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# Port and Maritime Security: Potential for Terrorist Nuclear Attack Using Oil Tankers

**Jonathan Medalia**
Specialist in Nuclear Weapons Policy

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# Summary

While much attention has been focused on threats to maritime security posed by cargo container ships, terrorists could also attempt to use oil tankers to stage an attack. If they were able to place an atomic bomb in a tanker and detonate it in a U.S. port, they would cause massive destruction and might halt crude oil shipments worldwide for some time. Detecting a bomb in a tanker would be difficult. Congress may consider various options to address this threat. S. 12, Targeting Terrorists More Effectively Act of 2005, included a Tanker Security Initiative (sec. 325). This report will be updated as needed.

## Introduction

The attacks of September 11, 2001, heightened interest in port and maritime security. Much of this interest has focused on cargo container ships because of concern that terrorists could use containers to transport weapons into the United States, yet only a small fraction of the millions of cargo containers entering the country each year is inspected. Some fear that a container-borne atomic bomb detonated in a U.S. port could wreak economic as well as physical havoc. Robert Bonner, former head of Customs and Border Protection (CBP) in the Department of Homeland Security (DHS), has argued that such an attack would lead to a halt to container traffic worldwide for some time, bringing the world economy to its knees. Stephen Flynn, a retired Coast Guard commander and an expert on maritime security at the Council on Foreign Relations, holds a similar view.[1]

While container ships accounted for 30.4% of vessel calls to U.S. ports in 2005, other ships carried crude oil (12.9%), dry bulk cargo (18.7%), and vehicles (6.0%), among other things.[2] These ships merit attention as well because terrorists will look for the weak link. The 9/11 Commission stressed the importance of a balanced approach to maritime security.[3] To this end, this report focuses on the threat of a terrorist nuclear attack using oil tanker ships. This threat is of particular interest because the Middle East is the chief source of anti-U.S. terrorism.

## Background

### Oil Shipments from the Middle East

Crude oil and other petroleum products account for almost all export earnings of many Middle Eastern nations.[4] In turn, 28.8% of net U.S. crude oil imports in September 2006 came from the Middle East.[5] Crude oil from the Middle East went to 30 U.S. ports in 2003. Those handling the most oil were Blaine, WA; El Segundo, Long Beach, Los Angeles, and Richmond, CA; Corpus Christi, Freeport, Galveston, Houston, Port Arthur, and Texas City, TX; Baton Rouge, Gramercy, Lake Charles, Morgan City, and New Orleans, LA; Pascagoula, MS; Mobile, AL; Wilmington, DE; and Paulsboro, NJ.[6]

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[1] U.S. Department of the Treasury. "U.S. Customs Commissioner Robert Bonner, Speech Before the Center for Strategic and International Studies," Washington, D.C., January 17, 2002; and Stephen Flynn, *America the Vulnerable: How Our Government Is Failing to Protect Us from Terrorism* (New York: HarperCollins, 2004), p. 83.

[2] U.S. Department of Transportation. Maritime Administration. *Vessel Calls at U.S. & World Ports, 2005,* April 2006, p. 1.

[3] U.S. National Commission on Terrorist Attacks upon the United States, *The 9/11 Commission Report,* Authorized edition (New York: Norton, 2004), p. 391.

[4] The figures are 90-95% for Saudi Arabia and 95% for Kuwait (source: U.S. Department of Energy, Energy Information Administration, *Country Analysis Briefs*) and roughly 85% for Qatar (source: U.S. Central Intelligence Agency, *The World Factbook*).

[5] U.S. Department of Energy, Energy Information Administration, "Table 37. Imports of Crude Oil and Petroleum Products into the United States by Country of Origin, September 2006." Available at http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/petroleum_supply_monthly/current/pdf/table37.pdf. Nations included for this calculation are Algeria, Iraq, Kuwait, Libya, Oman, Saudi Arabia, United Arab Emirates, and Yemen.

[6] U.S. Department of Energy, Energy Information Administration, Petroleum Data Publications, "Company Level Imports," The American Petroleum Institute aggregated the port and monthly data from these tables for CRS.

Crude oil from the Middle East is typically shipped to the United States in supertankers—Very Large Crude Carriers (VLCCs) and Ultra Large Crude Carriers (ULCCs). Their size is measured in deadweight tons (DWT), the weight of the stores, fuel, and cargo they can carry. One DWT is 2,240 lb. While definitions vary slightly, VLCCs can carry about 200,000 to 300,000 DWT and ULCCs can carry more than 300,000 DWT. Crude oil accounts for almost all of the deadweight tonnage of such ships. A representative ULCC was 60 meters wide and 350 meters long, and had a draft (depth below the waterline) of 22 meters. They are the largest ships ever built. The interior of a tanker is divided into multiple storage tanks.

Both the Coast Guard and the Navy stated that they do not have responsibility for, or authority over, security of foreign-flagged vessels at foreign ports.[7] Nor do other American forces. Security of foreign ports rests with foreign governments.

## Staging a Terrorist Nuclear Attack Using Tankers

The simplest type of atomic bomb, and by far the easiest to fabricate, is a gun-assembly bomb, in which one mass of uranium highly enriched in the fissile isotope 235 (highly enriched uranium, or HEU) is shot down a tube into another mass of HEU, forming a critical mass and causing a nuclear explosion. The Hiroshima bomb was of this type; its designers had such confidence in the design that it was not tested before use. This bomb had an explosive yield of 15 kilotons (equivalent to 15,000 tons of TNT). Excluding the bomb's outer casing, fins, and fuses, this device was 6 feet long and about 6 inches in diameter, and weighed about 1,000 pounds.[8] Some items loaded onto large cargo ships are of similar or greater size and weight. It might be possible to make a lighter gun-assembly bomb.

To stage a nuclear attack using a tanker, terrorists would need to acquire a nuclear device[9] and smuggle it (or key components) onto a ship. Their ability to accomplish this latter task would likely depend on their ability to circumvent local security; on the reliability of security personnel in oil-exporting countries such as Saudi Arabia, Kuwait, and Algeria; and on the reliability of the ship's officers and crew. Terrorists might seek to place a nuclear device inside one of a tanker's oil tanks, which would require sealing and cushioning the bomb and possibly attaching it to the tank wall; or in a dry space on the ship; or in a blister attached to the ship underwater. Remotely detonating a bomb inside an oil tank or underwater might be difficult: it might not be possible to attach wires leading out to dry spaces, or to send an electromagnetic signal (e.g., a cell phone call) through water or oil to the bomb. Detonating the bomb with a timer would run the risk of the ship not being at the target at the specified time. Overcoming these challenges might be within the ability of a terrorist group resourceful enough to acquire an atomic bomb. Terrorists might also smuggle a bomb onto a ship at sea, as discussed later.

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[7] Source: Discussions with Navy and Coast Guard officers, November 2004.

[8] Thomas Cochran, William Arkin, and Milton Hoenig, *Nuclear Weapons Databook, volume I: U.S. Nuclear Forces and Capabilities* (Cambridge, MA: Ballinger, 1984), p. 32.

[9] CRS Report RL32595, *Nuclear Terrorism: A Brief Review of Threats and Responses*, by Jonathan Medalia, discusses how terrorists might acquire a nuclear device.

## Potential Targets

Terrorists could be expected to select as their target a port that handled a large volume of oil and other goods and that had a densely-populated area that tankers passed on their way through a harbor to an unloading terminal. Various cities worldwide meet these criteria. If terrorists sought major economic damage while minimizing loss of life, they might target the Louisiana Offshore Oil Port, or LOOP, the only U.S. deepwater oil port that can handle fully loaded supertankers. LOOP, 18 miles off the Louisiana coast, handles about 10% of U.S. crude oil imports. The Panama Canal might be another potential economic target.

## Detecting an Atomic Bomb in a Tanker

Some means of detecting atomic bombs in a tanker would fail, especially for a bomb inside an oil tank. Gamma rays, essentially high-energy x-rays, are used to create x-ray-type pictures of the contents of cargo containers, but a tanker's huge mass of oil and steel would prevent gamma rays from traveling the width of a tanker. Neutrons may be used to detect fissile material; neutrons of the appropriate energy level cause such material to fission, producing neutrons and gamma rays that can be detected. The hydrogen atoms of crude oil, however, would block neutrons from penetrating. Other candidate techniques include chemical sampling of oil for traces of extraneous material, and preparing an acoustic profile of a ship when known to be "clean" to compare with a profile taken as the ship nears port. The vast amount of oil in a supertanker works against the former technique; the complex configuration of tanks on a tanker works against the latter. A more remote possibility, muon detection, might work if daunting technical challenges could be overcome.[10]

## Securing Tankers

The difficulty of detecting a bomb aboard a tanker underscores the importance of keeping bombs off tankers. Securing tankers at loading terminals would likely involve a security perimeter (including underwater), and measures to ensure personnel reliability. Items brought on a ship would have to be screened. A National Nuclear Security Administration program, "Second Line of Defense," screens people and baggage for fissile material; similar technology might help secure tankers.

Securing tankers in port might not be sufficient if terrorists could smuggle a bomb onto a ship at sea. It may be possible to improve security by using surveillance aircraft or satellites. Security may be a greater issue as tankers slow to navigate straits or approach port. Several issues arise: (1) Would shippers let crew spend time to upgrade security beyond current levels? VLCCs have small crews, perhaps 25 to 40 people, who may have no time for added tasks. (2) If intelligence data indicated a plot to board a tanker at sea to place a bomb, could a warning be passed without

[10] Muons are subatomic particles produced when cosmic rays from space strike atoms in the upper atmosphere. Some 10,000 muons per minute strike each square meter of Earth. They can penetrate many meters of rock. Their path is bent slightly in proportion to the density and atomic number (number of protons in the nucleus) of the material. Los Alamos National Laboratory has conducted experiments to determine if muons can be used to detect fissile material in cargo containers. The technique involves placing a flat-plate detector above and below the container to measure how much the paths of individual muons are bent. Detectors would have to be scaled up immensely to go from a container to a VLCC. Detection could be time-consuming: the level of detail increases with number of muons, which increases with time. See Brian Fishbine, "Muon Radiography: Detecting Nuclear Contraband," *Los Alamos Research Quarterly,* Spring 2003.

compromising U.S. intelligence capabilities? (3) This scenario would require the connivance of the entire crew, or silencing those who opposed the plot. Screening for personnel reliability may be the only defense against this prospect.

## Potential Oversight Questions and Options For Congress

### Oversight Questions

Possible oversight questions include the following:

- How does the Administration view the potential for terrorists to use a tanker for a nuclear attack? To what extent has the Administration considered this threat in planning for port and maritime security?
- If considered a serious threat, what measures is the Administration implementing to respond to it? When will they be in place? How much funding is programmed for them over the next few years? Which areas of detection technology may merit development?
- Which executive branch office has overall responsibility for examining or addressing this potential threat? What other executive offices have responsibilities in this area? Is there adequate coordination among them?

### Potential Options

Congress might consider options such as the following to further explore the threat discussed in this report.

- **Clarify federal responsibility for tanker security** by requiring a lead federal agency for tanker security and making more explicit the responsibilities of various federal agencies involved in tanker security.
- **Create a Tanker Security Initiative (TSI)** analogous to the Container Security Initiative for improving containerized cargo security.[11] TSI might set security standards for tankers that transport oil to U.S. ports, and for the ports where they load. Tankers not meeting the standards, or that come from ports not meeting the standards, could be denied entry to U.S. ports. Establishing such a regime would undoubtedly require negotiations with other countries. (See “Legislative Activities,” below.)
- **Ensure that tankers are a focus of maritime domain awareness,** which refers to surveillance and communication systems that would permit U.S. officials to have a comprehensive understanding at any given moment of the location and identity of ships at sea.
- **Assure sufficient U.S. intelligence assets are focused on the threat** and possible indications of preparations for such an attack. Terrorists seeking to acquire or build a bomb and smuggle it onto a tanker would need to go through

[11] For more on the Container Security Initiative, see CRS Report RL31733, *Port and Maritime Security: Background and Issues for Congress*, by (name redacted), op. cit.

certain steps. Similarly, a terrorist bomb placed inside a tank of crude oil might have certain signatures, such as a way to detonate the bomb. The Intelligence Community could analyze such steps and signatures, and be alert to signs of the most critical ones.

- **Determine whether funding is adequate for technologies** that hold some prospect of detecting an atomic bomb aboard a tanker.
- **Keep oil tankers away from U.S. ports** by promoting the construction of more offshore ports like LOOP.
- **Improve international cooperation.** Existing international agreements and organizations that might focus on tanker security include agreements for countering narcotics, crime, and piracy; the International Maritime Organization, shipping associations, and Interpol; and the International Ship and Port Facility Security Code. These efforts could supplement the Proliferation Security Initiative (PSI), a multilateral effort for interdicting ships at sea that are suspected of carrying weapons of mass destruction. Ships available for PSI missions might respond to indications of tanker security problems at sea.[12] The United States could pursue increased bilateral cooperation with oil-exporting states and countries under whose flags tankers are registered. Potential measures include improved perimeter security at oil-loading terminals and more rigorous background screening and training of port workers and tanker crew members.

Should Congress conclude that proactive steps should be taken in this area, the issues of who should pay and how funds should be collected would arise. Costs could be covered by general revenues. Alternatives would be to charge a fee on ships landing oil in the United States or to impose a tax on crude oil or petroleum products consumed in the United States. Congress may also wish to consider whether the issues discussed here might apply to other types of ships, such as those for carrying cars or dry bulk goods.

## Legislative Activities

On January 24, 2005, S. 12, Targeting Terrorists More Effectively Act of 2005, was introduced and was referred to the Senate Committee on Foreign Relations. Section 325 provides for a Tanker Security Initiative under which "[t]he Secretary of Homeland Security shall establish a Tanker Security Initiative to promulgate and enforce standards and carry out activities to ensure that tanker vessels that transport oil, natural gas, or other materials are not used by terrorists or as carriers of weapons of mass destruction." As part of this initiative, the Secretary may develop standards to prevent terrorists from placing weapons of mass destruction on tankers, develop detection equipment and inspection procedures, conduct R&D on sensors to detect a nuclear device on a tanker, and aid foreign countries in carrying out provisions of this initiative. The legislation would also require the Secretary to submit a report to Congress on terrorism risks posed by tankers, means of combating this risk, and a proposed budget to carry out this initiative. This legislation was not reported from committee.

Should the 110th Congress undertake further consideration of the potential tanker/nuclear threat, issues that may garner attention include: (1) How might port security grant programs enhance

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[12] See CRS Report RS21881, *Proliferation Security Initiative (PSI)*, by (name redacted).

tanker security? (2) Could imaging or radiation-detection systems available now, or deployable in the near future, significantly augment tanker security against this threat? (3) If so, is it worth the money to deploy them now, or would it be preferable to wait until more advanced systems were available? (4) If not, does the current R&D investment strategy consider tanker security, and what detection programs might be developed to do so? These questions might be raised as Congress oversees implementation of the SAFE Port Act, P.L. 109-347.

## Author Contact Information

Jonathan Medalia
Specialist in Nuclear Weapons Policy
[redacted]@crs.loc.gov, 7-....