Testimony for "A Review of U.S. International Efforts to Secure Radiological Materials"
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Mr. Chairman, I appreciate the opportunity to testify at this important hearing concerning the United States' international efforts to secure high-risk radioactive materials in more than 40 countries. To provide context for my testimony and recommendations, I will begin by briefly discussing relevant work I have done with the U.S. government and other organizations in helping to improve the security of radioactive materials that could fuel potent radiological dispersal devices (RDDs), one type of which is commonly called a "dirty bomb." My involvement in this work dates back to September 12, 2001, when I was asked to write a memorandum to then-Secretary of State Colin Powell about the threat of radiological terrorism. In March 2002, I left the State Department to work as a scientist-in-residence at the Monterey Institute's Center for Nonproliferation Studies (CNS), where I continued my work on this issue.

In January 2003, CNS published "Commercial Radioactive Sources: Surveying the Security Risks," one of the first in-depth post-9/11 reports on the radiological terrorism threat. I was the lead author of that report, which attracted attention in the U.S. government, the Sandia National Laboratories, the International Atomic Energy Agency (IAEA), and the Health Physics Society, which awarded me the 2003 Robert S. Landaurer Memorial Lecturer Award in recognition for work on the CNS report. The report led to officials at the National Nuclear Security Administration (NNSA) hiring me as a non-governmental consultant to help them develop their action plan to secure the highest risk radioactive sources. This consultancy took place during the month of April 2003 and contributed to the NNSA action plan of July 2003. This action plan has partially formed the basis of NNSA's current program to secure the highest risk international radioactive sources.

The CNS report also resulted in the Sandia National Laboratories hiring me as a scientific consultant on a study investigating the security of research and blood irradiators, which are highly radioactive sources used in scientific and medical applications in thousands of locations throughout the world. As part of that study, I helped organize site visits to several places in the United States containing these sources. My research team also identified several hundred of these sources in dozens of countries.

In other work on radioactive materials security, I have written or co-written articles for the *Bulletin* of the IAEA, the journal *Issues in Science and Technology*, as well as other publications, such as the chapters on radiological terrorism in the book *The Four Faces of Nuclear Terrorism*, and I have briefed commissioners at the Nuclear Regulatory Commission (NRC). I have also had discussions with officials and analysts with the Government Accountability Office (GAO) during the research phase of some of GAO's reports on radioactive materials security. Most recently, in October 2006, I helped train border guards and customs officials from Tajikistan about nuclear and radiological security. That training workshop was funded by the State Department. Also in October 2006, I participated in the NATO-Russia workshop, held in Bratislava, Slovakia, on the social and psychological effects of radiological terrorism.

What is the Nature of the Radiological Terrorism Threat?

Mr. Chairman, practically all nuclear and radiological security analysts agree that the probability of a dirty bomb attack is much greater than the probability of a nuclear bomb attack from a terrorist group. There is also broad agreement that the consequences of a nuclear bomb attack are far greater than the damage from a dirty bomb attack. Many analysts, including myself, have said that it is all but inevitable that the United States or some other country will experience a radiological attack. The question is, though: Why hasn't such an attack already happened?

To answer this question, it helps to think like a detective. As any competent detective knows, for a crime to occur, there are three essential ingredients: motive, means, and opportunity. Similarly, for a particular act of terror to happen, a terrorist group must be highly motivated to carry out that act, must identify the appropriate means, and must find the right opportunity to acquire these means and to launch the attack. The government has considerable leverage in controlling means and opportunity and far less leverage in influencing terrorists' motivations. Nonetheless, the government should work to develop a greater understanding of the dynamical nature of terrorists' motivations as well as the motivations of those people who have access to radioactive materials and who may want to abet terrorists either intentionally or unintentionally.

While most terrorist groups have expressed little or no interest in radiological terrorism, the current trend line is not encouraging. Prior to the past year, many of the reported incidents of terrorist interest in radiological attacks appeared amateurish, for example, the reported activities of José Padilla and Dhiren Barot. However, some terrorists and criminals appear to be climbing a learning curve. In September 2006, for example, Abu Hamza al-Muhajir, who was then the leader of al-Qaeda-in-Iraq, called for nuclear scientists and explosive experts to help his organization in making biological and "dirty radioactive weapons. Later that year, former Russian spy Alexander Litvinenko was murdered in London with tiny amounts (micrograms) of radioactive polonium-210. Investigators are still trying to narrow down where this particular polonium material came from, but it is well known that Russia is the major global producer of polonium used in civilian applications. Although the perpetrators do not appear to have been motivated to instill terror in a large population, traces of polonium were found in several

locations. This contamination was too little to cause health effects in many people; nonetheless, the relatively high-level of expertise shown in acquiring and using this rare radioactive material has increased concern that criminals and terrorists' capabilities to use radioactive materials have increased.

These two recent incidents also illustrate the international nature of the threat. The Litvinenko case, in particular, underscores the need for better regulatory controls over radioactive materials. Whether in Great Britain, Russia, or some other country where the polonium was located, the regulatory system did not prevent misuse of this material. The continuing illicit trafficking of radioactive materials, as documented by the IAEA, also underscores the need for improved regulatory controls in more than one hundred countries.

The means for producing radiological weapons are found in practically all countries of the world. Millions of radioactive sources are used around the globe. While only a small fraction of those sources pose high safety and security risks, this fraction includes at least several thousand high risk sources. NNSA, the NRC, and the IAEA have focused their security efforts on about ten radioactive isotopes that are contained in the most prevalently used high risk sources. While polonium-210 was listed in a May 2003 NRC-NNSA report, this isotope had not attracted significant national and international attention until the Litvinenko murder. This murder points to the need for continual reassessments of the radioactive isotopes and radioactive sources that could cause harm to human heath as well as damage to valuable property.

The high-risk source categorization system developed by the IAEA and followed by the NRC and NNSA primarily categorizes radioactive sources based on the harm that a source could do to human health. While this is a vitally important consideration, a comprehensive assessment would have to factor in the economic damage that could result from the contamination from sources that would not pose an immediate threat to health but could disrupt use of valuable property. Moreover, a thorough security assessment would consider the portability of a source and the dispersibility of the radioactive material in a source. Those sources that are easy to access and carry, have relatively large amounts of radioactive material, and contain material that is relatively easy to disperse should receive the greatest security attention.

What improvements are needed for U.S. government, other governments, and industry's efforts to secure the highest risk radioactive sources?

I have recently reviewed the NNSA's Global Threat Reduction Initiative (GTRI) unclassified risk profile system for assessing radioactive sources. I found it to be a sound system based on prioritization criteria that factor in: nuclear and radioactive material attractiveness, external threat environment within the country, internal site vulnerability condition, and proximity to strategic interests. I have also reviewed GAO's recent report on NNSA's international radiological threat reduction program. The overall impression that emerges from these reviews is that NNSA has made significant accomplishments in this program, especially in the area of physical security efforts. Physical security has

traditionally been one of NNSA's strengths. NNSA has transferred the lessons learned in providing for physical security of nuclear explosive materials into the area of enhancing physical protection of commercial radioactive materials. But more attention is needed to address security of radioactive sources that are used daily and to enhance the regulatory infrastructure in dozens of countries.

Uses of nuclear explosive materials and commercial radioactive materials differ. In contrast to nuclear explosive materials, commercial radioactive materials are designed to be used on a daily basis in a variety of settings, many of which are accessible to the public. For instance, potent radioactive materials are used in hospitals and universities. Also unlike nuclear explosive materials, many radioactive sources are accessible to numerous workers, such as hospital doctors, nurses, and technicians. Simply locking up radioactive sources that are still in use is not adequate. NNSA has recognized this situation and thus, has made improving safety and security culture, including regulatory infrastructure a crucial pillar of its action plan. Moreover, NNSA has recognized that it has limited capability in this area of work and has been leveraging cooperative activities with the IAEA, which has a Model Project to help countries in need of regulatory assistance. However, more worked is needed in this area including developing a long-term sustainability plan.

Sustainability depends fundamentally on all countries taking responsibility for ensuring safety and security of their radioactive sources. The NNSA program, I believe, works best when it provides a jumpstart to countries in serious need of security assistance. The program also importantly can serve as a bridge on the way toward having countries pick up the costs of sustainable security solutions. As the NNSA program heads into its fifth year of operations, it is transitioning into that bridging period for many of the countries that received security assistance in 2002 and 2003. Russia, in particular, is now in a better position, especially with money earned from oil revenues, to fund its radioactive source program with gaps covered by some international resources. With terrorist activity within its borders and interest expressed by some Chechen rebels in radioactive materials, Russia has a clear vested interest in significantly improving its own security efforts. Nevertheless, with strategic assets abroad and the possibility that terrorists could transport radioactive materials to the U.S. homeland, the United States continues to have a strong interest in securing the highest risk international radioactive sources.

Congress should be commended for delegating authority in October 2006 to NNSA to accept international monetary and other resource commitments for the radioactive source security program. NNSA has been seeking contributions from international donors. If it is not already doing so or if it has not already intended to do so, the United States should use the G8 and other international forums to raise money to create a sustainable radioactive source security program. The Bush administration could draw on the precedent it established in 2002 at the G8 summit to start the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction in which the United States pledged $10 billion over ten years and requested matching $10 billion from the G8 and other countries. While this partnership has yet to reach its goal pledges of $20 billion, it has reenergized efforts to secure and eliminate nuclear, chemical, and biological weapons

and the materials to make those weapons. A similar partnership to address radioactive materials would cost far less than the partnership focused on weapons of mass destruction. One of the first priorities of a global partnership to improve the security of radioactive materials would be to do a comprehensive analysis of the near and long term costs. This partnership should also recognize that a radiological attack anywhere is a radiological attack everywhere. Thus, it is every country's responsibility to enhance the security of its radioactive materials.

The radioactive source industry and the users of commercial radioactive sources also have fundamental roles to play. A major terrorist attack using commercial radioactive sources could have a chilling effect on the industry. Thus, industry and the community of radioactive source users have a vested interest in ensuring rigorous security. They should internalize as many of the external security costs as possible in the costs of radioactive sources. A security fee could be assessed to help cover those costs. Governments should not have to subsidize this industry.

It is my understanding the U.S. government has done some work with the radioactive source industry to encourage greater security efforts. But the U.S. and other governments should do more. In particular, they should form a public-private partnership that would work vigorously to phase out production and use of radioactive materials that can be easily dispersed. The community of radioactive source users should also be able to make an informed decision about whether to buy a radioactive source or a non-radioactive alternative product. The Nuclear Regulatory Commission has resisted asking users to consider alternatives to radioactive sources. The point is not to second guess users or to dictate what type of product they should use. Instead, to uphold high standards of safety and security, users should be made aware of the full portfolio of product choices in their purchasing decisions, which would include security costs. For example, one of the impediments to removing many of the very potent radioisotope thermoelectric generators (RTGs) in Russia is developing suitable alternatives. Reducing the use of dispersible radioactive materials and substituting alternatives to radioactive sources where appropriate would significantly result in permanent risk reduction. Such a strategy would fit within the mission of NNSA's GTRI, which is "to seek permanent threat reduction."

Summary of Major Recommendations

- Congress should require NNSA, NRC, and other relevant government agencies to perform an urgent, comprehensive risk assessment of all types of radioactive sources. This assessment should be updated at least every two years and should include an evaluation of the dynamical nature of the terrorist threat.

- A global problem requires a global solution. The United States should leverage international donations to help create a long-term sustainable plan to develop safety and security culture. The United States should use the G8 and other appropriate international forums to seek and obtain substantial international contributions to create a radioactive source security fund. This international

radioactive source security partnership should first estimate what are the near- and long-term costs to create a sustainable security system.

- The United States and partner governments should form public-private partnerships with industry to work vigorously toward phasing out production and use of easily dispersible radioactive materials.

- The radioactive source industry and the user community should internalize as many of the safety, security, and disposal costs in the price of commercial radioactive sources.

- The U.S. Nuclear Regulatory Commission and regulatory agencies in other countries should encourage users to make an informed decision about whether to purchase a radioactive source or a non-radioactive alternative product. Such a decision should factor in all relevant costs, including security.

Mr. Chairman, thank you for the opportunity to offer guidance on improving the security of radioactive sources.