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**The Economic Impact  
of Nuclear Terrorist  
Attacks on Freight  
Transport Systems in  
an Age of Seaport  
Vulnerability**

**Contract #  
DTRS57-03-P-80130**

April 30, 2003

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# 1.0 Executive Summary

## 1.1 The Importance of Seaport-Based Transport Systems to the U.S. and the World Economy

Today a third of the world economy, and a quarter of America's, depends on safe international commerce and trade, most of which since the last thirty years is transported across the oceans and land borders in standardized steel cargo containers carried by ships, trucks, and rail.

Thirty percent of the world economy and 20 percent of the U.S. economy—\$2 trillion—depend on trade. The transport of world trade is absolutely dependent on the shipping portals at seaports, land borders, and airports. These major seaport cities, together with their usually co-located international airports, constitute both the most valuable and vulnerable targets of catastrophic nuclear terrorism. The world's seaports have some 72 million containers moving through them every year (7 million in the United States alone), in any one of which a 60-to-600-pound nuclear weapon could be delivered to the seaport and detonated before unloading.

## 1.2 The Nuclear Terrorist Threat to U.S. and World Economy: Weapons, Targets, and Aim Points

The conjunction of three trends—*globalization* of industry, trade, and transport; *diffusion of nuclear weapons technology*, and the threatening rise of *globally dispersed, WMD-armed, undeterred terrorism*—today present an unprecedented threat to the United States, all its trading partners, and the whole civilized world. The recent accelerated growth of this offensive threat to peace and otherwise rising world prosperity has not been matched by a parallel strengthening of military defenses and non-military defenses of international law, law enforcement, and policing. Nor have there been significant advances in the counter-threat capabilities of the relevant institutions, the United Nations, Interpol, and the defense departments and intelligence agencies of all the nations whose economies are put at risk by nuclear-armed international terrorists.

### 1.2.1 Weapons

International terrorists have asserted their intention to acquire nuclear weapons, and have an increasing capability of secretly purchasing, stealing, or making a nuclear fission weapon from fissile material stolen or bought from the many insufficiently secured stockpiles, today primarily in Russia but also increasingly in several other nuclear-capable countries. Currently a Hiroshima-scale 10-20 kilotons, fission weapon could be smuggled undetected into a major U.S. seaport (NY, LA) or the DC Capital in any one of millions of cargo containers shipped or trucked into the United States every year and thousands every day, and detonated dockside or after being trucked into the city center.

### 1.2.2 Targets

The catastrophic terrorists' priority targets are the major U.S. population, commercial, government, and transportation centers. The top three are New York, Washington DC, and Los Angeles, as has been repeatedly demonstrated in the last decade before 9/11/2001. Clearly the centers of American

economy, government, and urban society are targeted by the terrorists for strategic bombardment and destruction, and are likely to continue to be their targets for the foreseeable future.

### **1.2.3 Aim Points**

The aim points for nuclear weapons detonation, within the priority target cities, are either dockside at container ports (so they don't risk inspection of container delivery vehicles after unloading), or the center of the most valuable targets accessible by container-bearing truck, such as the 14<sup>th</sup> Street Bridge in DC, or midtown Manhattan.

## **1.3 Costs and Consequences of a Nuclear Terrorist Attack Under Current 2003 Inadequate Defense Conditions**

Assuming the main current nuclear terrorist threat of a cargo container-delivered 10-20 Kiloton fission weapon, several plausible scenarios created by the writer and other researchers were examined to estimate the economic impacts of a nuclear attack on two major seaport cities and the government center of Washington, DC. First the destructive radii from the probable aim points of the weapons were plotted on maps of three likely targets, New York, Washington DC, and Boston. (Boston was selected as fairly representative of an important seaport with city center adjacent to the container port, similar to Baltimore, Charleston, Miami, Oakland, and Seattle.) Loss of life and property estimates are based on the density of population and property value in the destroyed or severely damaged area.

The losses attributable to trade disruption were estimated on the basis of the extent and duration of disruption of ocean, truck, and air cargo transport at the target and corresponding sites that might be shut down in response to such an attack (as they were for a week after 9/11 and some might be again.) Finally, indirect economic costs were estimated by a conservative multiplier of times the direct costs. One-year costs were estimated only for the United States, and did not include either global or long-term costs, which are believed to exceed substantially the immediate U.S. costs estimated. Major uncertainties in the determining variables are reflected by the estimates being given as ranges rather than the spurious exactitude of point values.

The economic impact of even a single nuclear terrorist attack on a major U.S. seaport would be very great. In the three plausible scenarios examined, a successful attack would create disruption of U.S. trade valued at \$100-200 billion, property damage of \$50-500 billion, and 50,000 to 1,000,000 lives could be lost. Global and long-term effects, including the economic impacts of the pervasive national and international responses to the nuclear attack, though not calculated, are believed to be substantially greater.

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**Table 1-1****Deaths and Damages of a Nuclear Terrorist Attack on a Major Seaport or Washington DC**

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Deaths	50,000 (Port Elizabeth) – 1,000,000 (Manhattan)
Value Statistical Lives Lost @ \$3 million each	\$150 Billion - \$ 3 Trillion (30% of US GDP)
Property Damage – Direct	\$50 – 500 Billion
Trade Disruption	\$100 – 200 Billion
Indirect Costs (Direct times multiplier of 2)	\$300 – 1,400 Billion (1.4 Trillion)
Total First Year Costs	Hundreds of Billions to Trillions (not including cost of lives lost)

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## **1.4 Reduced Risks and Costs with Improved Defenses Against Nuclear Terrorist Attack of Ports**

The vulnerability of the trade and transportation sectors of the U.S. economy to disruption and destruction by nuclear terrorism remains high in 2003. This vulnerability to great costs is avoidable. Currently available and affordable technology and systems could be deployed within two to three years that would dramatically reduce the likelihood and destruction of a container-based nuclear terrorist attack.

Current defense efforts are aimed in the right direction but are inadequate in scope, speed and intensity. The U.S. Customs strategy of intelligence-based sampling of a small fraction the flow of millions of containers a year can be too easily countered by terrorists and their supporters. Terrorists can evade or deceive the data and intelligence collection and intelligence information analyses of suspicious cargoes, conveyances, and personnel handlers, by shielding and decoying the weapons from external gamma-ray detector screening, by saturating the inspection process with higher peak traffic loads than can be carefully screened by current methods without seriously impeding the flow of trade, and by leaving most foreign container ports unsecured and without uniformly high inspection standards. A nuclear weapon loaded on to a container in a foreign port has a very high probability of passing undetected through the foreign port of embarkation. A terrorist who can get a nuclear device into a container is virtually assured of achieving at least a dockside detonation.

The technology and the organizational and procedural designs exist which could greatly reduce the risk of deaths and damages from nuclear terrorist attack on seaport-based transport. The key technology is the shielded pulsed-active neutron interrogation device, or scanner, augmenting the currently partially deployed gamma ray scanners. Expertise in this technology exists in government labs, university research labs, and private industry firms. An effective system of defenses built around this technology would include:

- Forward deployment of customs inspection to foreign container ports of embarkation for the United States, 100 percent external scanning of all U.S.-bound containers, using fixed drive-through installations, mobile truck-mounted scanners, and scanners on container lift cranes

- Augmented container transport intelligence information systems, including the use of tamper-resistant electronic reporting seals on containers
- Strengthened personnel security

The annual cost of a solution for effectively screening 100 percent of U.S.-bound containers at Ports is estimated to be about \$100 Million per major port, or \$10 billion for 100 ports. The likelihood of a successful nuclear terrorist attack using cargo container transport can be greatly reduced by an improved defense system.

Analysis shows that the improved defenses can reduce the terrorist's chances of evading detection of this means of weapon delivery at the port of embarkation to 9 percent, and the chances of successful container transshipment to an inland target to 1 percent.

However, an effective defense must encompass overseas freight export operations. There is broad agreement among government officials and independent analysts on the ideal attributes of a global containerized cargo system secure from nuclear weapons attack by means of container-borne delivery. All Researchers speak of "extending the borders out," "controlling and monitoring the entire supply chain from origin to destination," securing individual containers, conveyances, and crews handling them with various security and identity clearances, collecting information from all sources, including financial and transportation and personnel records, and data mining it to gain early warning of suspicious cargoes and to gain more efficient sample selection of those containers to be taken off line and opened for rigorous internal inspection. Needed is universalization and enforcement of international standards of container security with fast-track rewards for cooperation and compliance, and denial of port access rights for the recalcitrant, careless or willful violators. There is an increased need for inter-agency intelligence information sharing and coordination, and for public-private cooperation and burden sharing.

Currently there is little or no agreement, domestically and internationally and between government and industry, regarding how much improved transport security will cost, who is in charge of what aspect and the whole system, and what will be the burden-sharing arrangements. Competition among agencies, governments, and industries for control and benefits, and to avoid costs continues apace with no evidence of increased resolution.

At this writing, U.S. Customs must be given credit for having done the most to improve the security of the container transport system, but with their still very constrained resources they have not been able to mobilize the cooperation (which sometimes must be dearly bought) in inspection and cargo intelligence of more than 15 of the 50-100 major container ports abroad shipping to the United States, nor have they been given adequate budget and mandate to procure and operate the best and latest external screening and scanning equipment. Progress on this effort is also retarded by current diplomatic disputes between the United States, France, Belgium, and Germany, and the SARS crisis in major Chinese and Southeast Asian ports. Only time will tell whether it will be politically feasible to obtain the worldwide cooperation and burden sharing required for an effective and affordable defense of the seaport-based transport system against nuclear terrorist attack.

Clearly the momentous and challenging organizational and political implications of the key design principles of the overseas-deployed layered defense-in-depth port security systems approach require further detailed operations analyses and technology and systems evaluations:

- **Worldwide container port deployment of U.S. Customs inspectors staffing operation of U.S. standard inspection devices and procedures.** Thousands of inspectors and scanning equipment operators must be recruited, trained, and deployed to foreign ports.
- **Worldwide port security standards balancing security from nuclear terrorism against commercial transportation productivity requirements**, as in Customs' C-TPAT (Customs Trade Partnership Against Terrorism).
- **Worldwide port deployment of detection technologies capable of detecting nuclear materials by external on-line inspection without delaying normal entry, storage, and loading processes.**
- **Design control and financing of the International port defense system** by organization of an international multi-governmental public-private partnership of all stakeholders, under U.S. leadership, and with individual national and private corporation members having veto powers over their own participation in the system, at the risk of being denied the special fast-track treatment and other commercially advantageous privileges of membership. This is essentially a legal law enforcement and technologically explicit international trade and tariffs and arms control agreement that will require many months, possibly years, of diplomatic, technological, economic, and commercial negotiations. The probably most expeditious beginning of this approach has been made by U.S. Customs C-TPAT program, and this should be fully supported, extended, and expanded.
- **Continued Cooperative Threat Reduction efforts to secure Russian and other insufficiently secure stockpiles of nuclear weapons and fissile materials**, and maintain secure or non-military employment of foreign nuclear weapons scientists.

The following table compares the estimated economic impacts, including the costs of the nuclear terrorist attack plus the costs of the defenses against it, under current (2003) and improved near future (2005) defense conditions. Losses reduced by improved defenses in 2005 are expressed as expected values (E.V.).

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**Table 1-2****Costs of Nuclear Attack, 2003 and 2005**

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<b>Costs of Nuclear Attack</b>	<b>2003 Current Defense</b>	<b>2005 Improved Defense</b>
Deaths	50,000- 1,000,000	5,000- 100,000 (E.V.)
Value of Statistical Lives Lost	\$150 B – 3 Trillion	\$15-300 Billion (E.V.)
Property Damage, Direct	\$50-500 Billion	\$5 – 50 Billion (E.V.)
Trade Disruption	\$100-200 Billion	\$10 -20 Billion (E.V.)
Indirect (Direct times 2)	\$300 B – 1.4 Trillion	\$30 – 140 Billion (E.V.)
Total Nuclear Attack Costs	Low \$ Trillions	\$45 – 210 Billion
+Cost of Defenses, 2003 & 2005	\$1 Billion	\$10 Billion (recommended)
Total Cost of Nuclear Terrorist Attack Damage + Defense Against It	Low \$ Trillions	\$ 55 – 220 Billion

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## **1.5 Dual-Use Collateral Peacetime Benefits for Transportation Efficiency and Cargo Crime Control**

Likely to Result from the \$10 Billion annual investment in Improved Seaport-Based Transport Security from Nuclear Terrorist Attack:

- Cargo crime is currently estimated to cost the trading countries of the world some \$650 billion per year in losses. The recommended improvements in container cargo security costing \$10 billion per year could easily pay for themselves by a mere 2 percent reduction in cargo crime losses, which seems highly likely. Insurance rates are also expected to come down, providing added savings.
- The recommended cargo tracking systems can improve freight transport efficiency and the productivity of ports, trade, and production dependent on just-in-time deliveries to minimize inventory costs.