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After A Nuclear 9/11

The appearance of nuclear weapons materials on the black market is a growing global concern, and it is crucial that the United States reinforce its team of nuclear forensics experts and modernize its forensics tools to prepare for or respond to a possible nuclear terrorist attack.

Large quantities of nuclear materials are inadequately secured in several countries, including Russia and Pakistan. Since 1993, there have been more than 1,300 incidents of illicit trafficking of nuclear materials, including plutonium and highly enriched uranium, both of which can be used to develop an atomic bomb. And these are only the incidents we know about.

It is quite possible that a terrorist group could acquire enough nuclear material to build a bomb. Nuclear materials have been discovered by border patrols, seized in police raids from India to, as recently as last fall, Slovakia, and even hidden in a flower garden in Hanover, Germany. With enough stolen material, only a few specialists would be needed to build a nuclear weapon. After that, terrorists would lack only a truck to deliver it.

If a terrorist group were to detonate a nuclear weapon on U.S. soil, the FBI, CIA, Department of Homeland Security and the nation's national labs would race to track down those responsible and prevent any further detonations by that group.

After the Sept. 11 attacks, the time between the fall of the twin towers and our response in Afghanistan was less than one month. But current U.S. nuclear forensics capability — which involves analyzing nuclear radiation and isotopic signatures — can't guarantee definitive information within a month of an attack.

Fibers, fingerprints, hair samples, a truck axle — all standard forensics clues — would have been vaporized in the explosion. Only two primary pieces of evidence would remain: radiation and isotopic signatures.

Radiation and isotopic signatures are the scents that nuclear forensics scientists use to hunt terrorists. Within a few hours, they would know whether the bomb was made of plutonium or uranium, a crucial first step in narrowing the investigation. Within hours to weeks, they would determine key details about the original nuclear material and then estimate the size, weight and complexity of the bomb. Over the next several months, they might be able to identify the source country and the terrorists' pathway into the United States.

But in our post-Sept. 11 world, we won't have months to respond. There would be enormous pressure to rapidly identify the terrorists and the chain of events leading up to the attack.

With a few changes, the speed and accuracy of nuclear forensics could be significantly improved.

First, we should update our 20th-century program to confront 21st-century enemies. Much of our field and laboratory equipment dates to the Cold War. So do most of our personnel. We need to develop and manufacture advanced, automated radiation analysis equipment that can be deployed to the field and is backed up by improved laboratory measurement. We need enhanced computer simulation and modeling capabilities. And we need to establish a federal initiative to reinvigorate the field of nuclear chemistry.

Second, international collaboration is essential. Nuclear material can have a unique signature depending on its source reactor or fuel facility. A shared and appropriately accessible international database of nuclear samples can help to more quickly match debris from an explosion with its original source.

Third, we must consider what it will take for the world to believe our analysis. The U.S. intelligence community's failures in assessing weapons of mass destruction in Iraq could well result in international skepticism regarding any nuclear forensics investigation we might perform. A group of recognized experts not associated with our federal investigation should be established to provide independent validation of the forensics analysis.

Finally, we need to manage expectations and prepare for the inevitable political pressure to respond quickly after an attack. Through realistic drills, our leaders can become aware of the strengths and limitations of the nation's nuclear forensics capability. Even with these changes, forensics analysis will take time, and results will not be immediately conclusive. Our leaders must recognize that, at times, decisions may need to be deferred or made amid uncertainty.

There has been some good news. Some countries, including Pakistan, are strengthening the critical programs that lock down nuclear material at its source. But we must take additional steps, in case plutonium or uranium slips past the gate.

Jay Davis, a weapons inspector in Iraq after the Persian Gulf War, serves on the Defense Department's Threat Reduction Advisory Committee. He is a founding director of the federal Defense Threat Reduction Agency and recently served on a committee sponsored by the American Physical Society and the American Association for the Advancement of Science that completed the first unclassified review of the nation's nuclear forensics capability.