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Terrorist Nuclear Attacks on Seaports: Threat and Response

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Summary

This report focuses on a possible terrorist nuclear attack on a U.S. seaport, a low-probability but high-consequence threat. Ports are vulnerable, and an attack could affect the global economy as well as cause local devastation. Terrorists might obtain a bomb in several ways, though each presents difficulties. Current ability to detect a bomb appears limited. The United States is seeking to thwart a potential attack through intelligence, technology, cooperation with other nations, etc. Issues for Congress include choosing an appropriate level of effort, safeguarding foreign nuclear material, improving port security, and mitigating economic effects of an attack. This report will be updated as developments occur.

Background

Terrorists have tried to obtain weapons of mass destruction – chemical, biological, radiological, and nuclear weapons. Hearings and media articles since September 11 have highlighted radiological dispersal devices, or "dirty bombs," which would use standard explosives or other means to disperse radioactive materials. Dirty bombs would be quite feasible for a terrorist group to make, given the limited expertise needed and the availability of explosives and radioactive material. An attack with such a weapon likely would kill or injure few people and cause little property damage, though it could cause panic and might require closing some areas for an undetermined time. While a terrorist attack using a nuclear weapon (a device that caused a substantial nuclear explosive yield, as distinct from a dirty bomb) has much lower feasibility, it merits consideration because it would have much higher consequence.

The September 11 attacks, as well as earlier and later analyses, showed that many U.S. facilities could be attractive targets for terrorist attack. One set of targets that has attracted attention from Congress is the nation's seaports. If terrorists smuggled a Hiroshima-sized bomb into a port and set it off, the attack would destroy buildings out to a mile or two; start fires, especially in a port that handled petroleum and chemicals; spread

fallout over many square miles; and disrupt commerce. It could kill many thousands of people. (See CRS Report RS21079, *Maritime Security: Overview of Issues*.)

Terrorists might attempt to smuggle a bomb into a U.S. port in many ways, such as in a tanker or a dry bulk freighter, but sea containers may provide them a particularly attractive route. A container is "[a] truck trailer body that can be detached from the chassis for loading into a vessel, a rail car or stacked in a container depot."[1] Much of the world's cargo moves by container.[2] The U.S. Customs Service processed 5.7 million containers entering the United States by ship in 2001.[3] It screens data for all these containers,[4] though it inspects "only about 2 percent of the total volume of trade entering the country each year."[5] Containers could easily accommodate a nuclear weapon. U.S. Customs Commissioner Robert Bonner believes that with an attack using a bomb in a container, "the shipping of sea containers would stop," leading to "devastating" consequences for the global economy, bringing some countries to "the edge of economic collapse."[6] On the other hand, people can find ways to minimize economic problems. The Y2K computer bug did not result in disaster, in part because organizations using computers took steps to ward off the problem. German production of tanks, aircraft, and artillery pieces increased in 1943 and 1944 despite Allied bombing.[7] Because of concern for port vulnerability, Congress is considering S. 1214, Port and Maritime Security Act of 2001; a conference is pending. (See CRS Report RL31424, *Maritime and Port Security: A Comparison of Major Provisions of S. 1214 and H.R. 3983*.[8])

Terrorist nuclear weapons: routes to a bomb. A terrorist group (as distinct from a nation) might obtain a nuclear bomb by several plausible routes. In each case, a reasonable estimate of explosive yield is that of the Hiroshima bomb, 15 kilotons, equivalent to the explosive force of 15,000 tons of TNT.

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[1] U.S. Department of Transportation. Maritime Administration. "Glossary of Shipping Terms." [http://www.marad.dot.gov/publications/glossary/C.html] Typical dimensions of a container are 40 ft by 8½ ft by 8 ft.

[2] U.S. Department of the Treasury. Customs Service. Factsheet: "U.S. Customs Container Security Initiative to Safeguard U.S., Global Economy." February 2002. [http://www.customs.gov/hot-new/pressrel/2002/0222-00.htm]

[3] Ibid.

[4] U.S. Department of the Treasury. Customs Service. Fact Sheet: "The '2 Percent Myth': Automated System, Technology, People Screen Cargo for Contraband," May 2002.

[5] U.S. Department of the Treasury. Customs Service. Robert Bonner, U.S. Customs Commissioner, Speech Before the Center for Strategic and International Studies, Washington, D.C., January 17, 2002. [http://www.customs.gov/about/speeches/speech0117-02.htm]

[6] Ibid.

[7] Richard Overy, *Why the Allies Won*, Norton and Co., New York, 1995, p. 331-332.

[8] On the issue of port security, see also Stephen Flynn, "America the Vulnerable," *Foreign Affairs*, January/February 2002: 60-74; and James Kitfield, "Port Insecurity," *National Journal*, June 29, 2002: 1938-1944.

Russia. Strategic nuclear weapons (long-range weapons the Soviet Union would have used to attack the United States) are reportedly well guarded on missiles or, thanks in part to U.S. assistance, in storage. In contrast, thousands of lower-yield weapons intended for use in combat are less well secured, and numbers and locations are uncertain. (See CRS Issue Brief IB98038, *Nuclear Weapons in Russia: Safety, Security, and Control Issues*.) Terrorists might buy or steal one of these weapons. The weapons might (or might not) have devices to prevent unauthorized use, or terrorists might lack confidence that they could make a weapon work. Without such confidence, terrorists might "mine" the weapon for nuclear materials and components to make their own device.

Pakistan. Other nations have nuclear weapons. U.S., British, French, and Israeli weapons are thought to be well guarded. Chinese weapons are also thought to be well guarded, though less is known on this point. Control is less certain for India and Pakistan. Of the two, it appears more likely that terrorists might obtain a bomb from Pakistan. That nation asserts that it has complete control over its weapons, but that could change if Pakistan were taken over by Islamic fundamentalists sympathetic to al-Qaeda and other terrorist groups. In this scenario, the "donors" would presumably give the terrorists detailed instructions for operating the bombs.

Build a bomb. The Hiroshima bomb was a "gun assembly" weapon. Its nuclear explosive component was a gun barrel about 6 inches in diameter by 6 feet long. It was capped at each end, with standard explosive at one end, a mass of uranium highly enriched in the isotope 235 (highly enriched uranium, or HEU) at the other end, and a second HEU mass in the middle. Detonating the explosive shot one mass of HEU into the other, rapidly assembling a mass large enough to support a fission chain reaction. (Plutonium cannot be used.) This is the simplest type of nuclear weapon. U.S. scientists had such high confidence in the design that they did not test the Hiroshima bomb.

Many experts believe that a terrorist group having access to HEU and the requisite skills, but without the resources available to a nation, could build such a weapon. Five former Los Alamos nuclear weapons experts held that a crude nuclear weapon "could be constructed by a group not previously engaged in designing or building nuclear weapons, providing a number of requirements were adequately met."[9] The requirements they list, though, are substantial. They include detailed design drawings and specifications; individuals skilled in a wide range of weapons skills; the necessary equipment; and extensive preparations to create a bomb quickly once in possession of HEU so as to reduce the risk of detection. A National Research Council study presents another view. "The basic technical information needed to construct a workable nuclear device is readily available in the open literature. The primary impediment that prevents countries or technically competent terrorist groups from developing nuclear weapons is the availability of SNM [special nuclear materials, i.e., HEU and plutonium-239], especially HEU."[10]

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[9] J. Carson Mark, Theodore Taylor, Eugene Eyster, William Maraman, and Jacob Wechsler, "Can Terrorists Build Nuclear Weapons?" Washington, Nuclear Control Institute. n.d., n.p. [http://www.nci.org/k-m/makeab.htm]

[10] National Research Council. Division of Engineering and Physical Sciences. Committee on Science and Technology for Countering Terrorism. *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism.* Washington, National Academy Press, 2002, (continued...)

It would be difficult for a terrorist group to obtain enough HEU for a weapon. Many nations have gone to great lengths to protect it. The International Atomic Energy Agency has safeguards to protect, among other things, HEU in nuclear reactors. The United States has had a number of programs over the past decade to help former Soviet republics protect nuclear weapons, material, and knowledge. (See CRS Report 97-1027, *Nunn-Lugar Cooperative Threat Reduction Programs: Issues for Congress*.) Perhaps the best evidence that these efforts have succeeded so far is that terrorists have not detonated a nuclear weapon. At the same time, some are concerned that terrorists could obtain HEU. For example, the National Research Council study noted above rated the threat level from SNM from Russia as "High – large inventories of SNM are stored at many sites that apparently lack inventory controls and indigenous threats have increased."[11]

Vulnerability of ports and shipping. Ports may be attractive targets for terrorists. With many of the largest ports in or near major cities, a nuclear bomb detonated in a port could kill many thousands of people, interrupt flows of U.S. commerce, and perhaps cause a global economic disruption. Ports are vulnerable. Many are flat, being at the ocean's edge, so would offer little shielding against weapon effects. Some have great quantities of inflammable material, such as fuel; fires could extend the area of destruction and release toxic gases. While ports may stretch on for miles, a 15-kiloton weapon would have enough force to destroy many key facilities of a typical port.

Current front-line capability to detect nuclear weapons is exceedingly limited. CRS visits to the U.S. Customs Service in Baltimore in July 2002 and to the U.S. Coast Guard in Philadelphia in August 2002 produced the following information. Customs' Container Security Initiative seeks to improve security at foreign ports for U.S.-bound containers, but Customs inspectors do not inspect cargo there and do not control personnel selection or port operations. The Coast Guard cannot open containers at sea for various reasons. For example, they are tightly packed and the door is part of a container's structure, so a container under other containers might crumple if the door were opened. Technology is lacking. A Coast Guard officer wrote, "our method of detecting nuclear and biological weapons is ... our eyes, ears, and brains. We currently have no more sophisticated equipment than that." At Baltimore, Customs inspects about 2 percent of containers. For some, it uses a sophisticated machine that x-rays entire containers; for others, it unloads all items from a container, may x-ray them, and searches some items. Customs agents have pager-size radiation detectors. Problems are obvious. Terrorists could infiltrate foreign ports as inspectors or longshoremen, and pass a container with a weapon into a secured zone. The Coast Guard almost certainly could not detect a bomb in a container or in the structure of a ship. Customs targets containers for inspection based on cargo manifest data, port of last call, shipping line, etc. Terrorists, however, could be expected to go to great lengths to make a bomb-carrying container appear normal. Small radiation detectors might detect highly radioactive isotopes that might be used in dirty bombs, but could not be sure of detecting less-radioactive uranium-235. Once a ship arrives in port, any inspection could be too late.

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[10] (...continued)
prepublication copy, p. 2-1. (As of August 2002, this was the only version available, at [http://www.nap.edu/catalog/10415.html].)

[11] National Research Council, *Making the Nation Safer*, Table 2.1B, "Improvised Nuclear Devices."

Responses and Countermeasures

The central approach to reducing vulnerability to a terrorist nuclear attack is "defense in depth," in which multiple methods are used to detect and interdict a terrorist nuclear weapon. Many existing technologies could assist the search for nuclear bombs, and others are under development. Intelligence can seek clues that terrorists were seeking or had obtained HEU, or were trying to make or smuggle a bomb. The United States can reach agreements with foreign governments.[12] Coast Guard and Customs inspections might help, especially if personnel had more and better equipment. Although no one method is perfect, together they can increase the odds of detecting a weapon. For example, it would be harder to evade several means of detection than just one, as attempts to reduce what one sensor detects may make the bomb more visible to another sensor using a different signature, or may reduce the likelihood that the bomb would work. Further, a terrorist group would not know the limits of detection capability, so would have to assume a capability greater than what existed.

Defense in depth could involve outfitting every port, airport, and border crossing with several types of sensors and the personnel to operate them, expanding intelligence capabilities with new sensors and analysts, placing U.S. agents in foreign ports, and upgrading Coast Guard and Customs equipment and adding personnel. Such steps would involve large costs.

While press articles focus on how the United States can augment its detection capabilities, the struggle is two-sided. If we deploy a new sensor at some ports, terrorists might detonate a weapon before it is inspected, or hide it in a container bound for another port. If foreign ports screened containers before being loaded onto U.S.-bound ships, they could infiltrate the port. If we secured the world's largest ports, they could use smaller ones. If we assured the security of every U.S.-bound container, they might smuggle a weapon in a freighter or supertanker. If we secured all U.S.-bound containers, they might ship a bomb to Mexico and bring it into the United States in a small boat or airplane. In short, despite overwhelming advantages that the United States and its trading partners possess in technology and organization, terrorists have other advantages.

Policy Options

Securing nuclear materials. The possibility that a terrorist group could make a nuclear weapon given enough HEU, and the difficulty of preventing terrorists from smuggling a weapon into a U.S. port, show the value of the effort to secure nuclear weapons and materials in Russia and elsewhere. Are current efforts sufficient?

Forensics. The United States can often identify the origin of nuclear material used in a bomb. This forensic capability strengthens the value of controlling Russian nuclear weapons and materials: finding that material for a bomb detonated in the United States came from Russia, a likely source, would in all probability lead to the conclusion that the

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[12] For example, Customs has initiated the Container Security Initiative, which involves bilateral agreements with foreign ports that export to the United States. Under the initiative, containers are screened before they leave those ports. See Bonner, Speech Before the Center for Strategic and International Studies.

material was stolen rather than that Russia conducted the attack. At the same time, augmenting already-excellent forensic capability through technology and intelligence could help deter other nations from giving nuclear materials to a terrorist group.

Ports in major cities. The terrorist weapons discussed earlier have much less explosive yield than nuclear weapons carried by bombers and long-range missiles, and a smaller destructive radius. Blast damage might extend 1 to 2 miles. (Fire and fallout might extend beyond that range.) Accordingly, it might be argued that ports with the greatest number of people living or working within a mile or two of cargo docks, such as Philadelphia and New York, should have highest priority in receiving security resources.

Overseas inspections. Inspection of ships in U.S. ports would be too late to prevent a nuclear explosion, so the United States might require screening of U.S.-bound cargo by U.S. personnel in ports originating shipments. Other nations might view such a requirement as an infringement on their prerogatives, but the size of the U.S. market would presumably make exporting nations more willing to consider such measures.

Ameliorating economic consequences. Civil defense studies over decades examined how to ameliorate the destructive effects of a large nuclear attack. This effort, and more recent emergency preparedness efforts, provide a template for response and recovery following a terrorist attack using one 15-kiloton weapon. This work does not, however, address possible global economic consequences and how to predict and mitigate them. These issues could benefit from further study and analyses.

What level of effort? While the United States is increasing its efforts to counter nuclear terrorism, the current level of effort might stop only an unsophisticated attempt to smuggle a nuclear weapon into the United States. Terrorists who might acquire a nuclear weapon, though, would surely go to great lengths to deliver it. A massive U.S. counterterrorism effort would increase security, but would require many more security personnel, large-scale diversion of technology resources, possible civil liberties concerns, and high cost. A low level of effort appears politically untenable. At issue is whether a moderate level of effort is effective, and whether a high level of effort is supportable.