

# **NUCLEAR TERRORISM**



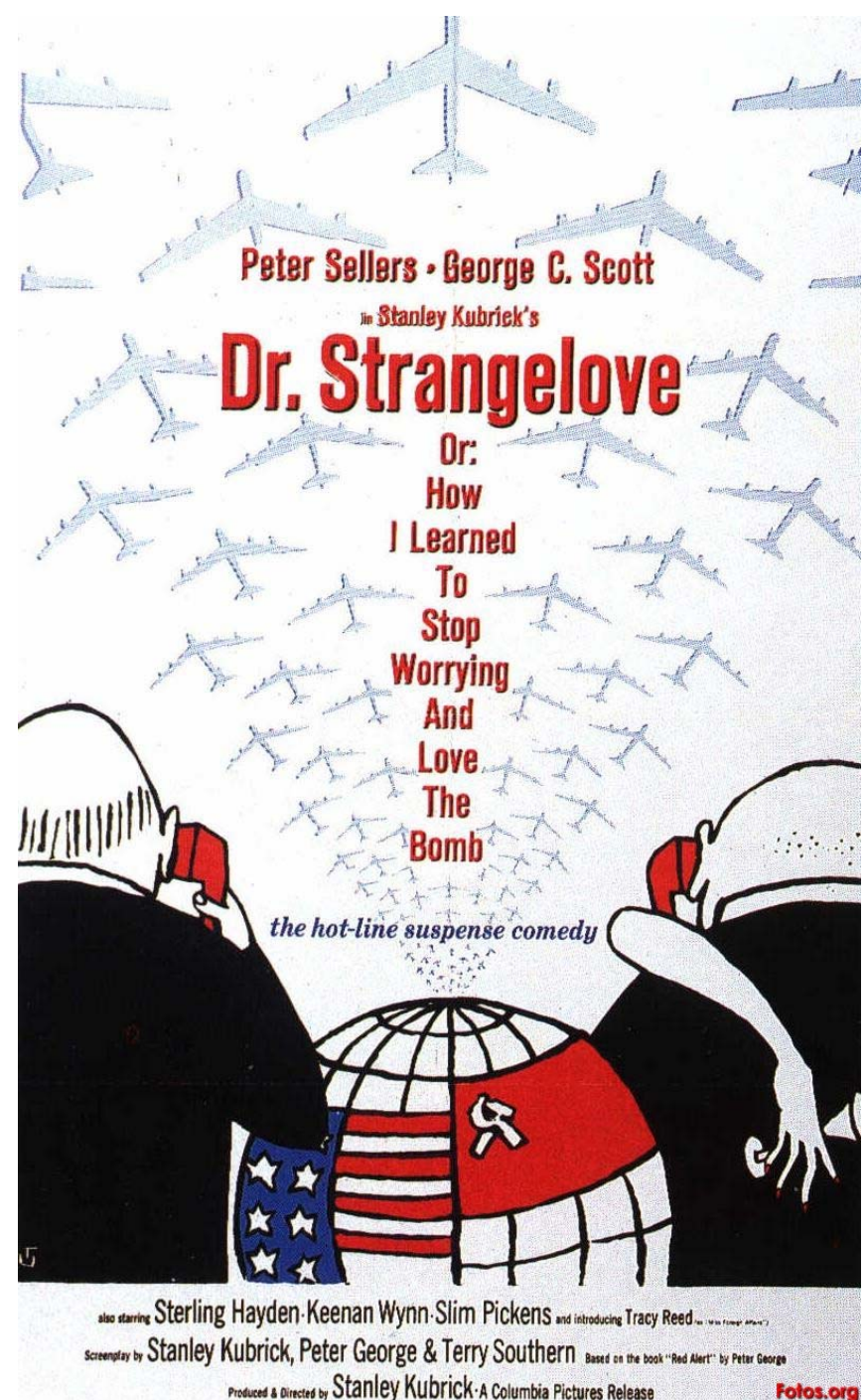
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# Weapons of Mass Destruction

A weapon of mass destruction (WMD) is a weapon which can kill large numbers of humans, animals, and plants.

# WMDs have caused fear and in turn have:

- Shaped political policies and campaigns
- Fostered social movements
- Been the central theme of many films



**Because of these fears, the development and use of such weapons has been regulated by international treaties including:**

- Partial Ban Treaty
- Outer Space Treaty
- Nuclear Non-Proliferation Treaty

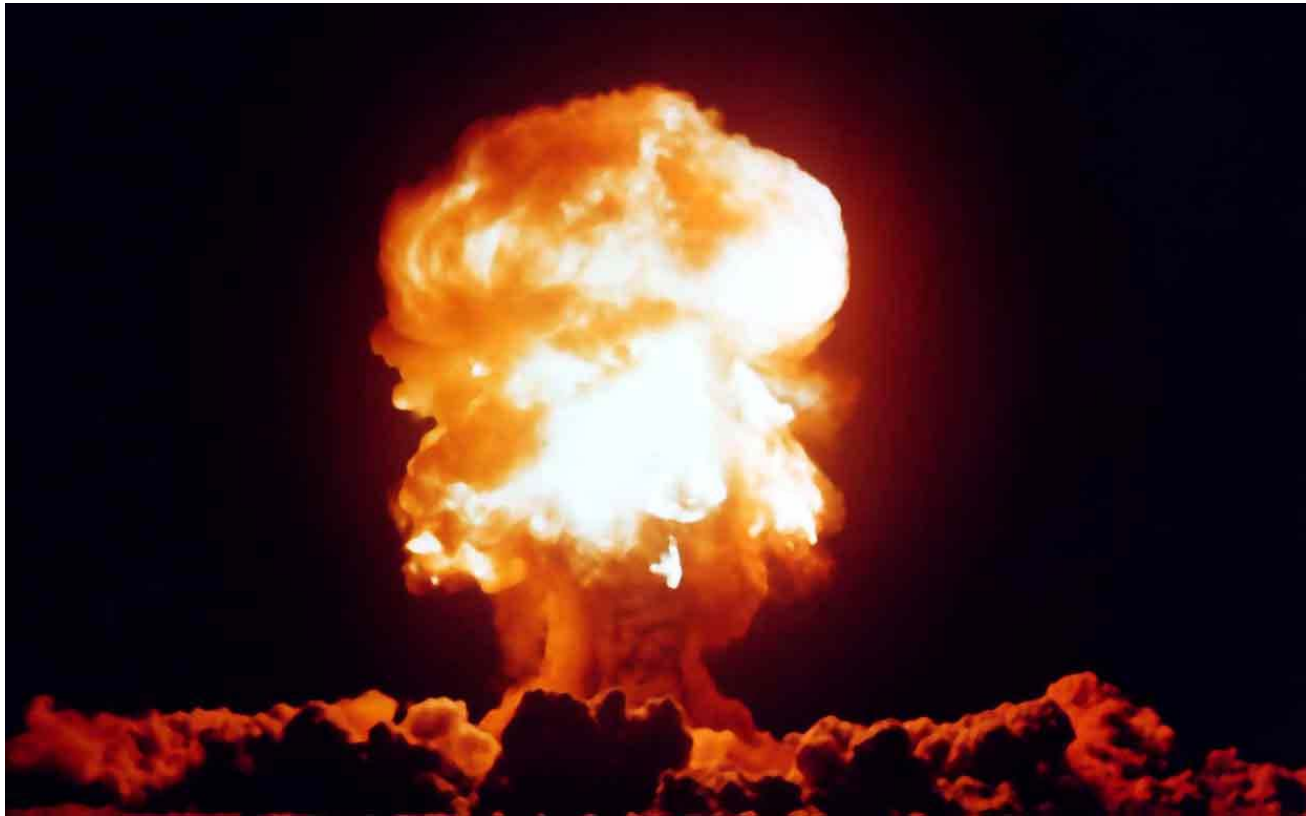
# Mutually Assured Destruction

- WMDs are rarely used because of the fear surrounding “Mutually Assured Destruction,” which is when war has been escalated to such a high degree that it affects much of the world and its inhabitants.

- Weapons of mass destruction include nuclear, chemical, and biological weapons.
- Today, we will only be discussing nuclear terrorism.



# Could terrorists acquire and use nuclear weapons?





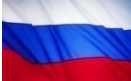








# **Four possible ways a terrorist could acquire and use a bomb:**

- Seizing and detonating an intact nuclear weapon**
- Seizing or purchasing weapons-grade uranium or plutonium leading to building and detonating a crude nuclear weapon**
- Sabotaging nuclear power plants and other nuclear facilities, releasing radioactivity**
- Acquiring radioactive material leading to building and detonating a dirty bomb**



# Seizing and Detonating an Intact Nuclear Weapon

# Countries That Currently Possess Nuclear Weapons

Country	Warheads Active/ Total	Year of First Test
Since the Non-Proliferation Treaty		
 • <b>Soviet Union ( now Russia)</b> RDS-1)	5,830/16,000	1949 (
 • <b>United States</b> Trinity)	5,163/ 9,938	1945 (
 • <b>United Kingdom</b> Hurricane)	750	1952(
 • <b>France</b> Gerboise Blue)	350	1963 (
 • <b>China</b>	130	1964 (936)
 • <b>India</b>	70	1974(Smiling Buddah)
 • <b>Pakistan</b> Chagai-I)	30/80	1998 (
 • <b>North Korea</b>	1/10	2006 ( The Beginning)
 • <b>Israel</b>	75/200	Unknown



# Nuclear Instability: Example of a new country trying to gain full nuclear capabilities

- Iranian President Ahmadinejad has insisted that his country's nuclear ambitions are purely for domestic purposes not defense.
- U.S. and other Western intelligence agencies have concluded differently and consider this step a threat to stability in the Middle East and around the world.
- The situation is fragile and may involve preemptive strike by the US or other western countries such as Britain or Israel
- If conflict erupts, nuclear facilities will be attacked and nuclear contamination of surrounding areas may be vast
- President Ahmadinejad may give nuclear weapons to ally terrorist groups to set off in major US cities
- In a free society this is almost impossible to



# Instability in Current Nuclear Capable Countries: Pakistan

- Currently Pakistan is in a state of political turmoil which has been consistent since the bloodless military coup in 1999 that overthrew Nawaz Sharif in favor of Pervez Musharraf
- There is currently a state of emergency in Pakistan following the eruption of riots after what were said to be fraudulent elections that swung in favor of President Musharraf
- Pakistan is a major nuclear player and rival state of India
- Its borders are not secure especially on its Afghan mountain border which is believed to be the place where Osama Bin Laden is hiding
- Its impossible to know how many secret terrorists exist inside the country's military intelligence agencies and what access they might have to Pakistan's roughly 50 nuclear weapons
- Terrorist could take advantage of anarchy or revolution in a failing nuclear state and gain control over a nuclear weapon



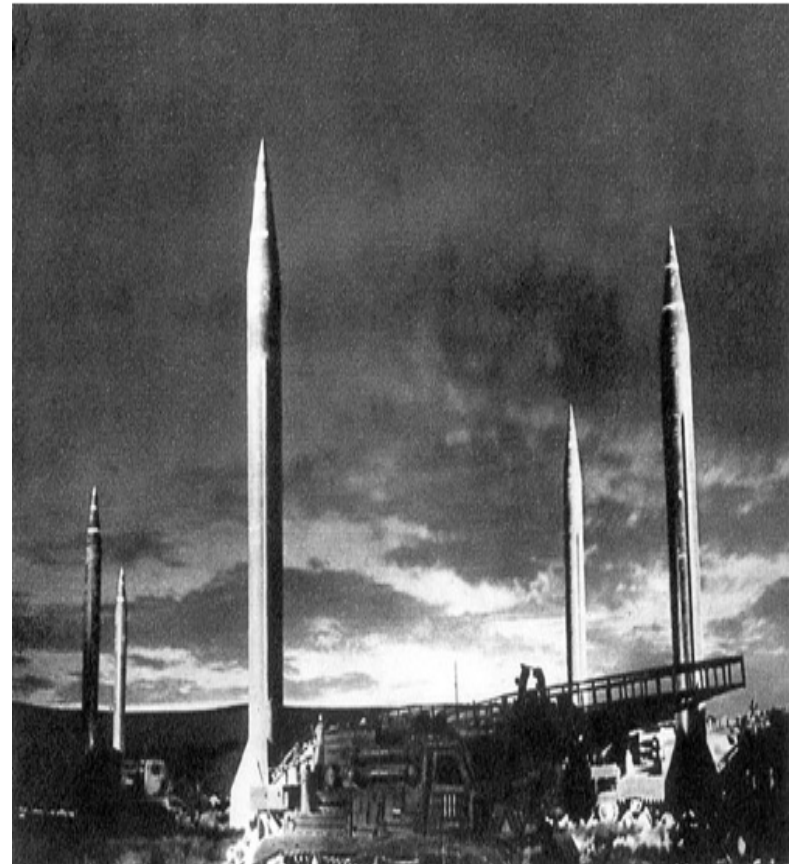
# Terrorist Groups Suspected of Trying to Obtain Nuclear Weapons

- **Al Qaeda ( International)**
- **Hezbollah ( Lebanon, Palestine)**
- **PLO ( Palestine)**
- **Hamas (Iran)**
- **Al-Jihad ( Egypt)**
- **Harakat ul-Ansar ( Pakistan)**
- **Shining Path ( Peru)**
- **Revolutionary Armed Forces of Colombia**
- **Revolutionary Nuclei ( Greece)**
- **Japanese Red Army ( Japan)**



# Cold War Fallout

- As noted in the first slide, the Soviet Union produced just over 5,000 nuclear weapons during the Cold War arms race with the United States
- Soviet President Gorbachev reportedly lost control of his country's nuclear arsenal when his opponents cut off communication links during a coup attempt against him in 1991
- To this day Russian Intelligence cannot account for several of its nuclear weapons left over from the Cold War
- Some believe that perhaps old Soviet rogue generals in exile may have control over them
- This is a perfect situation for a terrorist group who will use all resources to take advantage of the situation





# Obstacles for Terrorist Groups

- Obtaining the bomb
- Finding the scientific experts to construct or maintain the bomb
- Overcoming devices built in most nuclear bombs that prevent unauthorized use ( codes, nuclear football)
- Transporting the weapon to its target
- Figuring out how to trigger the device
- Tight security and lack of safe-havens around the world





**Seizing or  
Purchasing  
Weapons-Grade  
Uranium or  
Plutonium Leading  
to Building and**

# Background

- 25 kg of highly enriched uranium or 8 kg of plutonium are needed for a bomb
- Uranium occurs naturally, but not in a form that is usable for nuclear weapons. To convert natural uranium into a form that can be used in nuclear weapons, it must be "enriched" to increase the concentration of uranium-235 to uranium-238.
- Enriching uranium is difficult and costly, the process requires separating isotopes that have very similar chemical and physical properties.
- The enrichment process is the main obstacle to producing uranium that can be used in nuclear weapons.

# Background cont.

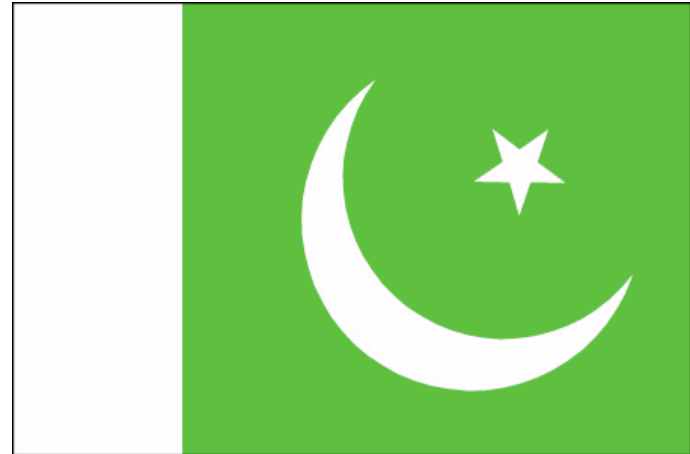
- Plutonium occurs only in small amounts in nature. However, essentially all isotopic mixtures of plutonium—including reactor-grade plutonium—can be used for nuclear weapons.
- In order to use plutonium in nuclear weapons it has to be separated from the rest of the spent fuel in a reprocessing facility.
- Plutonium separation is easier than uranium enrichment because it involves separating different elements instead of different isotopes of the same element.

# **RISKS!**

- **The raw materials of nuclear weapons are harder to secure than the actual weapons**
- **Nuclear materials are located in many places**

# Locations of Bomb Fuel

- Sites in Russia
- Pakistan
- 50 reactors used for nuclear research, located in Russia and about 20 other nations



# Difficulties in Obtaining Fuel

- Difficulty in obtaining 50 kg of highly enriched uranium
- US is trying to make sites more secure by phasing out the enriched-uranium research reactors



**Sabotaging  
Nuclear Power  
Plants and Other  
Nuclear Facilities  
to Release  
Radioactivity**



# Nuclear Power Plant Sabotage



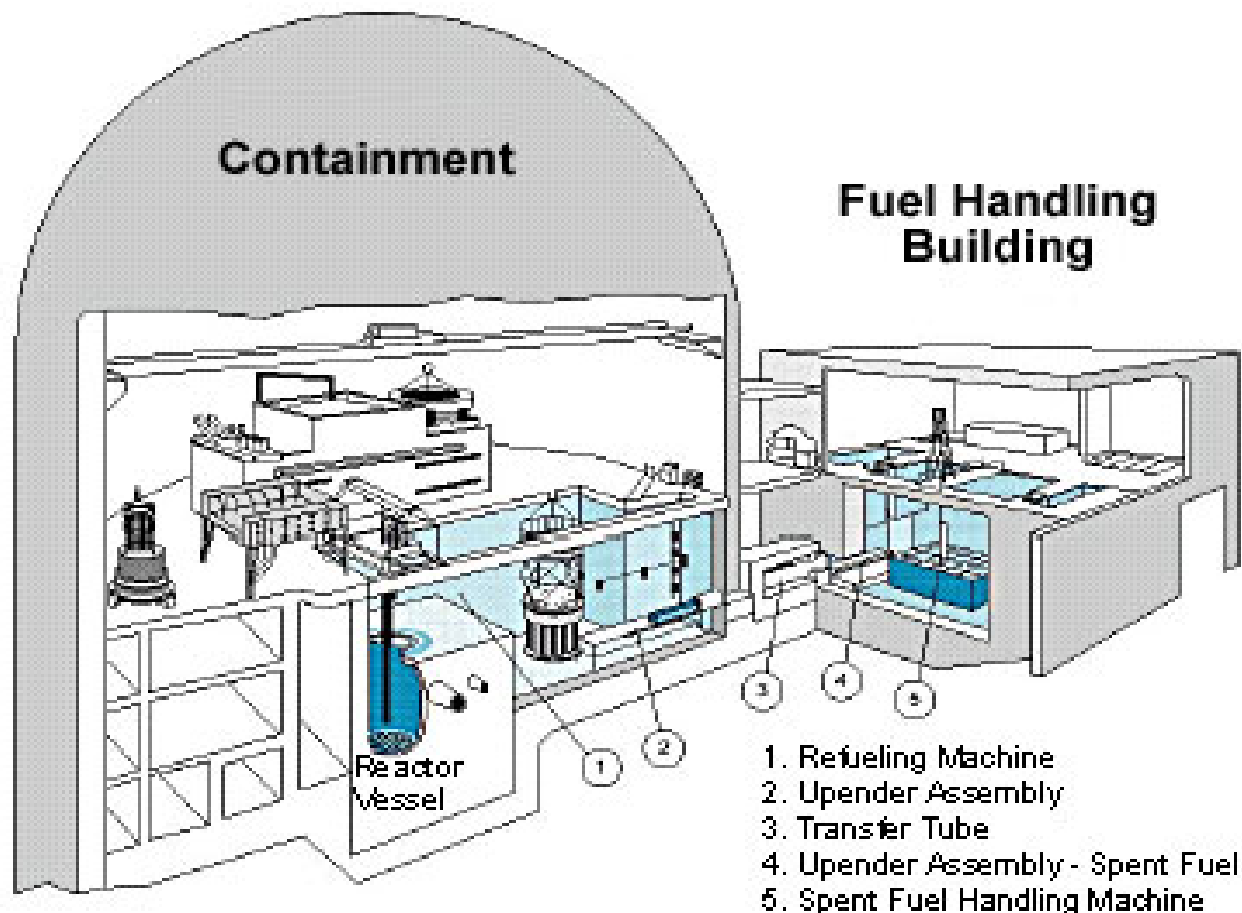
- The possibility that terrorists might crash a hijacked airliner into a nuclear power plant is one of the more nightmarish scenarios to have surfaced since the al Qaeda attacks on the Pentagon and the World Trade Center on Sept. 11, 2001.
- The main safety concern has always been the possibility of an uncontrolled release of radioactive material, leading to contamination and consequent radiation exposure off-site.



# Spent Fuel

- According to a January/ February 2002 article in the *Bulletin of the Atomic Scientists*, an average nuclear power plant contains 1,000 times as much long-lived radioactivity than was released by the Hiroshima bomb
- Radioactivity comes from spent fuel.
- Spent fuel is nuclear fuel that has been used in the reactor and is at the point where it is no longer useful in sustaining a nuclear reaction. Fuel is stored at Nuclear Power plant sites.
- Spent fuel is stored within water. Water storage is required because spent fuel assemblies continue to emit considerable amounts of both heat and radiation for many years. The fuel pool water is continuously cooled to remove the heat produced by the spent fuel assemblies

- Spent fuel pools contain more highly radioactive fuel than the reactor cores.
- And the spent fuel pools at all U.S. nuclear plants are located outside the reactor containment structure.
- Spent fuel is a softer target that could yield graver consequences than an aircraft crashing through the reactor containment structure.



# Sabotage to Spent Fuel

- Terrorist can target these spent fuel storage tanks with attacks that dismantle plant controls and damage cooling system
- Unlike an atomic bomb, any damage from a terrorist attack on a nuclear power plant would result almost entirely from the release of radioactivity, not the initial blast, although casualties would be similar

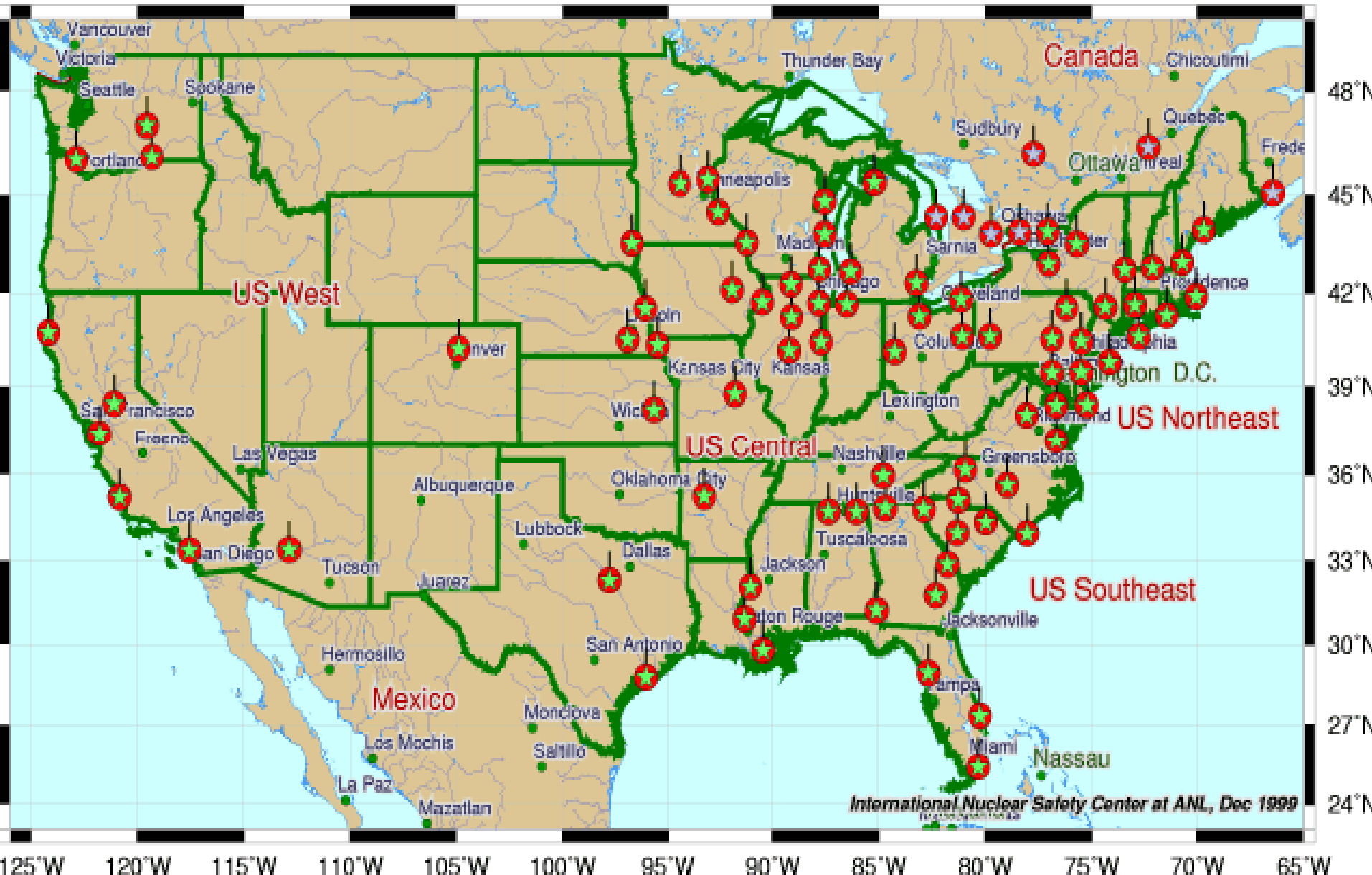




# Cost of Power Plant Sabotage

- According to a Nuclear Regulatory Commission (NRC) study, a meltdown at one of Southern California's San Onofre reactors could cause:
- **130,000** 'prompt' fatalities; **300,000** latent cancers; and **600,000** cases of genetic defects.
- Another study carried out for the NRC in 1980 estimated that such an incident would cost up to \$314 billion (around **\$700** billion in today's dollars). [1](#)

# Nuclear Power Plant Locations in the U.S





# You Don't Need to Worry

- **"Nuclear plants remain the best-defended parts of the energy infrastructure."**
- **Conversely, chemical storage sites and liquefied natural gas facilities were found to "remain a problem."**
- **As such findings indicate, the risk of terrorists crashing a hijacked airliner into a nuclear plant is not the only potential threat facing America's energy infrastructure. Nor is it necessarily the greatest.**

**Acquiring  
Radioactive  
Material Leading  
to Building and  
Detonating a Dirty  
Bomb**



# Dirty Bombs

- Also known as a Radiological Dispersion Device (RDD)
- RDDs are *not* nuclear weapons
- Some people refer to RDDs as WMDs; Dirty Bombs are more effective as a “Weapon of Mass DISRUPTION”
- The relative ease of RDD construction makes the threat of its use even more frightening

# Recipe for a Dirty Bomb

Dirty Bombs are extremely simple to create!

A conventional explosive, such as TNT, is packaged with a radioactive material, generally in the form of powder or pellets.

RDDs can vary in size

- small bombs: a single stick of TNT
- medium bombs: range in size from the size of a backpack to a small car
- large bombs: a shipping truck

\*The degree of radiation severity depends upon the radioactive material and its quantity\*

# Where to Find Radioactive Material

Believe it or not, obtaining radioactive materials isn't that hard! They can be found in:

- Hospitals: nuclear medicine (cesium-137)
- Universities: used in different fields of research
- Food Irradiation Plants: kills harmful bacteria on foods (cobalt-60)
- Radioactive mines: Uranium is mined in Africa
- Abandoned Nuclear Batteries around the former Soviet Union
- Russian reactors
- Everyday radioactive materials: found in smoke alarms

# How BIG is the threat?

- Due to the ease of construction and access to materials, RDDs create a serious terror threat
- Main Targets for Dirty Bombs
  - Largely attended sporting and entertainment events such as the Super Bowl, World Series or New Years Eve celebrations
  - Larger cities, ie. New York City, Washington, DC



Figure 6. A simulated effect of detonation of dirty bomb (3,500 curie of cesium-137 with ~50 lbs of explosive) at the lower tip of Manhattan Island (Scientific American, November 2002, page 76)

# Effects of a Dirty Bomb

- Widespread panic and terror
- Casualties caused by the initial explosion
- Radiation poisoning of those closely exposed to radioactive dust
- Cancer down the road
- Psychological implications
- Economic downturn: destruction of buildings, proper clean-up and removal of waste, possible need to abandon widely affected areas



# In the event of a Dirty Bomb...

The Center for Disease Control tells us to:

- Cover nose and mouth with a cloth to prevent breathing radioactive dust/smoke
- Don't touch objects thrown by the explosion
- Go in a building structurally intact
- Remove outer layer of clothing and seal in a plastic bag
- Wash with soap and water, make sure to wash hair
- Tune into local news for more information

In Conclusion...

# Interesting Facts

- In 2006 the FBI spent \$1 129 Million Dollars in Counterterrorism
- In 2004 the FBI reported 4,499 supposed terrorist threats
- At the end of 2004 there were 79 pending terrorist cases
- There are more than 100 research reactors or related facilities worldwide with enough highly enriched uranium to potentially build a bomb. Some of this material is secured by nothing more than an underpaid guard and a chain link fence.
- The first round of U.S.-funded security upgrades has been completed for only about 50 percent of the nuclear material in Russia. The remaining material, over 300 tons, is enough for more than 15,000 nuclear weapons.