



Nuclear
Terrorism Threat

or

The Future is Now

Princeton University

Sept. 29, 2003

Ara Barsamian

Nuclear Terrorism

- State-Sponsored
 - Has return address
 - Not very likely because of reprisals
- ➔ • Group/Individuals (a la Al-Qaeda, Red Brigades, IRA, PLO, rogue military, etc)
 - Highly motivated fanatics fueled by globalization, ethnic and religious conflicts
 - No deterrence: no qualms about mass-murder
 - Intellectually/technically knowledgeable
 - Highly likely because of sharpening economic, ethnic and religious conflicts (90% probability in the next 5 years ??)

What's The Big Deal About NW?

- No Time to Cope
 - 90% of Energy Released in ~ 50 nanoseconds (the Last 5 Generations)
- Enormous Instant Consequences
 - Instant Casualties (hundreds of thousands to millions)
 - No infrastructure to deal with massive casualties
- Easy to Smuggle
 - Small size easy to smuggle (Drug Dealers, Haitian refugees, Mexican illegals, etc)
 - No Practical Countermeasures

Instantaneous Effects of 1 kT Fission Weapon



- All energy liberated in ~last 5 generations (50 nanoseconds)
- Energy $\sim 4 \times 10^9$ BTU
- Fireball size ~ 90 ft
- Fireball temperature $\sim 7,000$ degC
- Radiant heat ~ 50 cal/cm² @250m range
- Radiation 10,000 Rads at 450m
- Shock Overpressure ~ 30 PSI @ 150 m

Miniaturization Without Sophistication

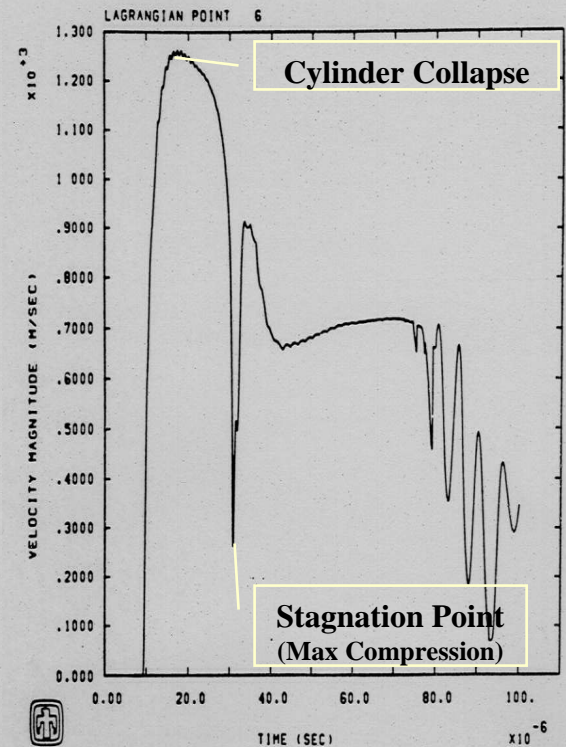
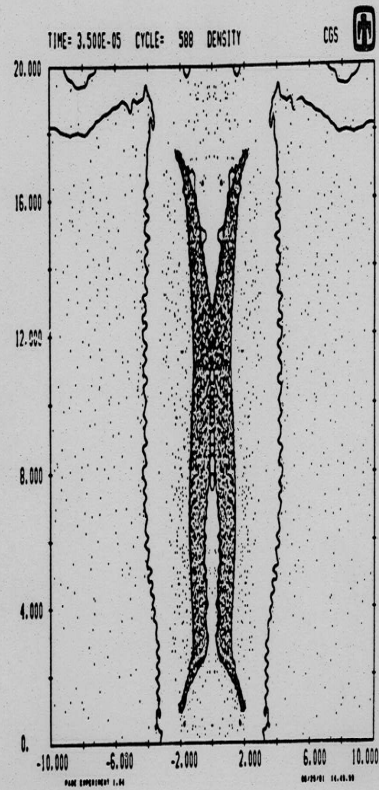
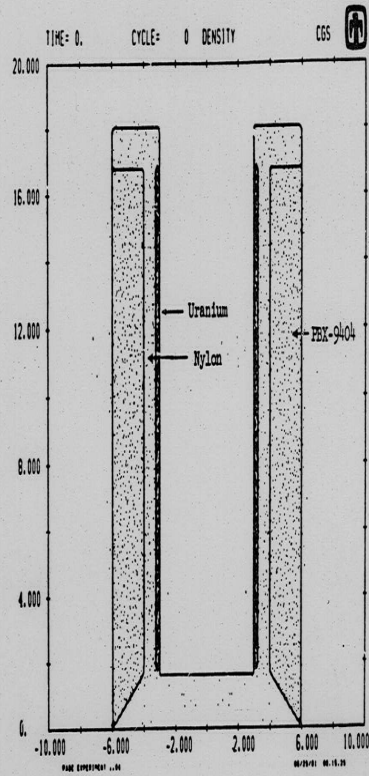
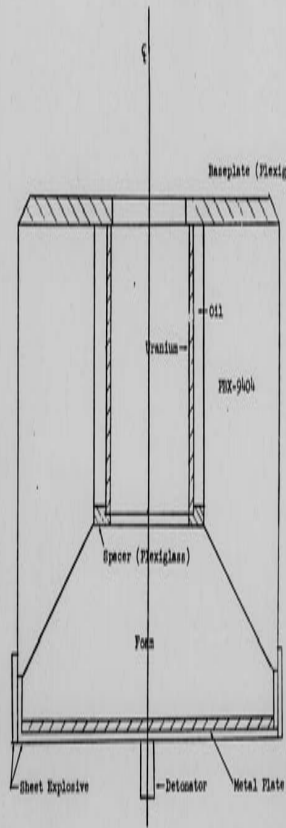


1945 Fat Man



1958 W-48

Sample Cylindrical Implosion Device



Nuclear Terrorism is a Matter of Time....

- **A Terrorist Nuclear Explosion is a Matter of Time**
 - Stolen NW or bought on the black market
 - Home-brew NW with illicit materials
 - Ease of smuggling across borders (2L Coke bottle)
- **Western Society Utterly Unprepared**
 - Scale of Casualties
 - Lack of Facilities
 - Public Order
- **Consequences on Western Society Unpredictable**
 - Government Institutions Collapse
 - Economic Collapse
 - Civil Unrest

Mythology of NW

- Requires Manhattan Project Scale
 - Billions in Funding,
 - Enormous Infrastructure,
 - Constellation of Nobel-class People
- Technically Too Complicated
 - Need NW-experienced people
 - Need nuclear physicists, chemists, electrical engineers
 - Need super-computers and sophisticated programs
- Too Big, Heavy, Can be Detected, etc, etc,...

The TRUTH is that everyone that tried, rich and poor, succeeded on the first try....

What Has Changed

- Failure of Non-Proliferation Regime
- Availability of Material, **Particularly Reactor-Grade Pu (1500 + tons)**
- Trivial Design of **Implosion Devices**
- Cheap Electronics and Machine Tools
- Technically Savvy Terrorist Groups and Individuals
- Massive Illegal Immigration Eases Smuggling
- Willingness to Use - **September 11**

What Can Be Done?

- This is an International, not just an US Issue
- Secure Material *with Money*
 - By buying used reactor fuel
 - Buying reprocessed material
 - Siting facilities (storage, reactors) underground
 - Consolidate/centralize facilities
 - Help all power reactor owners with the changes
- Sign the CTBT
- Better Human Intelligence on Terrorist Groups and Individuals, and Willingness to Terminate
- Willingness to Use Massive Retaliatory Force
- Educate, Educate, Educate...the Politicians and the Public about the Issues

About: Ara Barsamian



- BSEE – CCNY
- MSEE – CCNY
- Lecturer, EE - CCNY
- Exxon Research & Engineering Co.
- 3X Corporation - Pres
- ABB Simcon - VP
- Refinery Automation Institute - Pres
- ...eventually teach