Opening Statement

Of

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Deputy Undersecretary of Energy for Counterterrorism

Before the House Committee on Homeland Security
Subcommittee on Emerging Threats, Cybersecurity, and Science and Technology

"H.R. 2631, the Nuclear Forensics and Attribution Act"

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Chairman Langevin, Representative McCaul, members of the Subcommittee. Thank you for the opportunity to appear before you today to discuss nuclear terrorism and, in particular, the Department of Energy's efforts to sustain and improve our nation's capabilities to attribute threats involving nuclear weapons or weapons-usable nuclear materials introduced covertly into our country. I will begin by briefly addressing the specifics of the nuclear terrorism threat, the components of a national strategy to counter that threat, and the specific role that technical nuclear forensics and attribution can play in that strategy. I conclude by describing DOE's efforts to work with its interagency partners to strengthen national nuclear technical forensics and attribution capabilities.

Countering Terrorist Nuclear Weapons Threats to the Homeland

In this post-Cold War world, nuclear terrorism may be the single most catastrophic threat that this nation faces—we must do everything we can to ensure against its occurrence. The focus of my testimony today involves covert delivery by sub-national terrorist groups, either at the bidding of a state sponsor supplying the nuclear warhead or on their own via purchasing or stealing a warhead. There are three main threat variants identified below in decreasing order of likelihood, but increasing order of consequence in terms of deaths, injuries, cleanup costs, etc.:

- terrorists could acquire radioactive materials and construct devices for dispersal—so called radioactive dispersal devices (RDDs) or "dirty bombs",
- terrorists could acquire special nuclear materials (SNM)—plutonium or highly-enriched uranium (HEU)—and build an improvised nuclear device (IND),
- terrorists could acquire a nuclear weapon from a nuclear weapons state.

The overall strategy to protect the United States from terrorist nuclear weapons threats has six components:

- <u>Determine</u> terrorists' intentions, capabilities, and plans to develop or acquire nuclear weapons
- <u>Deny</u> terrorists access to the nuclear materials, expertise, and other enabling capabilities required to develop a nuclear device
- <u>Deter</u> terrorists from employing nuclear devices
- <u>Detect</u> and <u>disrupt</u> terrorists' attempted movement of nuclear-related materials, weapons, and personnel
- <u>Prevent and respond</u> to a nuclear terrorism attack
- <u>Define</u> the nature and source of a terrorist-employed nuclear device

Prevention

Although the focus of today's hearing is nuclear forensics and attribution, I must reiterate that our number one priority is to keep key fissile materials—plutonium or highly-enriched uranium—out of the hands of terrorists. Absent access to sufficient quantities of such materials there can be no bomb. We cannot overstate the importance of this point. Making a sophisticated nuclear weapon small enough to fit on a modern ballistic missile is difficult. Making a crude and inefficient one delivered by a rental truck may not be. We cannot be certain that we have controlled knowledge; thus we must control materials.

We are working hard to prevent terrorist acquisition of nuclear devices and fissile materials by:

- Strengthening physical security of U.S. nuclear weapons and weapons usable materials,
- Providing assistance to Russia to strengthen protection, control, and accounting of its nuclear weapons and materials,
- Working with friends and allies to secure weapons-usable nuclear materials worldwide, and to strengthen security at civil nuclear facilities,
- Taking more aggressive steps to interdict illicit trafficking in weapons-usable nuclear materials and related technologies via strengthened export controls, cooperation with other countries through DOE's Second Line of Defense and MegaPorts programs, and the Proliferation Security Initiative.

In July 2006, at the G-8 summit, Presidents Bush and Putin announced that they would create a Global Initiative to Combat Nuclear Terrorism to strengthen cooperation worldwide on nuclear materials security and prevention of terrorist acts involving nuclear or radioactive substances. Keeping nuclear materials out of the hands of terrorists—and where possible, eliminating potentially vulnerable weapons-usable materials—is the most effective means of prevention. Paired with UNSCR 1540, we now have both the legal mandate and practical means necessary for concrete actions to secure nuclear material against the procurement efforts of terrorists.

Barriers to acquisition also provide an important element of deterrence. If terrorists believe that it will be extremely risky, or impossible, to acquire weapons or materials, they may be deterred from seeking them, or perhaps seek other avenues of attack. While we, of course, want to prevent all types of terrorism, deterring a devastating nuclear detonation has particular urgency.

Nuclear Forensics and Attribution

Attribution—a capability to rapidly characterize and identify the source of a nuclear warhead or weapons usable nuclear materials either before or after an attack—is a key component of an overall strategy to deter nuclear terrorism. States will not provide nuclear weapons to terrorists if they know that we will find out and, under certain conditions (e.g., a witting transfer from a state sponsor to terrorists), retaliate. Moreover, post-attack attribution would provide critical information to help prevent follow-on attacks.

Attribution involves the rapid fusion of information obtained via three sources: domestic law enforcement investigations of nuclear terrorist threats, associated collateral foreign intelligence received about those threats, and the technical analysis of the nuclear device or materials interdicted prior to detonation, or the debris and signals that result from a detonation. This latter source of information is called technical nuclear forensics. The elements of a nuclear forensics capability involve (1) collection of technical forensics data from the device or event, (2) lab analysis and reporting including comparison of collected data with a materials data base, and (3) interpretation and evaluation coupled with appropriate technical peer review.

The types of questions that we want to answer in technical nuclear forensics and, more broadly via the attribution process include: What material is it? Is it U.S. material? If not, where did it come from and how did it get here? How, when and where was it produced? For nuclear devices: Was it an RDD or a nuclear explosive device? What fissile materials were used? What was the yield? What was the design?

Post-detonation nuclear event forensics can provide key information about both the design and sophistication of a warhead, and about the origin of its fissile materials. During the period of nuclear testing, we gained much experience and critical information evaluating radioactive debris from Soviet above-ground nuclear tests, and from our own underground tests in Nevada. Covert delivery by terrorists presents a different challenge. For this challenge, a comprehensive international fissile materials data base would assist nuclear forensics efforts to correlate debris data with a particular reactor or enrichment facility that produced the material. It should be in every nation's interest to contribute to such a data base, both to help deter nuclear terrorism worldwide and to build confidence that it is a responsible steward of weapons usable fissile materials.

One point I want to emphasize: during the Cold War, post-detonation analysis was carried out over a period of several months—it was important but not time-urgent to complete it. We recognize that a nuclear detonation in a U.S. city would create enormous pressures to get solid information out in the shortest possible timeframe. As a result, our efforts to sustain and improve nuclear forensics capabilities include substantial efforts to shorten analytical timelines.

DOE contributions to technical nuclear forensics

The United States recently has made important progress, both in policy and technology, towards establishing a national technical nuclear forensics capability. As pointed out in Vayl Oxford's testimony, roles and responsibilities for various U.S. government agencies were established by the President last August and are being implemented. DHS is working to coordinate efforts among agencies, and identify capability gaps, in national technical nuclear forensics capabilities. This includes close coordination with the law enforcement and intelligence communities. At the initiative of the DoD, a national capability for post-detonation forensics became operational at the end of 2005. DHS is working to develop a concept of operations and to advance and ensure appropriate capabilities related to forensic analysis of interdicted nuclear materials. DOE has responsibility to develop a concept of operations and ensure appropriate capabilities to assess an interdicted nuclear device.

DOE has been engaged in a wide range of activities in support of this interagency effort. Its role has been key because most, if not all, of the capabilities that the nation draws upon for technical nuclear forensics reside at DOE's national laboratories. To date, forensics capabilities relating to such areas as nuclear weapons device modeling, nuclear materials production, radiochemistry and associated specialized facilities, advanced computations and simulations, and the physics and chemistry of fissile materials have been sustained in large part by leveraging off activities carried out in NNSA's nuclear weapons program. In the following discussion, we address some of the details of DOE's efforts in support of technical nuclear forensics.

Pre-and Post-Detonation Nuclear Device Missions

NNSA's Office of Emergency Operations provides operational capabilities and support in the following areas in addition to its direct support to the Attorney General in the render safe mission for interdicted nuclear devices in the United States:

- Develop and sustain pre-detonation nuclear device forensics concept of operations and associated capabilities.

- Take custody of the rendered safe nuclear explosive devices and support the collection of material samples and other forensic data from such devices.

- As part of the DoD-developed concept of operations for the post-detonation mission, support ground sample collection after a nuclear detonation or dispersion of nuclear material within the United States. This includes providing a reliable capability to deploy, support domestic ground sample collection, and deliver post-detonation nuclear debris samples for shipment to designated laboratories.

Nuclear Forensics R&D—Post-detonation analysis

NNSA's Defense Nuclear Nonproliferation (DNN) organization is sponsoring advanced R&D activities at our national laboratories to improve techniques for radiochemical analysis of bomb debris and has also sponsored ground-breaking work on other diagnostics tools. It is developing the next generation of post-nuclear detonation ground based forensics capabilities. Emphasis is on reducing timelines for producing analytical results. This work includes advanced sampling technology and collection tools for rapid, safe, precise post-detonation nuclear sample collection and analysis. It also includes nuclear event modeling to predict activation and entrainment of contaminants, deposition pattern of debris, remote sample collection/recovery concepts and rapid in-field analytical capabilities.

Nuclear Forensics R&D—Prompt output diagnostics measurements

DNN is also sponsoring work to improve capabilities to determine nuclear device information directly through collection and analysis of the prompt radiation diagnostics from a detonation. Hi-fidelity, near-field, prompt diagnostics capabilities are being developed that will provide greater sensitivity and thus greater insight into a terrorist nuclear device design than the current suite of satellite and seismic sensors used for world-wide nuclear event reporting, attack assessment and treaty monitoring.

Nuclear Counterterrorism Design Support

NNSA's Nuclear Counterterrorism Design Support (NCDS) program is focusing the talent, capabilities, and resources of our nuclear weapons program on the threat of nuclear terrorism. In place since 2000, the NCDS program provides an essential element of technical support to our nation's efforts to prevent the detonation of a terrorist nuclear device. Under NCDS, weapons designers at our national laboratories analyze and model potential IND designs, drawing on computational tools, experimental data, and expertise originally developed in the nuclear weapons program. The knowledge gained is applied to nuclear search and detection, forensic analysis, nuclear device render-safe, nuclear facility security, and intelligence assessments.

NCDS analysis is drawn on extensively by other DOE components as well as by other United States government agencies with associated responsibilities.

Nuclear Forensics R&D—Calculation of IND output and rad-chem signatures

In addition to its NCDS work, NNSA's Defense Programs organization is carrying related work in the following areas:

- Via device modeling studies of INDs, identification and characterization of signatures that discriminate various IND designs from traditional U.S. and foreign warheads.

- For pre-detonation forensics work, assessment of signatures associated with plutonium and HEU samples derived from domestic and foreign sources. Work currently includes physical and chemical analysis to associate materials processing knowledge to product material signatures.

- Support to attribution and forensics communities by providing IND experts to participate in exercises, more accurately identify the range of threats, and provide education on IND design.

Defense Programs, including through its Science Campaign, is seeking to improve capabilities to calculate and assess weapon outputs—both prompt (gamma rays, neutrons, x-rays, and debris kinetic energy) and long-lived radionuclide debris—released from a nuclear detonation. The Advanced Simulation and Computations (ASC) program is improving computer simulation capabilities for technical nuclear forensics. Improved physics models will enable the ASC codes to be applied more reliably to model the breadth of threats, including low-technology INDs, and provide predictions regarding the post-explosion radionuclide debris isotopes. This work facilitates more timely and responsive nuclear forensics capabilities.

Nuclear Materials Information Program (NMIP)

Last year, the President established the Nuclear Materials Information Program (NMIP)—an interagency effort managed by DOE's Office of Intelligence and Counterintelligence to:

- Develop an integrated system of information from all sources concerning worldwide nuclear material holdings and their security status;

- As part of this effort, collect signatures of nuclear materials to support forensics and attribution assessments; and

- Identify opportunities to work with international partners directly to share information on nuclear materials characteristics and security.

International Cooperation

Defense Nuclear Nonproliferation is advancing international nuclear forensics cooperation in Central Asia, which remains a focus of engagement due to the region's integral role in the former Soviet weapons complex and the willingness of the current governments to work with NNSA and U.S. laboratory personnel. This international collaboration focuses on joint collection and characterization of uranium ore, ore concentrate and tailings, which expands the U.S. knowledge base and contributes to the overall nuclear counterterrorism effort. To date, work has focused on uranium mining and milling sites in the Central Asian nations of Tajikistan and Kyrgyzstan. NNSA coordinates its Central Asia work closely with the DHS, which is conducting similar international outreach activity in Kazakhstan.

Search and Render Safe

Should we detect nuclear materials or a suspected nuclear device, the DOE—through its national laboratory system—deploys highly-trained teams of experts to search for clandestine nuclear materials or warheads and, if necessary, to disarm and dispose of a terrorist nuclear device. These teams work in close partnership with the DoD, DHS and the FBI in managing our national response to nuclear terrorism. The DOE has a robust research program to support its nuclear search and render-safe mission and a complementary technology integration program that develops tools for use by its emergency response teams in the field.

Sustaining Key Capabilities

A key challenge is to ensure that we sustain and strengthen nuclear forensics capabilities in support of nuclear counterterrorism in an era when our nuclear weapons program is undergoing substantial change. This includes sustaining the people at our national laboratories involved in these efforts and the specialized laboratory facilities and experimental and analytical tools that they employ to carry out their job. Along these lines, in coordination with DHS and DOD, the DOE has initiated a study to be conducted by the National Academy of Science to examine the nation's nuclear forensics capabilities and provide findings and recommendations to sustain and improve them including technical, infrastructure, and human resource elements, and international collaboration, cooperation and information sharing.

Finally, while we have made great progress over the past several years, more remains to be done in fleshing out the technical and policy dimensions of nuclear forensics and attribution.

Thank you for your attention; I would be happy to take questions.