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INTRODUCTION

Mr. Chairman, Senator Thompson, members of the Committee; my name is William Madia, and I am Director of the Department of Energy's Oak Ridge National Laboratory and past Director of their Pacific Northwest National Laboratory. I am pleased to provide this testimony on how best to organize our nation's science and technology capabilities to help secure our homeland against terrorist attack.

The challenge of assuring our homeland security is complex. I know the Administration and Members of this Committee have been considering the many issues involved in assuring our government is properly organized and well prepared to provide for homeland security for many months. Now Congress and this Committee face a demanding, yet critically important task as you formally take up the President's proposal to form a Department of Homeland Security. I strongly support this proposal, and its emphasis on the critical role of science and technology in meeting our homeland security needs.

In this statement I begin with a brief review of the nature of our homeland security challenge. This is followed by four observations regarding organization of our science and technology response. I close with comments on the role of the national laboratories managed by the Office of Science and the National Nuclear Security Administration in the Department of Energy.

OUR HOMELAND SECURITY CHALLENGES

Our homeland security challenges are enduring, daunting in scope, diverse, and technically and logistically complex. The threat we face is dynamic. It changes rapidly with political and social developments around the world. It grows with the technical capacity of our adversaries, and with changes in our own economy and infrastructure. We require a science and technology response that is equally robust. We need a focused response around clear priorities. We must take into account the challenge of implementation on a national scale. We should be as flexible and adaptable as are the adversaries who would threaten us.

Our homeland security challenges are compounded by clear constraints. We cannot protect everything against every possible contingency -- there are simply too many possibilities, and we will need clear priorities if we are to be effective. Our response needs to take into account the costs and other impacts of the security measures we deploy. If we make our transportation system more secure by greatly increasing the cost of moving either people or goods we will both reduce our freedom and quality of life and disrupt our economy, the strength of which underpins our ability to meet homeland security needs in the first place. The systems we deploy should create the minimum of disruption or friction in our economy, and, where possible, should provide benefits in addition to enhanced security, such as increased robustness against natural disaster or accident. Finally, we will need appropriate standards so that the systems and technologies we deploy will communicate and work together.

Our effort since last September has been primarily focused on rapid deployment, and sometimes improvement, of the best available current technology for immediate needs, and we are making real progress. We are developing and deploying new tools for rapid detection of chemical or biological agents, for inspecting sealed containers for radioactive material, and for improving aviation security. However, for many critical problems these and other currently available technologies provide only partial solutions. As we plan and organize for the longer term we should complement our rapid development and deployment efforts with a sustained program to create better solutions and to predict and prepare for threats that are the stuff of speculation today, but may become all too real tomorrow.

I would like to recognize and support the comprehensive and thoughtful National Academy report prepared by the Committee on Science and Technology for Countering Terrorism chaired by Drs. Lewis Branscomb and Richard Klausner that was released Tuesday morning as a valuable contribution to our understanding of these issues.

SCIENCE AND TECHNOLOGY IN THE DEPARTMENT OF HOMELAND SECURITY

As both President Bush and Governor Ridge have noted, U.S. leadership in science and technology, and the broad and diverse research enterprise that provides that leadership, are among our few most powerful advantages in assuring our homeland security. I believe that science and technology are critical to the primary functions of the proposed Department of Homeland Security as laid out in the Governor's recent statement to this Committee. We can employ our research enterprise to 1) deliver the best possible technology solutions available to the most critical threats today; 2) deliver the science and technology required for better, more complete solutions tomorrow; and 3) anticipate new threats that may emerge from advances in science and technology or the deployment of new technology in the U.S. economy.

To carry out these functions we need: clearly assigned leadership; a thorough understanding of the requirements of those responsible for different elements of our security; and understanding of the promise, limits, and costs of our technologies. We will need to rapidly bring new ideas to application and continue to make scientific advances in critical areas for homeland defense. I offer four observations for how these things can be accomplished in the context of the proposed DHS:

- We require clear leadership of our science and technology efforts in support of homeland security. Accordingly, I support the President's proposal formally assigning the new Department the role of leading the nation's technology development and deployment efforts as they apply to homeland security, with responsibility for coordinating across all federal agencies. A center for program coordination and management, such as has been proposed at Lawrence Livermore National Laboratory, would enable this function. I support there being a senior official in DHS, reporting to the Secretary, with crosscutting responsibility for science and technology, a role assigned to the Undersecretary for Chemical, Biological, Radiological and Nuclear Countermeasures in the President's proposal. To assure proper coordination, the DHS should also have strong coupling to the policy setting function of the Office of Science and Technology Policy.

- Next, we should set our science and technology priorities from the best possible understanding of both our vulnerabilities, and the effectiveness and cost of proposed solutions. Therefore, to inform its leadership and planning for technology deployment, the new Department will need dedicated risk analysis and technology evaluation capabilities. The DHS's role in assessing vulnerabilities and potential solutions should also be closely connected to the threat identification and analysis functions of our intelligence community.

- Third, in line with the President's proposal, I support the establishment of a strong problem-directed R&D program in the new Department. Its research and technology development efforts should be organized around and responsive to the specific challenges and needs of the customers who will deploy the resulting technologies, whether these customers are located within the new Department, in other agencies, or at the state and local level -- for instance improving aviation security or protecting nuclear reactors. This program should be designed to close the gap between new ideas and basic science advances and deployable solutions. In operation this program should be flexible and highly responsive. It should be judged by results, and subject to the minimum necessary procedural requirements. DARPA may be a good model in several respects, as has been suggested by Dr. Marburger. The management flexibility components of the President's proposal are particularly important for research and development.

- To ensure our long-term capacity to respond with new and better solutions, we should provide robust support for the basic research that will underlie and inform our problem-directed R&D, with particular emphasis on information technology, modeling and simulation, biotechnology, nanoscience, advanced sensor technology and related fields. Continuing strong support for NSF, DOE Office of Science, NIH and other basic research programs in these areas is needed.

These recommendations do not imply the creation of extensive new research capabilities or wholesale transfer of large elements of our existing federal research infrastructure to the proposed Department. Rather, and again in line with the President's proposal, the DHS should draw broadly on our existing government, university and industrial research base, and must have ready access to the expertise and research facilities of DOE, DOD, NIH and other agencies.

ROLE OF THE NATIONAL LABORATORIES

I strongly believe that our science and technology response to our homeland security challenges must draw broadly on the talent and expertise resident in our research universities, our industry, and in the government laboratories managed by multiple agencies. The national laboratories managed by DOE's Office of Science and National Nuclear Security Administration will play a very substantial role, particularly on weapons of mass destruction issues. These laboratories

have specialized capabilities in several areas of science and technology, such as the control and detection of nuclear materials, and expertise pertinent to radiological, chemical and biological threats, that will be critical to our homeland security. The national laboratories maintain the interdisciplinary approach and scientific and engineering breadth necessary to take a broad systems view of these problems, and have the ability to deliver substantial projects in a secure environment. It is essential that the new DHS have ready access to the national laboratories, and these laboratories should be expected to give full attention to the needs of homeland security. The proposed "Centers of Excellence" in the major DOE laboratories to support DHS would be effective in obtaining the necessary focus and commitment. Single points of contact and other coordination mechanisms between the Office of Homeland Security and the future DHS with both the Office of Science and NNSA are already under development.

Let me close with some supporting examples of science and technology either developed by the national laboratories or under development. These examples illustrate both the capabilities of the laboratories and the role that I believe the laboratories should play.

- Rapid detection and characterization of the nature and distribution of harmful nuclear, chemical or biological material in the environment and inside buildings or other structures is a critical homeland security challenge. The "Sensornet" concept, in which arrays of sensors are deployed on the ubiquitous cell phone towers to detect harmful agents, with a supporting communications and alert infrastructure, is an example of the kind of extensible, integrated system that we can hope to develop and deploy over the next few years, and has recently been demonstrated in the state of Tennessee. In the PROTECT program two national laboratories are collaborating on systems to protect against chemical attacks and support first responders in public facilities, with initial demonstration in the Washington DC Metro. A variety of promising new sensing and analytic technologies for identifying chemical and biological agents in structures or in the open environment are seeing rapid development and testing across the laboratory system.

- Methods for detecting the transport of special nuclear or other radiological materials are needed for a variety of homeland security, border control, and other threat prevention applications. National laboratories are demonstrating and deploying to industry for production a variety of new methods, including hand-held detectors for special nuclear materials and glass fiber based radionuclide detection systems.

- Similarly, methods for assuring the security of our airports, ports and other commerce facilities, and public buildings are under development. These include a millimeter wave holography system that can detect nonmetallic objects in screening applications, highly sensitive technologies for detection of explosive residue on boarding passes or persons in transit, and a variety of techniques for detecting materials or objects in sealed containers.

- Methods for extracting real information -- for "connecting the dots" -- from the flood of data that we see each day are critically needed for intelligence applications. Software that assists analysts in understanding the connections between literally thousands of documents has been developed and deployed, and research in critically needed next generation methods is ongoing.

- Modeling and simulation of both complex engineered systems such as our electrical grid and of contaminant transport in the natural environment are essential tools for assessing vulnerability, for assisting responders both in planning for and in real time reaction to terrorist incidents, and for maintaining the operation of critical infrastructure that has been attacked. This is an area of substantial historical and current emphasis at many of the laboratories, with new efforts directed specifically at critical elements of our infrastructure.

- National laboratory staff have been providing DNA/forensics expertise in support of the investigation of the 2001 anthrax releases, provided technologies to help with cleanup of anthrax-contaminated areas on Capitol Hill, and carried out additional DNA sequencing work on a number of other biopathogens. Laboratory expertise has been employed in support of the emergency response and cleanup of the World Trade Center attack. Several laboratory-developed systems have been deployed at the Olympics or other major public events, including the Biological Aerosol Sentry and Information System, providing public health officials with early warning of a potential bioterrorist attack.

- One of our principle tools for reducing the danger of weapons of mass destruction is our cooperative effort with Russia to reduce the likelihood of diversion of nuclear materials. The national laboratories provide the technical expertise for these efforts.

I very much appreciate the opportunity to provide this testimony and will be pleased to answer questions or provide any additional information that would be helpful.