Cesium-137 and Dirty Bombs

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Cesium-137

- Usually found as Cesium Chloride
- Radioactive Isotope
  - β–emitter
  - γ-emitter
  - Produced by Uranium fission
  - Half-Life of ~30 years
- Water Soluble
- Chernobyl

Cesium-137 Uses

- Self-Contained Irradiators
  - Blood Irradiation
    - Prevent graft-versus-host-disease (GVHD)
  - 30 year half-life
    - Long lasting radiation source-Good
- Cancer Treatment
- Industrial Devices
- Thousands of Devices in the U.S.

What is a Dirty Bomb?

- Radiological Dispersal Device (RDD)
- Conventional Explosive + Radioactive Material
- In NO WAY similar to a Nuclear Weapon
- A Weapon of Mass Disruption
  - Fear and Long Term Contamination

History of Dirty Bombs

- Moscow 1995-Chechen rebels bury radioactive material in Moscow's Ismailovsky Park.
- North Carolina 1998- 19 small tubes of Cesium stolen
- 1998 Chechnya-Ibragim Khultygov announces Security Service team has found a container filled with radioactive materials and attached to an explosive mine

Cont.

- 1999 Chechnya- Attempted Theft of radioactive material
- 2001 Russia- 2 people hospitalized after plundering nuclear powered lighthouse
- 2002 Chicago- Jose Padilla arrested for suspicion of planning to build and detonate a dirty bomb in an American city
- Based on evidence uncovered in Herat British intelligence agents and weapons researchers conclude that Al Qaeda has succeeded in constructing a small dirty bomb

Effects of a Cesium Bomb

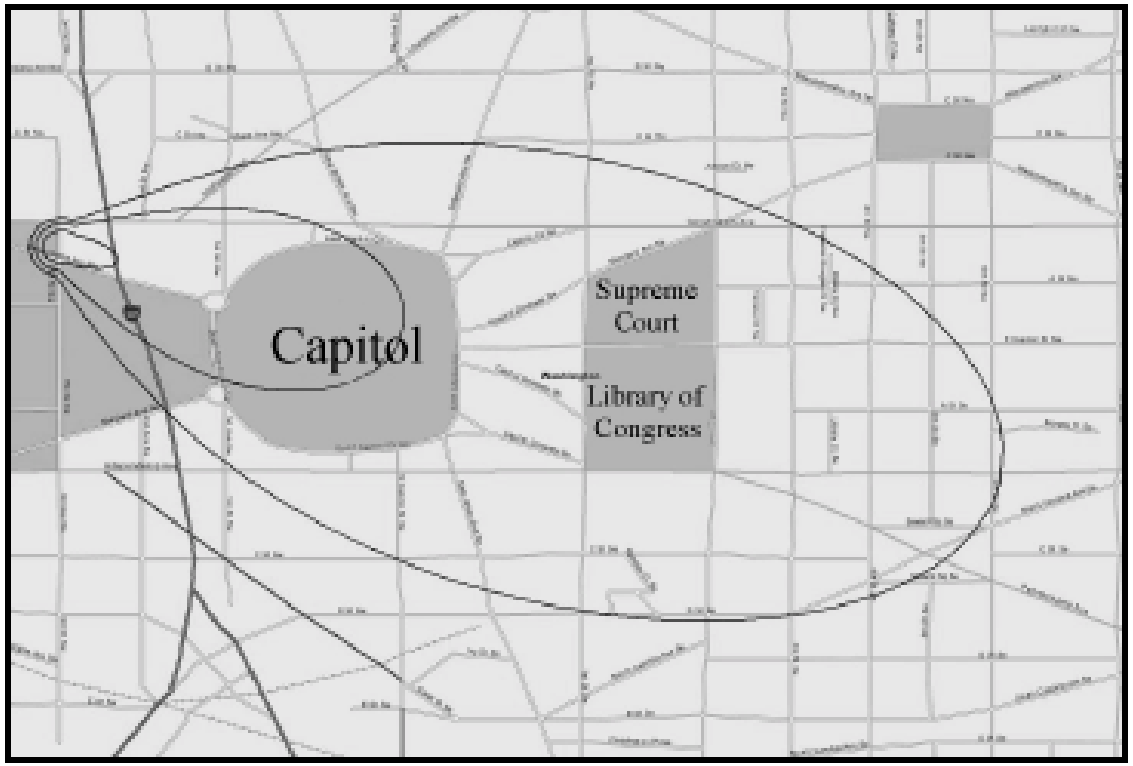

Figure 1. Long-term Contamination Due to Cesium Bomb in Washington, DC

Inner Ring: One cancer death per 100 people due to remaining radiation

Middle Ring: One cancer death per 1,000 people due to remaining radiation

Outer Ring: One cancer death per 10,000 people due to remaining radiation; EPA recommends decontamination or destruction

Effects Cont.

- Primary Deaths from Explosive
- Little Risk of immediate effect of radioactive material
  - Acute Radiation Syndrome unlikely
- Risk of long term exposure if area is not evacuated
- Require Decontamination or Destruction of the Area
  - Remember the 30 year half-life

Alternatives to Cesium Chloride

- Replace Cesium Chloride with less radioactive forms of Cesium or radioactive Cobalt (shorter Half-life ~5 years)
- Replace with Cesium Glass or its mineral form.
  - Smaller specific activity, less radiation output
- Currently more expensive

References

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