‘Dirty nukes’: The threat and the response

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In late February 2003, PBS aired a “Dirty Bombs” documentary on the science television series, NOVA.[1] This week the International Atomic Energy Agency (IAEA) hosted in Vienna a three-day International Conference on Security of Radioactive Sources (March 11-13).[2] Around 600 representatives from about 100 countries focused on this threat in an attempt to give people a better understanding of ways to account for and secure these materials. All of which raises the question: just how dangerous is the radiological threat?

Ever since the June 10, 2002 announcement by U.S. Attorney General John Ashcroft that the U.S. government had arrested a Chicago street criminal, Jose Padilla, on the charge that he planned to build and detonate a “dirty bomb” the issue of possible terrorist use of some sort of radiological dispersal device (RDD) has been a prominent public concern.[3]

On February 11, Central Intelligence Agency Director George Tenet testified that the intelligence community had information pointing to plots that could include the use of a RDD.[4]

During the recent “Code Orange” security alert dirty bombs were explicitly mentioned by Secretary of Homeland Security Thomas Ridge.

The government views this threat as far more likely than that of an actual nuclear weapon. In fact, it was revealed at the IAEA conference that both U.S. and Russian experts are experimenting with simulated ‘’dirty bombs’’ to see how such radiation weapons and potential terrorist tools might work.[5]

According to the Federal Emergency Management Agency:

These radiological weapons are a combination of conventional explosives and radioactive materials designed to scatter dangerous and sub-lethal amounts of radioactive material over a general area. Such radiological weapons appeal to terrorists because they require very little technical knowledge to build and deploy compared to that of a nuclear device. Also, these radioactive materials used widely in medicine, agriculture, industry and research, are much more readily available and easy to obtain compared to weapons grade uranium or plutonium.[6]

Evidence of this proliferation risk includes, for example:

- Western countries searching in Georgia for potential “dirty bomb” materials – highly radioactive and mobile nuclear batteries containing strontium-90;[7]
- The U.S. oil company Halliburton investigating the disappearance of radioactive materials used in its operations in Nigeria;[8] and
- The U.S. government sending detection equipment to border posts in Central Asia and training customs officers in intercepting nuclear contraband.[9]

In addition, alarmed by reports of al Qaeda’s progress toward obtaining a nuclear device, the Bush administration has deployed hundreds of sophisticated sensors to U.S. borders, overseas facilities, and choke points around Washington since November 2001. It has also placed the Delta Force, the nation’s elite commando unit, on a new standby alert to seize control of nuclear materials that the sensors may detect.[10]

What are the dangers?

Contrary to they way they are often labeled in the press RDDs are not weapons of mass destruction. Few, if any, people would die immediately after exposure to the ionizing radiation from an RDD. However, the use of such a ‘dirty’ bomb would undoubtedly spread panic and produce severe economic damage, due to extensive cleanup difficulties. Techniques for dealing with radioactive contamination rely largely on demolition and removal, but the long-term effects and clean-up procedures are complex as well as expensive. There is currently confusion and disagreement, for example, about the long-term health effects of low-level radiation. In addition, dirty bombs may contain a variety

of different materials, causing unique synergistic effects that might be very difficult to understand or address.

Because it will be difficult to assess the long-term public health effects of exposure from an RDD, public health care and protection planning is very challenging. Determining publicly acceptable levels of cleanup will likely be very controversial as well.

Fortunately, there is reason to believe that much of the concern over dirty bombs is exaggerated. In terms of practicality, it is much easier said than done. To disperse significant radioactivity over an area of, say, 1 square mile, the initial concentration within a small bomb would have to be roughly 10 million times greater and would quickly kill the terrorists trying to assemble the material. The radioactivity also creates large amounts of heat energy sufficient to melt most containers.

But that is not the same as saying there is no reason for concern. For the economic and public health and safety reasons mentioned above, the security of radioactive material deserves greater attention. According to the IAEA many radioactive sources are not generally subject to tight security measures; such measures have traditionally been limited to preventing accidental access or petty theft (e.g. of shielding materials). Traditional security measures aim to prevent unauthorized access to radioactive sources; such access is facilitated when sources are misplaced, forgotten, lost or insecurely stored.

Regulatory controls on sources

In the United States the vast majority of radioactive sources are under the control of competent governmental regulatory authorities.[11] Nevertheless, there are many sources that have never been subject to regulatory control, or were initially regulated but have since been abandoned, lost, misplaced, stolen or otherwise removed without authorization; these are termed 'orphan sources'. Because of their availability and lack of control, such orphan sources pose a risk of being used for malevolent purposes, while the modern terrorists apparent indifference to their own safety means that the risks of handling powerful radioactive sources can no longer be seen as an effective deterrent.

According to a recent report[12] by the Center for Nonproliferation Studies at the Monterey Institute of International Studies:

- Only a small fraction of the radioactive sources in use today pose inherently high security risks, and the great majority of these are under regulatory control in advanced countries.
- The production of commercial radioactive sources is concentrated in a handful of countries and enterprises, creating regulatory opportunities to ensure adequate security in recipient states.
- U.S. and Canadian export licensing rules, typical of suppliers, permit the export of most high-risk sources without any governmental review of the credentials of end-users. Pending new regulations, Canada has alerted exporters to verify the bona fides of end-users, but the U.S. has not.

Legislative initiatives

Recently Senate Foreign Relations Chairman Lugar said he will reintroduce the Nuclear and Radiological Terrorism Threat Reduction Act. The bill authorizes the Secretary of State to takes measures to support international programs to detect and prevent acts of nuclear or radiological terrorism. He first introduced the bill last October with Foreign Relations ranking member Joseph Biden, D-DE., who was then committee chairman. It would provide temporary facilities in up to five countries for radioactive storage; accelerate

discovery, inventory and recovery of unwanted radioactive material; replace former Soviet lighthouses, weather stations and other facilities using RTGs; provide training for radiological emergencies; require a global radiological threat assessment; develop non-radioactive alternatives to radiological uses; and appoint a special representative to coordinate U.S. efforts worldwide.

Several lawmakers, including Sen. Hillary Rodham Clinton, D-N.Y., have introduced bills that seek to ensure that radioactive material in the United States does not fall into the wrong hands. Clinton's bill, the Dirty Bomb Prevention Act of 2003, (S. 350), which is co-sponsored by Sen. Judd Gregg, R-N.H., amends the the Atomic Energy Act of 1954 and calls for the creation of a task force chaired by the Nuclear Regulatory Commission to prevent a dirty bomb attack in the United States. Specifically, the task force is to "evaluate the security of sensitive radioactive material against security threats; and, recommend administrative and legislative actions to be taken to provide the maximum practicable degree of security against security threats."

Rep. Edward Markey, D-Mass., is sponsoring a similar bill on the House side. He said there are more than 2 million radioactive sources in the United States, used for medical procedures, research, and industrial processes. In the past 5 years, nearly 1500 radioactive sources have been reported lost or stolen in the U.S., but less than half of them have been found. The Nuclear Regulatory Commission (NRC) has admitted that it stopped tracking radioactive sources by serial number in 1984.[13]

The lawmakers want the NRC to oversee a classification and tracking system for the recovery and storage of unused radioactive sources. Specifically, the bill requires the NRC to set up a task force which would recommend regulatory changes to be implemented:

- Ensure there are systems for the secure tracking, recovery and storage of radioactive materials;
- Ensure there are audits, inspections, and penalties for those who mishandle radioactive sources;
- Increase physical security for facilities that store these materials and require security background checks for personnel with access to them;
- Establish a system that would require anyone buying or leasing a radioactive source to pay a refundable deposit that they would get back when they returned the source safely;
- Evaluate U.S. export controls on these materials to ensure that they do not fall into the wrong hands overseas; and
- Assess whether there are some uses of radioactive materials that could be easily accomplished using other, less dangerous materials.

The NRC reports that among the 375 sources that are lost or stolen each year, 60 percent have yet to be recovered. Likewise, a European Union (EU) study estimated that some 70 sources each year are lost from regulatory control in the EU.[14] The IAEA has said that more than 100 nations have inadequate control and monitoring programs to prevent or detect the theft of these materials. In his opening address to this week's Conference, the IAEA Director General noted that the IAEA's Illicit Trafficking Database includes over 280 confirmed incidents since 1993 involving radioactive sources and that much remains to be done to improve the security of radioactive sources worldwide.[15]

In addition to the Clinton-Gregg and Markey bills, Sen. Mary Landrieu, D-La., is sponsoring legislation (S. 193) that calls for a radioactive detection system demonstration project for the nation's seaports. And a section in Minority Leader Daschle's Homeland Security Act (S. 6) deals with radioactive material.

[1] http://www.pbs.org/wgbh/nova/transcripts/3007_dirtybom.html

[2] International Conference on Security of Radioactive Sources, http://www.iaea.org/worldatom/Meetings/2003/infcn113.shtml and http://www.iaea.org/worldatom/Press/Focus/RadSources

[3] Ashcroft referred to Padilla by his adopted name of Abdullah al Muhajir, calling him “an al-Qaida operative,” and said his arrest “disrupted an unfolding terrorist plot to attack the United States.” Few others in the administration saw Padilla as such a threat. Many thought Ashcroft was grandstanding. His appearances were severely curtailed. Still, Ashcroft’s Justice Department has fought to keep Padilla and another U.S. citizen - Yasser Esam Hamdi, who was captured in Afghanistan - in custody as “enemy combatants” without such rights accorded to citizens as consultation with an attorney or a hearing to seek bail. The government has moved the two to Southern states so their cases can be heard in the conservative 4th Circuit, which includes Maryland.

[4] DCI’s Worldwide Threat Briefing , “The Worldwide Threat in 2003: Evolving Dangers in a Complex World,” 11 February 2003, http://www.odci.gov/cia/public_affairs/speeches/dci_speech_02112003.html The Center for Nonproliferation Studies at the Monterey Institute of International Studies published a chart providing a comprehensive listing of reports concerning al-Qa`ida’s involvement with chemical, biological, radiological and nuclear weapons in the period between 1997 and December 2002, http://cns.miis.edu/pubs/other/sjm_cht.htm

[5] Charles J. Hanley, “U.S., Russian experts quietly testing `dirty bombs’ in growing effort to combat terror threat,” Associated Press, March 14, 2003.

[6] “Nuclear and Radiological Attack,” http://www.fema.gov/pdf/areyouready/security.pdf, in Are You Ready? A Guide to Citizen Preparedness, Federal Emergency Management Agency.

[7] Ian Traynor, “West scours Georgia for nuclear trash,” The Guardian, March 27, 2002.

[8] “Radiological Weapons: U.S. Oil Company Investigating Missing Nigerian Radioactive Material,” March 10, 2003, http://www.nti.org/d_newswire/issues/newswires/2003_3_10.html#1

[9] Charles J. Hanley, “Central Asia emerges as source of ‘dirty bomb’,” Washington Times, June 15, 2002.

[10] Barton Gellman, “Fears Prompt U.S. to Beef Up Nuclear Terror Detection,” Washington Post , March 3, 2002; p. A1.

[11] This is not something that can be said about the rest of the world. More than half of the world’s nations (more than 100) have inadequate regulatory systems.

[12] Charles D. Ferguson, Tahseen Kazi, and Judith Perera, Commercial Radioactive Sources: Surveying the Security Risks, Center for Nonproliferation Studies, Monterey Institute of International Studies,, Occasional Paper No. 11, http://cns.miis.edu/pubs/opapers/op11/index.htm

[13] Statement of Edward J. Markey (D-MA) on the Introduction of the Dirty Bomb Prevention Act, February 11, 2003. H.R. 897. A bill to establish a task force to evaluate and make recommendations with respect to the security of sealed sources of radioactive materials, and for other purposes. Bill was introduced on Feb. 25, 2003. http://www.cns.miis.edu/cr/03_03_03.htm#nonproA

[14] IAEA, Inadequate Control of World’s Radioactive Sources, http://www.iaea.org/worldatom/Press/Focus/Radsources/rads_factsheet.pdf

[15] Mohamed ElBaradei, Statement to the International Conference on Security of Radioactive Sources, http://www.iaea.org/worldatom/Press/Statements/2003/ebsp2003n007.shtml