Opening Statement

Of

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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 2008 and how these activities will directly enhance the probability of mission success. I am pleased to be here with other distinguished witnesses, Under Secretary Cohen, Mr. Czerwinski, Dr. Epstein, and Ms. Ward.

Key to the success of the Department of Homeland Security (DHS) is improving the Department's ability to mitigate risks across the entire threat spectrum. In recognition of the catastrophic risk posed by the use of a nuclear weapon within the United States, all nuclear detection research, development, test, evaluation, and operational support within the Department was consolidated into the DNDO in April of 2005. Since then DNDO has developed, and continues to evolve, the global nuclear detection architecture, while improving the domestic means to detect and report attempts to import or transport a nuclear device or fissile or radiological material intended for illicit use.

DNDO maintains a preeminent research and development program and capitalizes on the benefits of integrating this program with larger acquisition efforts. Over half of DNDO's Fiscal Year 2008 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.

Today, I will be discussing both our near-term and transformational R&D plans for FY 2008. As I describe these efforts, I will share with you how DNDO uses architectural analysis and end-user requirements to help guide not only acquisition efforts, but also our research agenda. I will also touch upon how DNDO coordinates its scientific research and technical development activities with other Federal agencies.

Near-Term R&D Priorities

Our analysis of the detection architecture concluded that we must finish the work of securing our Nation's ports of entry (POEs). However, we cannot ignore the possibility that a terrorist might attempt to illicitly transport a nuclear device or radioactive material between the POEs. 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. These include general aviation, small maritime craft, non-POE land border crossings, and State and local operations.

DNDO will continue our Advanced Spectroscopic Portal (ASP) program, which improves upon existing polyvinyl toluene (PVT)-based radiation portal monitors that are currently deployed at the Nation's POEs, and select foreign POEs through the DOE Megaports Initiative. ASP systems not only detect the presence of radiation, but also identify the radiation source, enabling the system to discriminate real threat alarms from alarms due to normally occurring radioactive material (NORM). Alarms due to NORM are also known as nuisance alarms. The use of spectroscopic identification dramatically reduces nuisance alarms, and will allow for considerably improved throughput at high-volume ports, while simultaneously improving security. DNDO awarded contracts to Raytheon Company, Thermo Electron Corporation, and Canberra Industries, Inc. for the development and production of ASP last July. Approximately $44.5 million was immediately provided to the three vendors. Based on results of system performance tests now underway and upon certification by the Secretary, DNDO plans to award up to $1.1 billion over a five-year period to complete ASP development and acquisition.

In FY 2008, we will complete development and test phases and begin production for: truck-mounted ASP systems that provide mobility for several applications, including relocatable chokepoint applications in State and local operations, or at low-volume POEs where fixed systems may not be cost effective; and shuttle carrier-mounted ASP systems that address the challenge presented by several seaports that load cargo directly from ships to rail cars, therefore bypassing typical exit gate screening operations. By developing additional passive detection design variants that meet unique port requirements, DNDO will be well on its way to achieving technical solutions that enable us to screen 100 percent of cargo containers entering the United

States. To support all of our passive systems, we will be upgrading the standard ASP cargo portals with software improvements and better controls and displays based on feedback that we receive from operational deployments.

The Cargo Advanced Automated Radiography System (CAARS) will automatically detect high-density material shielded within cargo that could escape detection by passive radiation systems, like ASP. The automated image processing techniques envisioned for CAARS will also substantially improve throughput rates over current-generation radiography systems. DNDO awarded contracts to L-3 Communications, American Science and Engineering, Incorporated, and SAIC for the development of CAARS last September.

Development of these technologies will continue in FY 2008, with a projected delivery of prototype units in mid-2009. Once ready, these systems will be subjected to a rigorous test program to evaluate the technology and to enter into engineering development. Test results will serve as a major factor in evaluating the performance of the three contractors and continuing with the next phase of the program, in which low-rate initial production will begin. DNDO will also begin preparations for pilot deployments to evaluate operational factors and conduct other deployment planning efforts such as site surveys and environmental impact assessments.

Nevertheless, ASP and CAARS deployed at our official POEs are not the only technologies needed to fulfill our nuclear detection architecture. The DNDO is also working on Human Portable Radiation Detection Systems, or HPRDS, that aim to improve on current handheld and backpack radiation detection systems similar to those currently used by Customs Border and Protection (CBP) and the Coast Guard. These systems currently weigh ten to 25 pounds, and are generally operated as a secondary screening tool. When an alarm is detected, handheld systems can then be used to isolate and identify the source of the radiation. The HPRDS program seeks to reduce the weight of systems to approximately five pounds, while simultaneously improving detection probabilities to as high as 90 percent when used in tertiary or confirmatory inspection applications; and also improve connectivity for alarm reporting and technical support. In October, five companies received awards – Smiths Detection, SAIC, Ortec, Sanmina-SCI, and Target Instruments.

In FY 2008, development efforts for the next generation of handhelds and backpacks will focus on: improving the identification capabilities of human portable systems so they can distinguish between threat and non-threat material quicker and with greater accuracy; standardizing the displays and control functions to improve system operability for field operators; reducing the weight of units so they are less burdensome to use; and improving systems connectivity so that data can be rapidly communicated and analyzed to determine if it represents a potential threat.

Long-Term Transformational R&D Priorities

Despite the progression of our near-term R&D efforts, there are still key, long-term challenges and vulnerabilities in our detection architecture that require long-range, higher-risk research programs to deliver the highest payoff improvements in detection capabilities. One of the primary motives for the establishment of the DNDO was to create a mechanism for significant and sustained funding into radiation detection technologies through innovative approaches. Our transformational R&D program works with all sectors – National Laboratories, academia, and private industry – to seek dramatic technical improvements.

This is not research for the sake of research. This is a deliberate, focused effort to address significant capability gaps in our present detection architecture – gaps that cannot be filled with current technologies because of performance issues, cost, or lack of capability. Revolutionary advances in radiation detection technology could potentially impact all capability gaps in our present detection architecture, from a distributed network of inexpensive radiation detectors to highly sensitive, standoff detection systems for sensing mobile threats at speed. Many of these technical breakthroughs would directly address some of the opportunities and challenges I mentioned before, such as general aviation, small maritime craft, non-POE land border crossings, and State and local operations.

Our transformational research includes a robust Exploratory Research Program, a dedicated Academic Research Initiative, and several upcoming Advanced Technology Demonstrations (ATDs). Exploratory Research focuses on technical solutions that are at the feasibility phase and

show significant promise, but require further concept development and demonstration. As solutions and concepts mature, technologies will transition either into enabling components for existing ATDs or will generate new ATD initiatives. The purpose of an ATD is to develop and test a device and generate the data needed to perform a preliminary cost-benefit analysis for a technology. Successful research originating from our Academic Research Initiative will also transition to exploratory research or an ATD initiative.

In December 2005, DNDO published a Call for Proposals to the National Laboratories soliciting novel detection approaches, materials, and advanced technologies as part of our Exploratory Research program. DNDO received more than 150 proposals, and ultimately selected 44 for award, resulting in nearly $40 million in research programs. Similarly, DNDO released a solicitation for private industry and academia proposals in the same research topics. More than 200 white papers were submitted, and last month we announced the award of seven cooperative agreements with academia totaling approximately $3.1 million. The research topics of these universities include advances in materials, associated electronics, detection techniques, and enabling technologies to investigate and understand important and related phenomenology.

In FY 2008, exploratory research topics will include: new materials that have high energy resolution, high efficiency, and low cost; shielded special nuclear material (SNM) verification efforts that would enable highly penetrating, efficient, low-dose interrogation systems to address screening of general aviation, small boats, and occupied vehicles; new solutions for passive detection of SNM in general aviation, commercial air cargo, and boats and small ships near the U.S. coastline; and technology and concepts that offer significantly enhanced threat sensitivity with remote and distributed emplaced sensor networks. In addition, we will be working with the DHS Science and Technology Directorate to examine techniques for integrating explosives detection with radiological and nuclear detection, achieving single-device solutions.

Our ATD program takes leading edge technological concepts (in many cases technology demonstrated conceptually under Exploratory Research) and develops a performance test unit to conduct a realistic demonstration of capabilities. 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 our Systems Development and Acquisition program.

In FY 2008, the Intelligence Personal Radiation Locator (IPRL) ATD that started in 2006 will result in a performance test unit that will be ready for testing. 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, first responders, and law enforcement officials. IPRL will have sufficient energy resolution and sensitivity to reliably discriminate between 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. DNDO awarded contracts worth up to $22M for the IPRL program last September. This enabled us to conduct the design and development work required to take IPRL from the conceptual phase and become ready for testing of IPRL performance test units in early FY 2009.

In addition, our Standoff Detection ATD will be ready for final system design review, with a mid-FY 2009 target for testing of the performance test units. 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 nuclear detection ranges 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. Defense Threat Reduction Agency (DTRA) and the Department of Defense (DOD) also have strong requirements for long standoff capability for detection of nuclear materials. To de-conflict our programs, DTRA cites the need for very long standoff detection of 1 kilometer (1000 meters) or more. Since in most cases the goal of 100 meters is unattainable with current technologies, DTRA's current efforts are closely related to those of DNDO. Achieving our shared goal to improve capability for longer standoff detection will require the resources of both DHS and DoD.

Our Verification of Shielded 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 resolve alarms and definitively verify the presence of SNM despite

cluttered environments or intentional countermeasures like shielding. 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 that can automatically verify the presence of shielded SNM.

The final component of our transformational R&D program provides a much needed emphasis in nuclear detection sciences, a field that has been in decline at American universities for years. A survey by the National Science Foundation showed a downward trend since the mid-1990s of nuclear scientists and engineers of approximately 60 per year. In 1980, there were 65 nuclear engineering departments actively operating in the US universities; now there are only 29. Currently, it is estimated that one-third to three-quarters of the current nuclear workforce will reach retirement in the next 10 years. The future security of our Nation requires such a rejuvenation effort at our universities. The current projections forecast a need for approximately 100 new PhDs per year.

DNDO's Academic Research Initiative will spur 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. In addition, the program will foster potentially high-risk but high-payoff ideas that could lead to solutions that have not yet been considered. Last month, DNDO and the National Science Foundation announced grant opportunities worth up to $58 million over the next five years for colleges and universities. Once this program matures, our estimate is that this initiative will produce 20 to 30 new PhDs per year, while also addressing critical research needs. This will not address the need completely. But our efforts, 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.

Coordination of Effort

The identification of gaps in nuclear detection capabilities justifies the need for a well-supported DNDO research and development program. At the same time, we recognize that several Federal agencies already engage in research and development in this area. Therefore, the planning

process for the DNDO transformational research agenda was 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). I would like to take a moment to describe several mechanisms currently in place to ensure active coordination between DNDO and other agencies funding related research and development.

From its founding, DNDO supported the Domestic Nuclear Defense Research and Development (DND R&D) Roadmap Working Group to develop a coordinated, interagency R&D roadmap that would enhance the breadth of domestic nuclear defense efforts to ensure a secure nation. The DND R&D Working Group was chartered by the Homeland Security Council/National Security Council Domestic Nuclear Defense (DND) Policy Coordinating Committee. The DND R&D Roadmap Working Group developed a long-term vision for domestic nuclear defense R&D. The scope of this working group covered the interagency coordination of: R&D strategies for domestic nuclear defense; the identification and filling of critical technology gaps; enhancing efforts to develop and sustain critical capabilities through appropriate investments in the foundational science and research; interagency funding for necessary science and technology; and collaboration and exchange of vital R&D information. DNDO co-chairs the working group on interdiction research and development.

DNDO has also supported 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.

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.

Conclusion

The challenges that lie ahead require a coordinated effort on the behalf of the best scientific minds within our government, academia and the private sector. The DNDO has taken an end-to-end approach to research and development, systems development, and product improvement. From fostering the development of revolutionary detection technologies that fill gaps in our evolving architecture to providing next-generation technologies that improve performance, cost, and operational value, DNDO is working 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.