Statement of Anne Harrington
Deputy Associate Administrator for Defense Nuclear Nonproliferation
National Nuclear Security Administration
U.S. Department of Energy
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INTRODUCTION

Mister Chairman, Ranking Member Coburn and distinguished members of the Committee, thank you for giving me the opportunity to testify on the Department of Energy National Nuclear Security Administration (NNSA) efforts to enhance the security of vulnerable high-risk radioactive sources in the United States. I would like to thank you for your continued interest and leadership on this important issue of securing vulnerable radioactive sources. I would also like to thank my colleagues from the Department of Homeland Security and the Nuclear Regulatory Commission for being constructive and indispensable partners in the effort to reduce the risk of radiological incidents.

SCOPE AND THREAT

When President Obama launched the Nuclear Security Summit series in 2010, the primary focus was on permanent risk reduction through the elimination of Highly Enriched Uranium (HEU) and plutonium. In the wrong hands, these materials could be used in an improvised device that would have catastrophic impact. As you know, the United States, working in concert with other countries has made very significant progress in this area. For instance, these efforts have resulted in the removal or disposition of more than 2,600 kilograms of HEU and plutonium since 2010, more than enough material for 100 nuclear weapons, which includes the removal of all HEU from eight countries. Although we still have large amounts of both HEU and plutonium to remove or secure worldwide, we have for years also engaged in parallel efforts to secure high-risk radioactive sources.

One of the missions of NNSA's Office of Defense Nuclear Nonproliferation (DNN) is to reduce and protect vulnerable nuclear and radioactive material at civilian sites worldwide, primarily through the Global Threat Reduction Initiative (GTRI) program. A key goal of that program is to enhance the security of high-risk radioactive materials that could be used in a Radiological Dispersal Device (RDD) – commonly known as a "dirty bomb." An RDD detonated in a major metropolitan area could result in economic costs in the billions of dollars as a result of evacuations, relocations, cleanup, and lost wages. Radioactive sources such as Cobalt, Cesium, Americium, and Iridium are used worldwide for many legitimate purposes and are located at thousands of sites in the United States and around the world. Since many of the sites that use these materials, such as medical, university, research, and industrial facilities are open environments, these facilities are more vulnerable to adversaries that may target these materials and are more difficult to secure. In looking at the risk, we must include not only outside terrorists attempting to steal radioactive sources as potential adversaries, but also insiders who work at these facilities who could have intimate knowledge of security procedures and vulnerabilities.

The 2014 Nuclear Security Summit Communique signed by 53 countries including the United States ". . . sets out a new ambition to secure all radioactive sources, such as those in industry, medicine, agriculture or research."[1] In addition, the importance of securing high-risk radioactive sources was highlighted at the 2014 Nuclear Security Summit[2] when 22 additional countries signed onto a United States sponsored "gift basket" committing to secure all IAEA Category I radioactive materials consistent with the IAEA's Code of Conduct on the Safety and Security of Radioactive Sources, and, where possible, to exceed those guidelines by the 2016 Nuclear Security Summit.

NNSA ROLE TO REDUCE THE RADIOLOGICAL THREAT

All three agencies appearing in today's hearing play important roles in reducing the risk of radiological terrorism. DNN collaborates with federal partners to reduce the risk of terrorists acquiring the materials for an RDD. While the Nuclear Regulatory Commission (NRC) has the mandate to license and regulate the use of civilian radioactive sources, NNSA brings the science and expertise of its National Laboratories to develop innovative solutions to prevent the acquisition of radioactive materials by adversaries. Laboratories from across the DOE/NNSA complex bring the experience of work overseas and domestically to identify and implement security best practices.

To address the risks of terrorists or other adversaries acquiring radioactive sources, DNN, in cooperation with its federal partners, launched a program in 2007 to implement voluntary security efforts at civilian sites in the United States that use or store high-risk radioactive materials. The program components include removal of unwanted radioactive sources, hardening kits for irradiators and other devices, facility-wide voluntary security enhancements, specialized training for security and law enforcement personnel, and tabletop exercises for first responders. These voluntary security efforts complement, but do not replace, NRC's regulatory requirements that govern domestic radiological site security.

When requested by the licensee, DNN's GTRI program assesses existing security conditions, provides recommendations on security enhancements, and when warranted, funds the procurement and installation of jointly agreed upon technical security upgrades and training to further the level of security. We consider 14 isotopes of concern above threshold quantities, and address several areas of security including detection, delay, response, and sustainability.

These voluntary security enhancement efforts have been endorsed by the NRC, the Department of Homeland Security (DHS), the Federal Bureau of Investigation (FBI), the Organization of Agreement States (OAS), and the Conference of Radiation Control Program Directors, Inc.

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[1] The Hague Nuclear Security Summit Communique.
https://www.nss2014.com/sites/default/files/documents/the_hague_nuclear_security_summit_communique_final.pdf

[2] 2014 Nuclear Security Summit; *Statement on Enhancing Radiological Security*.
https://www.nss2014.com/sites/default/files/documents/statement_on_enhancing_radiological_security_final_version_of_24_march2.pdf

(CRCPD). NRC has issued Regulatory Information Summaries (RIS) describing these voluntary security enhancement initiatives and recommends that licensees volunteer for these DNN-GTRI efforts.[3]

DNN prioritizes which sites receive voluntary security enhancements by assessing the attractiveness of the site's materials for possible use in an RDD, the site's proximity to DHS Urban Area Security Initiative (UASI) locations, and the site's proximity to other volunteer sites. We estimate that there are about 3,000 buildings in the United States that house high-risk radioactive materials. As of May 31, 2014, security enhancements and training for 1,742 buildings have been completed.

Consistent with U.S. commitments at the 2014 Nuclear Security Summit, DNN will prioritize its work at sites containing IAEA Category I materials. All Category I buildings in the United States currently meet NRC regulations and the international guideline. However, DNN's GTRI program has provided additional voluntary security enhancements that build on this standard to 273 of 554 Category I sites and will reach out to the remaining 281 sites with the goal of completing security enhancements by 2016. Additional security enhancements include In-Device Delay (IDD), Remote Monitoring Systems (RMS), and promotion of an adequately trained response force that can prevent an adversary from stealing high-risk radioactive materials.

Elimination – Removing Unwanted Sources

Since 1997, DOE/NNSA's Off Site Source Recovery Project (OSRP) operated by Los Alamos National Laboratory, Idaho National Laboratory, and the CRCPD has reduced the radiological risk by recovering and eliminating disused and unwanted sealed sources. DNN, in coordination with NRC, developed recovery prioritization criteria based on risk reduction. As of May 31, 2014, DOE/NNSA has recovered over 36,000 sources.

Irradiator In-Device Delay (IDD)

A fundamental component of our voluntary security enhancement program is delay. By increasing delay (the amount of time needed by the adversary to gain access to the radioactive sources) we give more time for law enforcement to interrupt the adversary before they can steal the radioactive source. As a result of the interagency DNN /DHS Domestic Nuclear Detection Office (DNDO) cesium irradiator vulnerability study, which utilized input from the three main cesium irradiator manufacturers IDD hardening kits were developed for the most widely used models of Cesium blood and research irradiators. These IDD kits increase the difficulty for an adversary to illicitly access and steal the radioactive source.

In August 2008 the IDD kit designs were completed. The NRC and corresponding Agreement States reviewed the designs and authorized the launch of a voluntary pilot program to install the

[3] RIS 2010-02; NRC Regulatory Issue Summary 2010-02 The Global Threat Reduction Initiative (DNN) Federally Funded Voluntary Security Enhancements for High-Risk Radiological Materiel, January 21, 2010; http://pbadupws.nrc.gov/docs/ML1001/ML100150354.pdf

first IDD kits. The pilot effort was deemed a success and DNN has initiated a national implementation plan to outfit all qualifying irradiators in the United States. The total number of Cesium devices in the United States is about 1,100, of which 815 are IDD eligible at this time. Each one of these Cesium irradiators has more than enough material to be used in a significant RDD. As of May 31, 2014 IDD kits have been installed on 463 irradiators. The remaining 352 irradiators can be hardened by FY20. In addition, the manufacturers have agreed to start factory hardening, or installing IDD kits at the factory, on all new irradiator sales. DNN has expanded its IDD efforts to include devices that use Co-60

In addition to the IDD hardening kits for Cesium Chloride-based irradiators, DNN voluntary security enhancements also include other delay elements such as device tie downs, locks, hardened doors/windows, walls, cages, and safes. All of these elements increase the time it takes the adversary to gain access to the radioactive source.

Detection – Remote Monitoring

A second fundamental component of the voluntary security enhancements program is detection. Increased delay coupled with detection that allows responders to arrive prior to source removal is considered to be effective. Increased delay without detection or timely response could allow the adversary to attack the source/device all weekend and would not be sufficiently effective in providing notification to responders of an adversary attack.

DNN-GTRI supplied detection upgrades include biometric access control devices, door alarms, motion sensors, cameras, wireless electronic tamper indicating seals, and area radiation monitors. Each of these technologies provides a specific deterrence, control, and/or detection function that, when integrated together and with delay, provides a significant security enhancement in a holistic manner.

The program also deploys remote monitoring systems that provide reliable transmission of alarms to responders and addresses the insider threat. Remote monitoring systems directly mitigate the insider threat by integrating alarms from multiple detection sensors (including device tamper sensors and radiation sensors) and prioritize alarms to ensure that critical alarms receive immediate attention. Alarms are simultaneously sent to on-site and off-site locations such as local police departments, regional emergency operation centers, or security contractors. This ensures a timely response by sending a reliable transmission of alarms directly to trained off-site experts and responders and protects against a single-point failure if the insider is the on-site alarm monitor or guard.

To address the sustainability portion of our security enhancement concept, DNN provides a three to five year maintenance and warranty contract for each security enhancement device, contacts each site quarterly to follow-up on the status of the enhanced security system, and conducts one follow-on visit to determine if changes to the operating or threat environment warrant additional system enhancements.

Response – Alarm Response Training

The most important aspect of any security system is a timely, well equipped, well trained response team of appropriate size to interrupt and neutralize the adversary before they gain

access to the radioactive source. We have made a focused effort to provide security personnel and local law enforcement with the tools and training needed to adequately respond to a security incident.

Most on-site guards at facilities with radioactive sources are not armed nor do the sites have large enough force strength to neutralize the threat. Therefore, the key responders are often off-site local law enforcement. Despite regulations requiring licensees to coordinate with local law enforcement, consistent feedback received from law enforcement officials indicates that they were not aware of the nature and risks associated with the material which is in use at hospitals, blood banks, universities, oil fields and manufacturing plants in their jurisdiction. It is important for their safety, and the safety of their communities, that they receive proper training about radioactive sources, about which many misconceptions exist. To ensure that both on-site and off-site responders understand how to respond to enhanced security system alarms, we have developed an alarm response training course run by the Y-12 National Security Complex in Oak Ridge, TN. This provides a venue for licensees and law enforcement officials to be in the same room and encourages the required coordination.

This alarm response training prepares responders to protect themselves and the public when responding to events involving radioactive materials. The participants conduct hands-on training in a realistic setting using actual protection equipment and real radioactive sources. The courses include operational exercise scenarios that build on classroom instruction and allow response forces to exercise their own procedures during realistic alarm scenarios.
As of May 31, 2014, we have conducted 85 training courses for 3,226 participants from 44 states.

Table Top Exercises (TTX)

As the capstone of the voluntary security enhancement support, DNN has partnered with NNSA's Office of the Associate Administrator and Deputy Under Secretary for Counterterrorism and Counterproliferation and the FBI's Weapons of Mass Destruction Directorate to provide table top exercises at select nuclear and radiological sites. The purpose is to provide a no-fault, site-specific scenario where senior managers from various Federal, State and Municipal organizations can exercise their crisis management and consequence management skills in response to a terrorist incident. The overall objectives are:

- Promote cross-sector communication, cooperation, and team-building among Federal, State, Local, and private sector first responders;
- Exercise FBI lead responsibility for criminal investigation;
- Examine newly developed tactics, techniques, and procedures resulting from DNN voluntary security enhancements;
- Promote attack prevention through intelligence sharing and coordinated approach to neutralize the threat;
- Prepare site specific integrated response plans with Federal, State, Local, and private sector partners.

As of May 31, 2014, we have conducted 35 TTXs.

Transportation

Radioactive sealed sources may be at their most vulnerable when in transit. Recognizing this, DNN implements security upgrades beyond regulatory requirements on our own source recovery shipments. Theses security enhancements include:

- Use of the DOE Transportation Tracking and Communication System (TRANSCOM) system for continuous monitoring of shipments;
- Driver duress button provides an alert signal upon activation;
- Text based communications channel provides a secondary satellite-based communication capability between the truck crew and the monitoring center;
- Delay boxes for up to thirteen 55-gallon-drum-sized packages providing delay from a broad variety of breaching tools and tactics;
- Run-flat inserts for all tires – provides capability to operate the truck at highway speeds for up to 50 miles after a tire is flattened.

INDUSTRIAL RADIOLOGICAL SOURCES

DNN's voluntary radiological security program includes addressing the security of industrial radioactive sources such as mobile sources used for oil well logging and radiography and panoramic irradiators.

Mobile Radiography and Well Logging Sources

Oil Field Service companies and Nondestructive Testing companies use radioactive sources in their industry – well logging and radiography. Because these sources are mobile (as opposed to devices in other industries that remain geographically static in a fixed location for storage and operation), DNN is collaborating with device manufacturers and end users to build GPS-enabled tracking technologies for radiography and well logging devices, transport containers and transport vehicles, and will work to promote appropriate monitoring and response procedures.

For radiography devices DNN is working with the largest device manufacturer to develop a tracking and security solution that will be integrated into the device package itself. The security package will include tamper and radiation alarms that can be transmitted to monitoring stations. A secure storage box with tamper detection would be provided for transport of the device while in trucks. DNN will work with industry partners to seek cost sharing arrangements for the deployment of the security package once developed.

For well logging devices, DNN is working with a major oil services company to develop a tracking and security system for the source containers while in transport to the field. The security package for well logging sources will also include GPS tracking, radiation detection, and tamper detection. DNN is implementing the pilot on a cost sharing basis and it is anticipated that once the tracking system is developed, major industry partners would procure the system. DNN may need to work with smaller industry partners to procure these systems under cost sharing arrangements.

The successful deployment of tracking and security systems with well logging and radiography devices may provide a security solution for these devices in storage as well as while mobile, thus reducing the number of buildings that require comprehensive site security upgrades and enabling DNN to accelerate overall program timelines.

Panoramic Irradiators

Panoramic irradiators have the highest activity of devices that use radioactive sources containing 1 to 7 million curies of Cobalt-60. The activity in Cobalt-60 sources in panoramic irradiators accounts for over 98% of the total activity in all civilian radiation sources in the United States. Industrial panoramic irradiators are used to irradiate single-use medical devices and products, cosmetics, food, and plastics. The sealed source is contained in a storage pool and is fully shielded when not in use; the sealed source is exposed within a radiation volume that is maintained inaccessible during use by an entry control system. These panoramic irradiators require re-sourcing every 18-24 months, which involves the transport of large quantities of Cobalt-60 throughout the United States and installation of Cobalt-60 pencils in the source rack. There are two major companies which operate the majority of the more than 60 industrial panoramic irradiators in use in the United States.

Due to the complexities of designing and installing security enhancements for panoramic irradiators, DNN is implementing a pilot security project at one panoramic facility. Once the pilot is proven successful and a working security system is installed, DNN will work with the industry partners to gain buy-in for expansion of security enhancements to the other panoramic irradiator sites.

Government Accountability Office (GAO) RECOMMENDATIONS

In the GAO's September 2012 report on Security of Radiological Medical Sources[4], the GAO recommended that NNSA increase outreach efforts to promote awareness and participation in NNSA's security program giving special attention to medical facilities with high-risk radioactive sources located in or in close proximity to urban areas. NNSA DNN has developed a strategy to further enhance its outreach efforts by:

- Accelerating and expanding outreach activities in conjunction with State regulators in states with the most IAEA Category I sites remaining, including Georgia, Florida, Wisconsin, Illinois, Texas, and California;
- The development and issuance of publications on DNN Security Recommendations for Users of Radioactive Sources and Security by Facility Design;
- Assisted NRC in creation of its security best practices guide.

The GAO's Draft May 2014 report on Security of U.S. Radiological Sources included a recommendation to NNSA stating "to better leverage resources, including expertise, to address

[4] GAO-12-925, United States Government Accountability Office, *Nuclear Nonproliferation: Additional Actions Needed to Improve Security of Radiological Sources at U.S. Medical Facilities*. http://www.gao.gov/products/GAO-12-925

vulnerabilities with radioactive sources while in transit, we recommend that the Administrator of NNSA, the Chairman of the NRC, and the Secretary of DHS review their existing collaboration mechanism for opportunities to enhance collaboration, especially in the development and implementation of new technologies."[5]

In implementing voluntary security enhancements at sites with radioactive sources, NNSA has maintained close coordination and cooperation with Federal, State, and local agencies and the private sector. In particular, we have established strong working relationships with the NRC, DHS, and the FBI.

To coordinate these complementary efforts, DNN participates regularly in meetings of the DHS-chaired Nuclear Sector Government Coordinating Council, the NRC-led Radiation Source Protection and Security Task Force, tri-lateral meetings comprised of senior representatives from NNSA, DHS, FBI, and NRC, and many additional working level meetings. These coordination venues have helped communicate to officials throughout the government so that they are aware of new initiatives, ongoing implementation efforts, and challenges encountered with enhancing radioactive source security.

In response to the GAO's recommendation, NNSA will continue to seek opportunities to further enhance coordination. DNN has recently briefed DNDO on its material tracking technology plans, has provided briefings on DNN RDD studies, and is jointly exploring options to enhance collaboration on response training and exercises.

STRATEGY FOR PERMANENT THREAT REDUCTION

While DNN continues to proceed with implementation of security enhancements for high-risk radioactive materials, several factors led DNN to consider a new strategic approach to addressing the RDD threat through actions that achieve permanent and sustainable threat reduction. These factors include the large number of radioactive sources worldwide, the ongoing production of new devices with radioactive sources, and the long-term costs for sustaining security systems.

DNN is developing a broader strategic approach to achieve more permanent risk reduction for vulnerable radioactive materials that will complement the existing removal project. The centerpiece of this strategy is to lead a worldwide effort to provide reliable non-radioactive alternatives for the highest activity radioactive sources that pose the greatest risk. DNN will promote the conversion or replacement of devices that use radioactive materials to non-radioactive material devices, thereby removing certain risk of an RDD threat to the United States and worldwide. DNN is considering the provision of incentives for replacement where commercially viable alternatives exist and is collaborating with Defense Nuclear Nonproliferation's Research and Development Office to explore and assess technological improvements that could be developed and ultimately transferred to industry for commercialization where necessary.

[5] GAO-14-203 DRAFT, United States Government Accountability Office, *Nuclear Nonproliferation: Additional Actions Needed to Increase Security of U.S. Industrial Radiological Sources*.

For instance, DNN is exploring the possibility of providing incentives for replacement of Cesium irradiators with commercially available x-ray devices, which might include cost sharing for new x-ray devices along with payment for removal of the Cesium irradiator. This approach may accelerate program timelines by implementing replacements instead of enhancing security and also will achieve permanent threat reduction. DNN is exploring the feasibility of replacement options for other devices including teletherapy, radiography, and well logging.

CONCLUSION

Our efforts on radioactive security measures to reduce the risk of terrorists acquiring an RDD are vital. We will continue to seek innovative approaches to enhancing security of high-risk radioactive materials. With your continued support, NNSA will continue to work with federal and industry partners to implement security enhancements on an accelerated basis in the most cost effective manner possible.

That concludes my statement and I will be happy to respond to your questions.