Opening Statement

Of

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Before the House Science Committee

Subcommittee on Technology and Innovation

"The Department of Homeland Security's R&D Budget Priorities for Fiscal Year 2009"

March 6, 2008

Introduction

Good morning Chairman Wu, Ranking Member Gingrey, and distinguished members of the subcommittee. As Director of the Domestic Nuclear Detection Office (DNDO), I would like to thank the Committee for the opportunity to discuss our research and development (R&D) priorities for Fiscal Year 2009. I am pleased to be here with my counterparts from the Science and Technology Directorate, Undersecretary Cohen and Mr. Ryan.

DNDO has made significant progress over the past three years towards mission success, from both a scientific and operational support standpoint. In sharing our Fiscal Year 2009 research and development agenda, it is my hope that the progress we have made is evident, and that future efforts to create better means to stop radiological and nuclear terrorism are well justified.

Consistent with previous years, over half of DNDO's Fiscal Year 2009 budget request is intended for R&D activities. We categorize our R&D work into two areas: enhancement of existing technologies through near-term, spiral development; and long-term transformational R&D that will deliver revolutionary improvements in the cost, performance, and associated operational burdens of nuclear detection systems. Of particular focus for Fiscal Year 2009 is developing breakthrough technologies to meet new mission requirements. We have made great progress in deploying detection systems to our Ports of Entry (POEs). At the end of 2007, 100% of Southern border container traffic and 98% of all seaport container traffic was being screened for radiological and nuclear threats. While work remains at our ports of entry, our research and development efforts must look beyond simply countering threats that may come through the supply chain. Therefore, we are focusing on developing solutions that can effectively counter a determined and mobile adversary who will seek routes to bypass existing security measures.

The architectural analysis conducted by DNDO is the driving force behind this shift in our research agenda. We know that unconventional pathways sought by the enemy – be it through our waterways or general aviation – present technical and operational challenges that cannot be easily resolved by existing technologies. DNDO is working with our interagency partners, Customs and Border Protection, the U.S. Coast Guard, State and local authorities, and others to

gather user requirements and develop viable concepts of operation. We are then translating this information about gaps in the existing detection architecture and associated user requirements into specific technical areas that define our long-term research agenda. In my testimony today, I will talk about these technical areas and provide a sampling of our projects that are already yielding promising results. I will also touch upon how DNDO conducts test and evaluation activities, and coordinates its research and development efforts with other DHS components, Federal agencies and private industry.

Near-Term Research Priorities

DNDO's near-term focus is on making further improvements to radiation detection capabilities for the Nation's POEs as well as developing solutions for non-POE applications. DNDO is continuing our Advanced Spectroscopic Portal, or ASP, program, which improves upon existing polyvinyl toluene (PVT)-based radiation portal monitors that are currently deployed throughout the global architecture. In Fiscal Year 2009, we will be conducting research to develop advanced systems for use in maritime, general aviation, and rail environments. We will specifically be developing systems for use in on-dock rail configurations to provide scanning solutions for seaports that load cargo directly from ships to rail cars, therefore bypassing typical exit gate screening operations. In addition, it is our expectation that Fiscal Year 2009 will bring about full-rate production and deployment of ASP systems at the Nation's POEs.

DNDO is also working on Human Portable Radiation Detection Systems, or HPRDS, to improve current handheld and backpack radiation detection systems. In previous years, our efforts have been focused on acquiring systems to meet the imminent operational needs of our users – Customs and Border Protection and the Coast Guard. DNDO and the Coast Guard implemented a Joint Acquisition Strategy, ensuring that every Coast Guard boarding team was equipped with radiation detection equipment by the end of 2007. In Fiscal Year 2009, DNDO will be improving detector sensitivity and identification capabilities, reducing false alarm rates, and ensuring that next-generation systems are more user-friendly for system operators. In addition, DNDO will be gathering data for software improvements and conducting testing to ensure that HPRDS under development are able to meet performance specifications. Handheld and

backpack systems will also be used in a variety of DNDO pilot programs, including maritime and aviation efforts, to determine how best to utilize this type of technology to meet emerging mission requirements.

Long-Term Research Priorities

New solutions are required to create a multi-layered detection system that is responsive to the changing threat environment. Not all of these solutions are on the immediate horizon. DNDO's long-term research agenda fills gaps in the present detection architecture that exist because of performance issues, cost, or lack of capabilities. We have several programs underway that support long-term research –Exploratory Research, Advanced Technology Demonstrations (ATDs), and a dedicated Academic Research Initiative. There is tremendous involvement with the National Labs, private industry, and academia for these efforts. I am proud to say that these programs have already yielded some very promising results that we hope will make a tangible impact on this Nation's nuclear detection capabilities.

Our Exploratory Research program focuses on technical solutions that are feasible and show significant promise, but require further concept development and demonstration. Successes to date include the development of a new scintillating material that has very high light output, good energy resolution, and is potentially inexpensive to scale up for use as a large detector. We also have developed a new semiconductor material, which is proving to be as good as the best current room temperature materials, but should be easier to grow to a large size. We have also seen breakthroughs in passive detection of shielded special nuclear material. Finally, our project that integrates video with directional gamma imaging has made good progress towards making it feasible for us to "tag" vehicles that might be transporting a nuclear threat.

In Fiscal Year 2009, we will focus on continuing research into new detector materials, passive and active detection concepts, and systems integration. Over $16 million is dedicated in Fiscal Year 2009 to begin new projects. Mature projects become candidates for future ATD program.

For our ATD program, leading edge technological concepts (in many cases technology demonstrated conceptually under Exploratory Research) are further developed, tested, and evaluated. Specifically, the basic technological components are integrated into an experimental device with reasonably realistic supporting elements so that the technology can be tested in a simulated environment. The results of the tests form the basis for a preliminary cost benefit analysis that is used to objectively determine whether the technology should transition to a systems development and acquisition program.

In Fiscal Year 2009, we will be completing our Intelligent Personal Radiation Locator, or IPRL, ATD with an expected transition to the HPRDS program in Fiscal Year 2010. The IPRL emerged from an end-user requirement for a next-generation personal radiation detection system similar to the radiation pagers often used by CBP, the Coast Guard, first responders, and law enforcement officials. IPRL will have sufficient energy resolution and sensitivity to reliably discriminate between naturally occurring radioactive material (or NORM), background, and potential threats, and will be used by law enforcement, first responder, counterterrorism, the intelligence community, and others in routine activities and surveillance.

Our Standoff Detection ATD will be completing critical design reviews and undergoing laboratory tests that will determine the technology's readiness to undergo performance tests. This ATD will allow DNDO to develop and evaluate key existing technologies such as coded aperture and Compton imaging that may dramatically improve sensitivity and directional accuracy. Our goal is to extend detection ranges against relevant nuclear and radiological sources to as much as 100 meters, potentially providing the capability to locate and identify nuclear threat materials at greater distances for use in ground-based, airborne, and maritime platforms.

Our Shielded Special Nuclear Materials (SNM) ATD is scheduled for preliminary design reviews in early FY 2009, with final system design review expected in late FY 2009. This ATD will develop and test advanced technology to definitively verify the presence of SNM despite cluttered environments or intentional countermeasures like shielding. As I mentioned previously, proof-of-concept results from Exploratory Research projects have been very

promising. Furthermore, another embodiment of this technology may lead to a whole new capability for portable interrogation systems that will enable relocatable or human portable detection systems to automatically verify the presence of shielded SNM.

Finally, in Fiscal Year 2009, we are beginning a new ATD on Remote Emplaced Sensors. This ATD will assess the performance capabilities of small, low-power, inexpensive detectors to detect and track the movement of SNM. The potential applications of this technology are significant, allowing us to increase the probability of detection in non-POE environments such as unattended borders, urban areas, and airports.

The final component of our long-term research program provides a much needed emphasis in nuclear detection sciences. DNDO's Academic Research Initiative, or ARI, spurs the academic community to provide the nuclear detection experts of the future by funding universities to conduct R&D in areas relevant to the detection of nuclear and radiological material, as well as nuclear forensics. In addition, the program fosters potentially high-risk but high-payoff ideas that could lead to solutions that have not yet been considered. We initiated ARI in Fiscal Year 2007 and received 132 applications from universities around the United States. We awarded 22 projects, totaling $58 million in funding over the next five years. The program currently supports over 70 graduate students in nuclear and radiological research areas. However, ARI is considered a multi-disciplinary program with students working on ARI projects pursuing degrees in various related university departments, including physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials science, and operations research. This year we are hosting our first annual grantee conference to showcase research and foster academic collaboration. In Fiscal Year 2008, follow-on grants will be made for the ARI projects begun in Fiscal Year 2007. In addition, we are soliciting for new proposals and anticipate adding 7-10 multi-year projects to the current 22. In Fiscal Year 2009, follow-on grants will be made for previous ARI projects in addition to another separate round of new awards for ARI grants. It is our hope that DNDO efforts through ARI as well as our nuclear forensics programs, combined with the academic support efforts of other Federal agencies like the Department of Energy, will help provide the nuclear scientists and engineers of the future.

Comprehensive Test and Evaluation

With a strong research and development portfolio, DNDO also maintains a comprehensive test and evaluation program. All technologies, tactics, and processes developed and acquired in support of the DNDO mission are evaluated and demonstrated prior to full-scale deployment. In addition, technologies are independently assessed once deployed. Finally, DNDO adheres to strict systems engineering principles that ensure that integrated and balanced solutions are developed for the global nuclear detection architecture. This means that our tests not only evaluate the technical performance of systems, but also reflect and involve our customers and their needs. For example, Customs and Border Protection works hand-in-hand with DNDO as it evaluates ASP systems. Similarly, the Coast Guard as well as State and local users have been critical players in evaluating handheld and backpack systems.

In Fiscal Year 2009, test and evaluation activities will support ASP spiral development, acquisition decisions for the HPRDS program, selection of detection systems in support of maritime and international general aviation pilot programs, and a variety of ATD transitions. DNDO is orchestrating a new test program that will enable vendors to submit performance data on radiation detectors collected independently at laboratories accredited by the National Voluntary Laboratory Accreditation Program. We will evaluate this detector performance information to support the Authorized Equipment List from the Federal Emergency Management Agency (FEMA) Grant Programs Directorate as well as to support other Federal acquisition programs. I am pleased to report that 2009 will be the beginning of nuclear operations at the Radiological and Nuclear Countermeasures Test and Evaluation Complex, or RNCTEC, in Nevada. This is a permanent DNDO facility that allows us to evaluate detection systems against SNM in realistic configurations.

As you can see, our test and evaluation schedule is quite full and we are dedicating significant resources to these efforts. While it appears that our budget for test and evaluation declines slightly from Fiscal Year 2008, this is a reflection of concluding instrumentation activities for our Rail Test Center that will help DNDO develop solutions for on-dock rail screening. Overall,

we are still dedicating significant financial resources, as well as personnel, to technology evaluation, with all test campaigns being supported by associated program funds.

In addition to traditional test and evaluation activities, DNDO will continue to conduct red teaming and net assessment activities in Fiscal Year 2009.

Coordination of Effort

Several Federal agencies already engage in research and development related to radiological and nuclear detection. Therefore, the planning process for the DNDO research agenda is coordinated with partners, including the DOE National Nuclear Security Administration's Nonproliferation and Verification Research and Development Program (NA-22), the Defense Threat Reduction Agency (DTRA), and the Office of the Director of National Intelligence (DNI). In addition, DNDO is home to the National Technical Nuclear Forensics Center that has a mission of being the US Government "system integrator" for technical nuclear forensics. This office provides national-level planning, integration, assessment, and stewardship across the forensics spectrum and with all the relevant partners in the Departments of Defense, State, Energy, Justice, and the DNI.

From its founding, DNDO supported the Office of Science and Technology Policy Domestic Nuclear Defense Research and Development (DND R&D) Roadmap Working Group's efforts to develop a coordinated, interagency R&D roadmap that would enhance the breadth of domestic nuclear defense efforts to ensure a secure nation. In addition, DNDO supports the National Nuclear Security Administration in reviewing foundational science proposals for advanced detectors and materials. Staff from both NA-22 and DNDO served on each others' proposal review panels, in part to ensure that duplication of funding is minimized. This interaction helped ensure that DNDO transformational R&D programs are well coordinated with those of NA-22 (which focused on foundational science for advanced detectors and materials), enabling the U.S. Government to best utilize the expertise of the National Labs. DNDO conducted similar proposal reviews with DTRA.

As a key part of the interagency execution strategy, the DOD, DOE, DNI and DHS have jointly signed a Memorandum of Understanding (MOU) on the Coordination of National Nuclear Detection Research and Development Programs. This MOU specifically cites that all Parties will integrate their programs via the following mechanisms: (1) include representation of all Parties during R&D program reviews, (2) provide full and open access among all Parties to all aspects of ongoing R&D programs, (3) provide equal and open access to the findings from all R&D programs and maximize leverage were possible, (4) establish a standing body of qualified R&D representatives from each agency for program coordination, and (5) where possible, joint programs are encouraged.

DNDO, as an interagency office, has full-time detailees from agencies such as DOE and DOD. These individuals have provided invaluable expertise in all aspects of the DNDO mission. Our detailees enable us to maintain an open and productive dialogue with our interagency partners so that we can avoid duplication of effort and make strides toward the complete implementation of the proposed architecture.

Within the Department, DNDO works with the Science and Technology Directorate, coordinating efforts on a variety of levels – from the shared use of radiological and nuclear detection expertise at the Environmental Measurements Laboratory (EML), through developing an integrated Chemical, Biological, Radiological, and Nuclear (CBRN) Risk Assessment required by HSPD-18, *Medical Countermeasures against Weapons of Mass Destruction*.

In fulfillment of a legislative requirement within the Security and Accountability For Every Port Act of 2006 (PL 109-347, Sec. 121 (e), S&T and DNDO collaborated to write the Report on the feasibility of, and a strategy for, the development of equipment to detect shielded nuclear and radiological threat material and chemical and biological weapons of mass destruction, submitted in April 2007. This report outlines the DHS R&D strategies for robust capabilities to detect chemical, biological, and shielded radiological and nuclear threats. These strategies have been implemented and are being continually refined to meet the evolving challenges of homeland security.

Conclusion

DNDO's Fiscal Year 2009 budget reflects a concerted effort to address the remaining vulnerabilities in our evolving detection architecture. The challenges that lie ahead require a coordinated effort on the behalf of the best scientific minds within the government, academia, and the private sector. We have made good progress, but much work remains to provide the Nation with a continuously improving capability to protect against a terrorist nuclear attack.

This concludes my prepared statement. With the committee's permission, I request my formal statement be submitted for the record. Chairman Wu, Ranking Member Gingrey, and Members of the Subcommittee, I thank you for your attention and will be happy to answer any questions that you may have.