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## Nuclear Incident Capabilities, Knowledge & Enabler Leveraging

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***“The greatest threat to the United States and global security is no longer a nuclear exchange between nations, but nuclear terrorism by violent extremists and nuclear proliferation.” - President Barack Obama***

### Executive Summary

The detonation of a 10 Kiloton Improvised Nuclear Device (IND) is a serious scenario that the United States must be prepared to address. The likelihood of a single nuclear bomb exploding in a single city is greater today than at the height of the Cold War. Layered defenses against domestic nuclear terrorism indicate that our government continues to view the threat as credible. The risk of such an event is further evidenced by terrorists' desire to acquire nuclear weapons.

The act of nuclear terrorism, particularly an act directed against a large population center in the United States, will overwhelm the capabilities of many local and state governments to respond, and will seriously challenge existing federal response capabilities. A 10 Kiloton IND detonation would cause total infrastructure damage in a 3-mile radius and levels of radiation spanning out 3,000 square miles. In a densely populated urban area, the anticipated casualties would be in excess of several hundred thousand. Although there would be enormous loss of life, housing and infrastructure, an IND detonation is a recoverable event.

We can reduce the risk of these high-consequence, nontraditional threats by enhancing our nuclear detection architecture and establishing well planned and rehearsed plans for coordinated response. It is also important for us to identify new and improved ways to foster collaboration regarding the response to the IND threat to ensure the demand and density of expertise required for such an event is postured and prepared to mobilize, integrate, and support a myriad of anticipated challenges.

We must be prepared to manage the consequences of such an event in a deliberate manner and get beyond notions of total devastation by adopting planning assumptions around survivability and resiliency. Planning for such a scenario needs to be decisive in determining a response based on competencies and desired outcomes. It is time to synthesize known threats and plausible consequences into action. Much work needs to be accomplished to enhance nuclear preparedness and to substantially bolster and clarify the capacity to deploy competent resources. Until detailed plans are scripted, and personnel and other resources are postured, and exercised, IND specific planning remains an urgent need requiring attention and action. Although strategic guidance, policies, concepts of operations, roles, responsibilities, and plans governing the response and consequence management for the IND scenario exist, an ongoing integration challenge prevails regarding how best to get capable and competent surge capacity personnel (disaster reservists) and other resources engaged and readied in an up-front manner with pre-scripted assignments to augment the magnitude of anticipated demands of expertise.

With the above in mind, Savannah River National Laboratory (SRNL) puts science to work to create and deploy practical, high-value, cost-effective nuclear solutions. As the Department of

Energy's (DOE) applied research and development laboratory, SRNL supports Savannah River Site (SRS) operations, DOE, national initiatives, and other federal agencies, across the country and around the world. SRNL's parent at SRS also employs more than 8,000 personnel. The team is a great asset that seeks to continue their service in the interest of national security and stands ready to accomplish new missions. Overall, an integral part of the vision for SRNL's National and Homeland Security Directorate is the establishment of a National Security Center at SRNL, and development of state of the science capabilities (technologies and trained technical personnel) for responding to emergency events on local, regional, or national scales. This entails leveraging and posturing the skills, knowledge and experience base of SRS personnel to deliver an integrated capability to support local, state, and federal authorities through the development of pre-scripted requests for assistance, agreements, and plans. It also includes developing plans, training, exercises, recruitment strategies, and processes to establish a 1,000 plus person nuclear disaster workforce capable of providing surge capacity support that can be deployed in part or in all.

## **Background**

The Federal Government has identified fifteen catastrophic planning scenarios in terms of scope, range, and complexity to help focus preparedness. National Planning Scenario 1: "Nuclear Detonation - 10 Kiloton IND" poses multiple challenges. Though an entire targeted city may or may not be destroyed, surrounding communities and states would be impacted. The support of many competent persons as well as other resources would be needed to respond to such a crisis. In order to save and protect lives and preserve property, participating agencies must be prepared to manage the consequences of such an event in a deliberate manner.

Government at the local, state, and federal levels is responsible for helping shape, prepare, plan, exercise, and execute malleable capabilities to respond to hazards and to mitigate the effects on its citizens. Emergency management and response personnel must be prepared to identify new and improved ways to address catastrophes. In the spirit of preparation, a growing partnership between federal, state, local, and the private sector regarding the response to the IND threat is needed to ensure the demand and density of expertise required for such an event is postured and prepared to mobilize, integrate, and support a myriad of anticipated challenges.

*Planning Guidance for Response to a Nuclear Detonation*, developed by the White House Homeland Security Council, stresses it is incumbent to prepare and plan for a terrorist's nuclear attack. Although there's a low probability compared to conventional explosives, the possibility is real and the consequences are catastrophic.

Overall, officials must not delude their thinking that existing response plans to a conventional bomb, "dirty bomb" or other attack can be simply ramped up to deal with nuclear terrorism -- there's no comparison. As Harvard professor and nuclear terrorism expert Graham Allison describes it, "a dirty bomb is to a nuclear bomb as a lightning bug is to lightning."

## **Guiding Principles**

The President's National Security Strategy, May 27, 2010, commits to securing the homeland against 21st century threats by preventing terrorist attacks and other threats against our homeland, preparing and planning for emergencies, and investing in strong response and recovery capabilities.

Attacks using improvised nuclear devices, pose a serious and increasing national security risk. We can reduce the risk of these high-consequence, nontraditional threats by enhancing our nuclear detection architecture and establishing well planned and rehearsed plans for coordinated response to dramatically diminish the consequences of nuclear incidents.

An expeditious federal response is required to mitigate the consequences of a nuclear incident. The federal government response to nuclear or radiological terrorist threats and incidents includes, but is not limited to, the following:

- The response to a radiological threat or actual incident requires an integrated federal government response.
- In the case of a nuclear terrorist attack, the plume may be dispersed over a large area over time, requiring response operations to be conducted over a multi-jurisdictional and/or multi-state region.
- A terrorist attack may involve multiple incidents, and each location may require an incident response and a crime scene investigation simultaneously.

### **Situational Awareness**

A 10 kiloton IND detonation would cause total infrastructure damage in a 3-mile radius and various levels of radiation spanning out 3,000 square miles. In a densely populated urban area, the anticipated casualties would be in excess of several hundred thousand, hundreds of thousands of survivors would either shelter in place or forced onto the city's transportation system to seek shelter in safe areas or evacuate the city. The attacked city would face hundreds of billions of dollars in damage and a recovery effort that will take years.

The act of nuclear terrorism, particularly an act directed against a large population center within the United States of America, will overwhelm the capabilities of many local and state governments to respond, and will seriously challenge existing federal response capabilities. Nonetheless, the initial response to a nuclear incident would start at the local and state levels. It would include the use of police, emergency medical technicians, firefighters, and National Guard assets.

Strategic guidance, policies, concepts of operations, roles, responsibilities, and plans governing the response and consequence management for the 10 kiloton IND detonation scenario exist. However, an ongoing integration challenge prevails regarding how best to get capable and competent surge capacity personnel (disaster reservists) and other resources engaged and readied in an up-front manner with pre-scripted assignments to augment the magnitude of anticipated demands of expertise that will be required for such an event.

### **Savannah River National Laboratory**

SRNL puts science and people to work to create and deploy practical, high-value, cost-effective solutions. As DOE's applied research and development laboratory, SRNL supports SRS operations, DOE, national initiatives, and other federal agencies, across the country and around the world.

SRNL's tradition of service to the nation goes back over 50 years. The laboratory was established in 1951 to provide research and development support for the Atomic Energy Commission's Savannah River Plant (SRP). SRNL personnel developed solutions for the many challenges of building and bringing into operation five nuclear production reactors. Also built were supporting facilities, including two chemical separations plants, a heavy water extraction plant, a nuclear fuel and target fabrication facility, a tritium extraction facility, and waste management facilities. Over the decades, SRP became known as SRS and SRNL matured into a technically diverse laboratory with international recognition.

After 50 years of producing nuclear materials for defense and non-defense uses, SRS has shifted its strategic direction and resources from nuclear weapons materials production to cleanup of the nuclear waste and environmental contamination created during production.

Today, SRS is dedicated to environmental management and cleanup, providing capability for supporting the enduring nuclear weapons stockpile and processing, and managing nuclear materials in support of nuclear non-proliferation efforts. It also develops and deploys innovative technologies to support environmental cleanup.

SRS is approximately 20 miles southeast of Augusta, Georgia, and south of Aiken, South Carolina, the two closest population centers. SRS encompasses parts of Aiken, Barnwell, and Allendale Counties in South Carolina. More than 90 percent of the Site's 198,344 acres (310 square miles) is covered in forest or other natural vegetation. Production, production support, service, research and development, waste management areas, roads, and utility corridors account for the remaining 10 percent. The original facility layout of SRS was designed to isolate major radioactive operations from the site boundaries, creating a buffer zone that provided additional security and to reduce the risk of an accidental exposure to the general public.

### **Personnel & Expertise**

SRNL directly employs around 800 persons. This includes materials scientists, chemists, physicists, biologists, microbiologists, mechanical engineers, chemical engineers, nuclear engineers and a host of other scientists, engineers and technicians. SRNL's technically exceptional workforce provides responsive solutions to a myriad of challenges under conditions that require the utmost attention to safety and security.

SRNL's parent at SRS also employs more than 8,000 personnel with expertise in nuclear facility management, hazardous material operations, environmental monitoring, industrial & occupational safety, health physics, industrial safety, engineering, and many other functional areas. The team is a great asset that seeks to continue their service in the interest of national security and stands ready to accomplish new missions of national priority and significance.

SRNL workers supported Ground Zero search and rescue operations, measured and analyzed the effects of Chernobyl, developed nuclear detection devices for our ports, trans-shipped dangerous nuclear materials from the former Soviet Union, and were on hand during the Gulf Oil Spill. Moreover, SRS infrastructure and personnel are at present supporting a number of missions in the areas of homeland security and national energy development. It is believed, that these missions could be greatly expanded to help meet national needs and to leverage a highly experienced and talented workforce.

### **Leveraging Resources**

During a major disaster, the whole community – government, private sector, civil society and international partners – must work together to respond and recover. The subject matter experts that SRNL could provide in the first seventy-two (72) hours of an incident include a notional construct of up to one thousand persons from broad technical disciplines. A partial list includes:

- Occupational Safety & Health Professionals
- Industrial Hygienists
- Health Physicists
- Atmospheric Scientists
- Hazard Material Management Professionals
- Hazardous Waste and Spill Response Professionals
- Hazardous Material Transportation Professionals
- Professionals with Fire/Rescue experience
- Professional Engineers

## **The Vision**

An integral part of the vision for SRNL's National and Homeland Security Directorate is the establishment of a National Security Center at SRNL, and development of state of the science capabilities (technologies and trained technical personnel) for responding to emergency events on local, regional, or national scales. This entails leveraging and posturing the skills, knowledge and experience base of SRS personnel to deliver an integrated capability to support local, state, and federal authorities. It includes the development of pre-scripted requests for assistance, agreements, and plans. It also includes periodic training, exercises, and qualification maintenance for a core team of personnel and others that could be tasked to support a major disaster.

### **Specific Support SRNL Could Provide:**

- Protocol Development & Planning
- Technical Assessments
- Training
- Field Exercise Support
- Laboratory Analyses & Services (i.e. Dosimetry & Bioassay Results and Environmental Sampling Analysis)
- Population Monitoring and Dose Modeling, Assessment & Reconstruction (i.e. Estimate the effects of radioactive releases on human health and the environment)
- Technical Support (i.e. Environmental & Waste Characterization, Containment, Cleanup, Remediation & Disposal Assistance plus Damaged Equipment, Building Integrity & Asset Assessment Advice)
- Integrate with other agencies, as requested, to assist with any of the following:
  - Radiological Monitoring, Sampling & Survey Functions
  - Gross Decontamination
  - Personnel Decontamination
  - Site Characterization
  - Debris Management
  - Site Remediation
  - Environmental Assessments
- Develop and document workforce plans, training, recruitment strategies, and processes to establish a 1,000 plus person nuclear disaster workforce capable of providing surge capacity support that can be deployed in part or in all