuclear weapons system's concept and feasibility studies.

In 1989, Nokes was appointed Special Scientific Advisor to the Assistant to the Secretary of Defense (Atomic Energy), providing advice on nuclear weapon safety, security, and reliability issues. In 1991, he was named Manager of the Trident Department with responsibility for Sandia's development and production activities for the Navy's strategic nuclear weapons, the W76 and W88 warheads, and the Mark 5 arming, firing, and fuzing system. Mr. Nokes became Manager of Sandia's Surety Technology Program in 1992, managing all research and development activities for nuclear weapon safety, security, control, and assessment. In 1993, he was designated as Manager of Sandia's Cooperative Measures Program, responsible for developing programs of cooperation with the former Soviet Union, including Lab-to-Lab activities with Russia's Nuclear Weapon Laboratories, the Safe Secure Dismantlement program, and Sandia's involvement in other government technical cooperative activities.