Opening Statement

Of

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"The Science of Security Part II: Technical Problems Continue to Hinder Advanced Radiation Monitors"

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Introduction:

Good afternoon Chairman Miller, Ranking Member Broun, and distinguished members of the Subcommittee. As Acting Deputy Director of the Domestic Nuclear Detection Office (DNDO) at the Department of Homeland Security (DHS), I would like to thank the Committee for the opportunity to provide a status update on the Advanced Spectroscopic Portal (ASP) program. I would also like to thank the Committee for its support of DNDO's mission to reduce the risk of radiological and nuclear terrorism to the Nation.

In late June of this year, I provided testimony about our next-generation radiation portal monitors (RPMs), including where RPMs are deployed and how DHS' U.S. Customs and Border Protection (CBP) operates this technology at our ports of entry (POEs). My testimony today will include a status update and the path forward for the ASP program. I will also describe operations during field validation and improvements for poly-vinyl toluene (PVT) systems.

Energy Windowing for PVT Systems:

Before I get into an update on the ASP Program, I have been asked to address the status of improvements to PVT systems. For some time, there have been various questions about the possibility of exploring energy windowing improvements to the currently deployed PVT systems. Energy windowing is an algorithmic alarm method that can be applied to plastic scintillator-based RPM systems to improve operational sensitivity to certain threat sources while reducing the alarm rates from naturally occurring radioactive material. Some have asked if software or algorithm improvements could provide enhanced capabilities for PVT systems that would achieve performance similar to that of the ASP systems. Algorithms that provide energy windowing for PVT systems were introduced into the currently deployed systems in 2007, and DNDO is currently funding work both at the Johns Hopkins University Applied Physics Laboratory (APL) and at Pacific Northwest National Laboratory (PNNL) to determine if further gains can be made

through additional energy windowing techniques. We have also asked that, wherever possible, the labs work cooperatively on these efforts. Funding for the work at PNNL is approximately $1.6 million of Fiscal Year (FY) 2008 appropriations, and investments in APL for studies related to energy windowing are approximately $90,000 of FY 2009 appropriations. Scientists are thus far uncertain whether additional gains in operational performance can be coaxed from PVT RPMs by using more energy windowing, because the limits of passive detection with plastic-based detectors are coupled with a need to keep false alarms at a minimum. As new techniques are studied and evaluated, it is important to note that the scintillation properties of PVT detectors are fundamentally different than the ASP technology and we continue to evaluate the operational effectiveness of next-generation systems concurrently.

Current Status of the ASP Program:

DNDO continues to enhance the capability to detect and report attempts to import, possess, store, develop, or transport nuclear or radiological material for use against the Nation. Part of our work involves working with DHS partners to provide the equipment and systems they need to perform their missions, including scanning cargo for possible radiological or nuclear threats. After 9/11, considerable concern was raised about the possibility that terrorists could use the enormous volume of cargo flowing into the United States as a means to bring in nuclear material or a nuclear weapon. By far, the largest mode for incoming cargo is maritime shipping containers, with approximately 11 million containers coming into the country every year. Additionally, in the Security and Accountability for Every (SAFE) Port Act of 2006, Congress mandated that all containers coming in through the 22 top volume ports be scanned for radiation by the end of 2007. Thus, considerable effort and resources have been devoted to this mode of transportation to provide comprehensive radiological and nuclear detection capabilities, particularly at POEs.

CBP currently scans cargo entering at our Nation's POEs using PVT based radiation portal monitors (RPMs) that can detect radiation, but cannot distinguish between threat

materials and naturally occurring radioactive materials (NORM), such as kitty litter and ceramic tiles. Narrowing down alarms to just those for dangerous materials is especially important for POEs that have a high volume of containers, or those that see a high rate of NORM.

Building on previous work within CBP and the DHS Science and Technology Directorate (S&T), DNDO initiated the ASP program in 2006 to develop next-generation technology that can both detect radiological material and distinguish between threat and non-threat materials. ASP systems have shown significantly improved capability to distinguish radiological threats from non-threats over the handheld instruments currently used in secondary screening. Thus, the introduction of ASP systems is expected to not only reduce the number of unnecessary referrals and false positives in primary scanning but increase the probability of detecting dangerous materials in secondary. I want to be clear here that ASP cannot and will not be acquired and deployed until an Acquisition Review Board (ARB) has been conducted and the Secretary of Homeland Security has certified that the technology provides a significant improvement in operational effectiveness over current systems. Although we are getting closer to these decision points, testing and evaluation still remains so that all the data required to make informed decisions has been accumulated, analyzed, and documented.

To date, two ASP vendors have developed systems that have completed the following 2008-2009 tests: System Qualification Testing, designed to demonstrate that ASP units are manufactured in accordance with processes and controls that meet the specified design requirements; and Performance Testing at the Nevada Test Site (NTS), designed to evaluate ASP, PVT, and radioisotope identification devices (RIID) detection and identification performance against controlled, realistic threat materials, shielding, and masking scenarios. One vendor has also completed Integration Testing, designed to determine whether the ASP systems are capable of operating and interfacing with the other equipment found in operational settings. This vendor has now begun field validation testing, designed to exercise ASP systems in a stream of commerce environment at POEs.

The second vendor has experienced technical and accounting issues that have caused its testing schedule to lag behind. DNDO is in the process of determining the best path forward with this vendor. The remainder of my testimony will focus solely on the first vendor.

Field Validation:

Since our last hearing, CBP conducted an additional round of field validation at operational POEs. You may recall that CBP operated the ASP systems at four field validation sites in January and February of 2009 for a period of two weeks. During this time, the systems were run in tandem with the PVT systems to scan incoming cargo conveyances, and were able to collect data in an operational port environment with real flow-of-commerce. During these operations, the ASP systems showed higher than expected alarm rates for three industrial sources.

Following this first round of field validation, the ASP thresholds were adjusted to more effectively eliminate alarms on benign sources and were retested to ensure that the sensitivity for detection of special nuclear material and threats did not fall below guidance requirements. Utilizing a computer-based replay tool, we were able to determine that the adjustments solved the problem without decreasing the probability that the system will detect and identify threats. Additionally, the systems were put through regression testing to determine if the problem had been appropriately addressed.

After the threshold adjustments were fine-tuned for the three specific isotopes that were problematic in the winter, CBP restarted field validation in July. This testing identified two additional issues. First, there was a single mission-critical fault at one field validation site in which the software database system failed to scan multiple conveyances, and did not immediately notify the CBP Officer of the problem. There was no security threat at this port because ASP systems were operating in parallel with the current generation systems. A technical representative from the vendor was summoned

and the issue was rectified. The cause of the problem has since been identified and fixed. To assure that the fix did not create any unintended problems, the software has been successfully regression tested.

The second technical issue identified during July field validations was a higher than expected rate of false alarms for certain special nuclear material (SNM) threats. Since ending this second round of testing, the ASP thresholds were adjusted to eliminate this problem, and the systems were retested to ensure that the sensitivity for detection of special nuclear material and threats was not reduced below guidance requirements. Use of the replay tool and regression testing validated that the false alarm rate will be reduced below guidance requirements, and it is anticipated that another round of tandem operation field validation will verify the effectiveness of the settings. In this case, the threshold adjustments resulted in an acceptable reduction in the sensitivity of the system, while remaining more sensitive than required by the original specifications.

The fact that the SNM false alarms did not occur at the same rate in the first round of field validation as seen in the second round is a good example of the need for robust, multi-stage testing, since it may have revealed a sensitivity to seasonal changes and cargo contents that was not expected. Such oddities are typical when a new system transitions from the lab to the real world, and we will continue to learn and improve as testing progresses. At present, DNDO and CBP are in discussions to establish the ground rules for starting the next period of tandem field validation evaluations. Following the completion of tandem operations, ASP systems will undergo solo field validation evaluations.

Path Forward:

Once all the phases of field validation are completed to the satisfaction of both DNDO and CBP, ASP systems will complete independent operational testing and evaluation (OT&E) conducted by the S&T Operational Testing Authority. Test data will be analyzed and provided to inform the Secretary's certification decision. DNDO is also

engaged with the National Academy of Sciences (NAS) to perform an additional review of ASP testing and inform the certification process, as required in the FY 2008, 2009, and 2010 Homeland Security Appropriations bills.

Additionally, DNDO is working to develop a cost-benefit analysis that will analyze the cost effectiveness of deploying ASP systems in several different configurations. This cost-benefit analysis methodology is still being processed with the available data and requires additional data from the remaining tests before it can undergo review within the Department and be finalized.

The current path to certification includes testing as described above, accompanied by the analysis of results, to ensure that Secretary Napolitano has sufficient information and all the Departmental acquisition program requirements are met. ASP systems have been under review and evaluation for over three years now, but we are focused on informing a decision to go forward with acquisition and deployment with the appropriate processes. Such a decision will be made only when it has been determined that ASP will increase the probability of detecting dangerous materials while minimizing operational burdens, rather than based on a pre-determined timeline..

The changes and continued diligence that DNDO exercises in conjunction with the ASP program will ensure that any eventual certification and acquisition decisions are consistent with DHS priorities and made with a documented acquisition management foundation. The ASP program will also be presented to the DHS ARB for an MD 102-01 milestone decision for purchase and deployment of ASP. This is a very well-defined milestone that was developed for all large programs within the Department of Homeland Security. Items such as mission needs, operational requirements, analysis of alternatives, etc, are part of the MD 102-01 process – no production units can be purchased and deployed without successfully navigating the process. To be clear, the Secretarial certification requirement is in addition to the MD 102-01 deployment decision. DNDO intends to present both the Secretary and the ARB with all the necessary information to

make decisions about the operational effectiveness and potential optimal deployment of ASP systems.

Conclusion:

DNDO will continue to work with CBP and other partners within and beyond DHS to improve the Nation's ability to detect radiological and nuclear threats at our ports and borders. DHS is facing a challenge; we must balance facilitating the flow of commerce at our ports and borders with the need to sufficiently scan cargo for radiological or nuclear threats before it enters our Nation. As both the President and Secretary have said, the nation needs more technology to meet its security challenges and the technologies that DNDO is pursuing, of which ASP is but one example, are a critical component in addressing that challenge.

Our efforts to develop and evaluate ASP systems are based on sound, proven testing and evaluation processes used with proven success across government and academia. Current test results are capturing the benefits of ASP systems, and the reviews to date have provided a valuable assessment of the program and identified a number of key lessons learned. As we collect more operational data for the ASP systems, we are better able to determine the optimized settings for detecting and identifying threats, while facilitating the flow of legitimate commerce.

I welcome and appreciate the Committee's active engagement with this program, and look forward to continuing our cooperation as we move forward together. Chairman Miller, Ranking Member Broun, and Members of the Subcommittee, I thank you for your attention and will be happy to answer any questions that you may have.