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Managing Potential Consequences from RDD Events

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Radioactive, unprotected: A 'dirty bomb' nightmare

Soviet-era nuclear material is a target for smugglers willing to sell to anyone

By Alex Rodriguez
Tribune foreign correspondent

YEREVAN, Armenia — Jobless for two years, Gagik Tovmasyan believed escape from poverty lay in a cardboard box on his kitchen floor.

Inside the box, a blue, lead-lined vessel held the right type and amount of radioactive cesium to make a "dirty bomb." The material was given to him by an unemployed Armenian Catholic priest who promised a cut if Tovmasyan could find a buyer.

He found one in 2004, but the man turned out to be an undercover agent. Tovmasyan spent a year behind bars on a charge of illegally storing and trying to sell 4 grams of cesium-137.

Today the chain-smoking Armenian cabdriver says his actions amounted to simple survival. "That's just the way it was back then," said Tovmasyan, 48, who insisted he had no idea of the danger the material presented. "I was selling all my belongings just to get by."

At a time when the U.S. is grappling with the specter of nuclear weapons in North Korea and Iran, security experts warn that a vast supply of radioactive materials—enough to make hundreds of so-called dirty bombs—lies virtually unprotected in former Soviet military bases and ruined factories.

Desperately poor scavengers looking for scrap metal already have raided many of those sites, fueling an ever-growing concern in the war on terrorism.

There were 662 confirmed cases of radioactive materials smuggling around the world from 1993 to 2004, according to the International Atomic Energy Agency. More than 400 involved substances that could be used to make a dirty bomb, a

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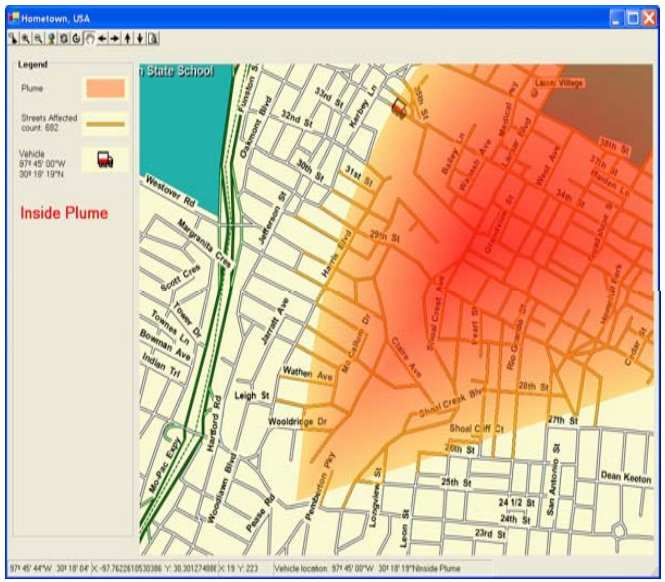
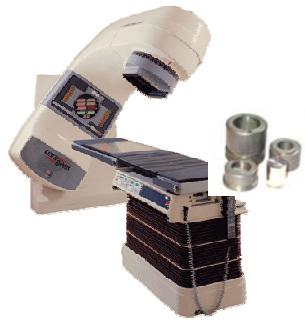
Radiological Dispersal Devices May Derive from Many Sources

- ***The term "radiological dispersal device" (RDD) refers to any method used to deliberately disperse radioactive material in the environment in order to cause harm.***



Industrial radiography

10 - 200 Ci of Ir-192 or Co-60



Teletherapy 500 – 1,500 Ci

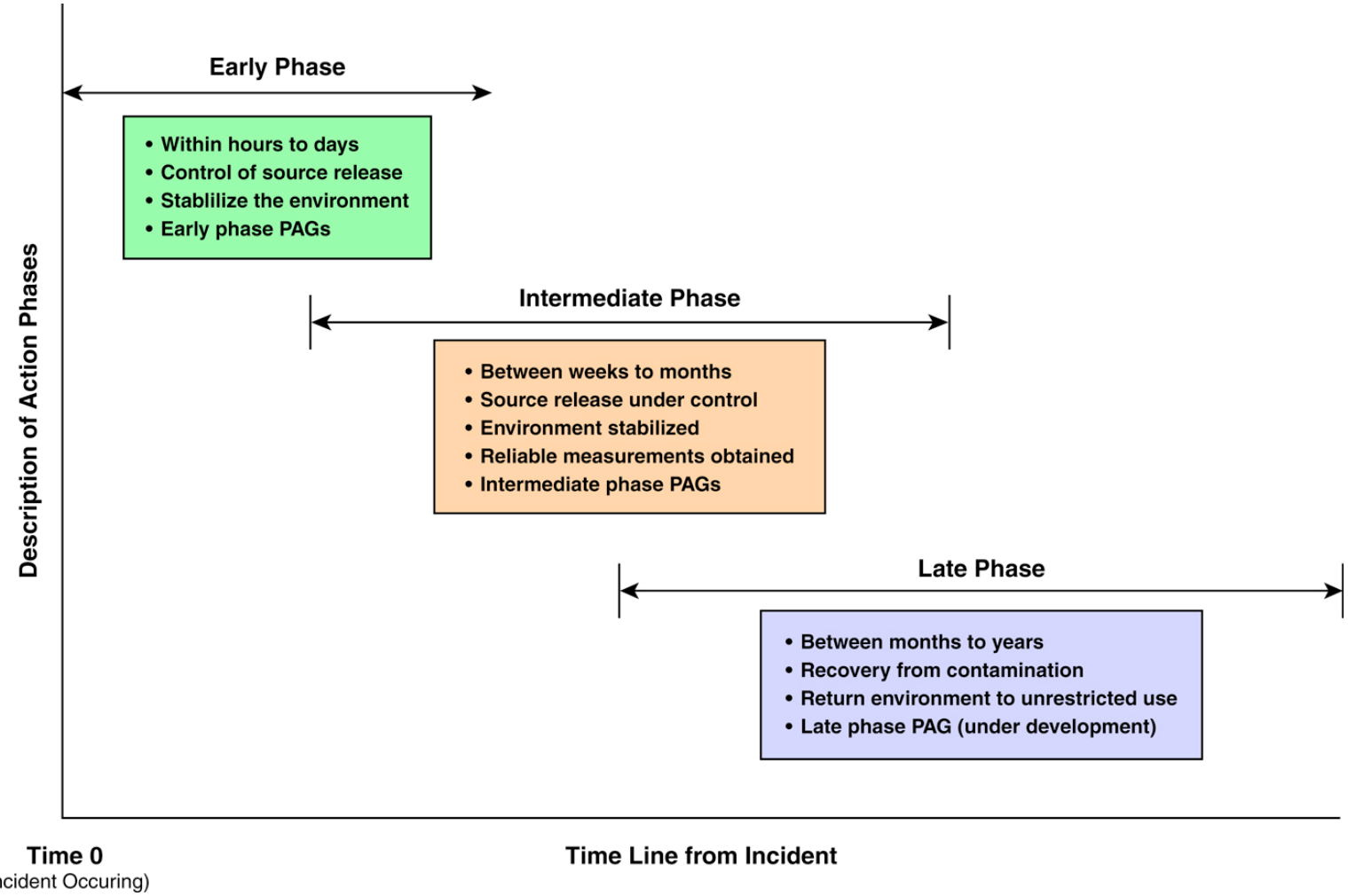
Cs-137 or Co-60

Moisture/density gauges

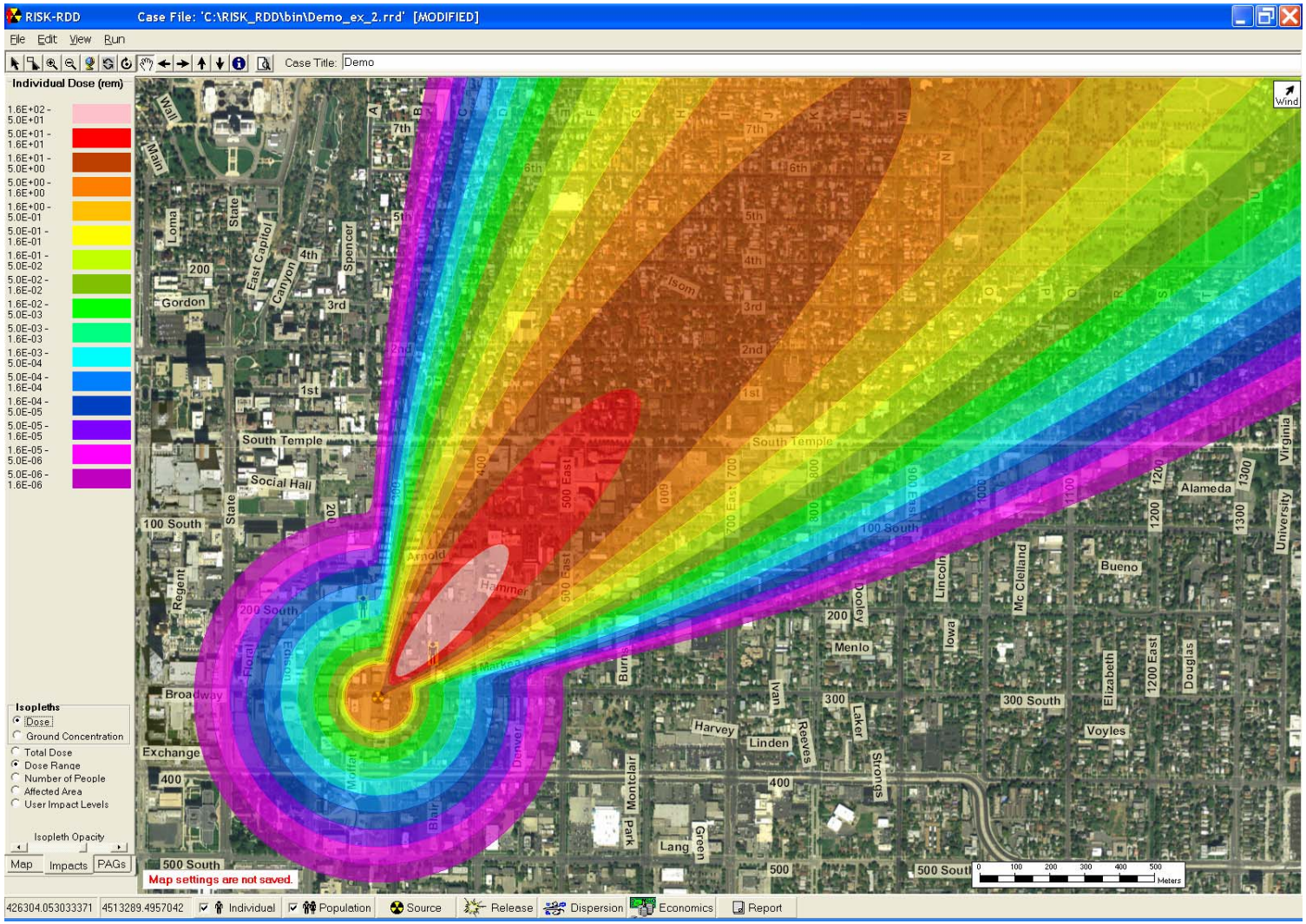
Am-241, Cs-137

0.01 – 0.1 Ci

The Radiological Emergency Response and Management Issues Are Identified in Three Sequential Phases



Response to RDD Events Depends on the Potential Consequences

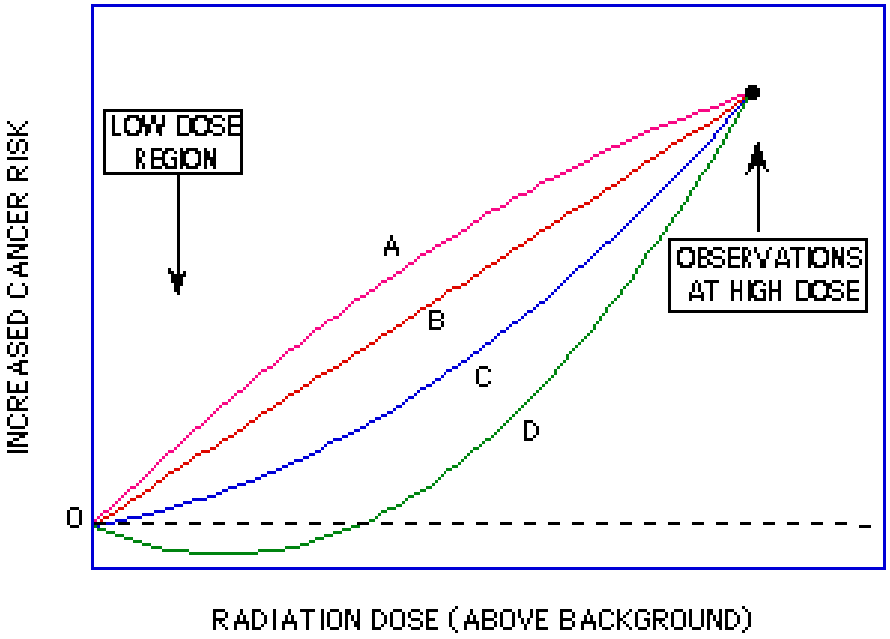


Radiological Health Risk is a Primary Concern

- **Individuals and Population Subgroups**
- **Short- and Long-Term Exposures**
  - Inhalation, Ingestion, cloudshine, groundshine
- **Acute Radiation Effects**
  - Fatalities from acute exposures:
    - *bone marrow, GI tract, lungs*
  - Medical treatment and uncertainty options
- **Long-Term Radiation Effects**
  - Cancer incidence/fatality

Radiation Impact to Humans – Chronic and Acute Effects

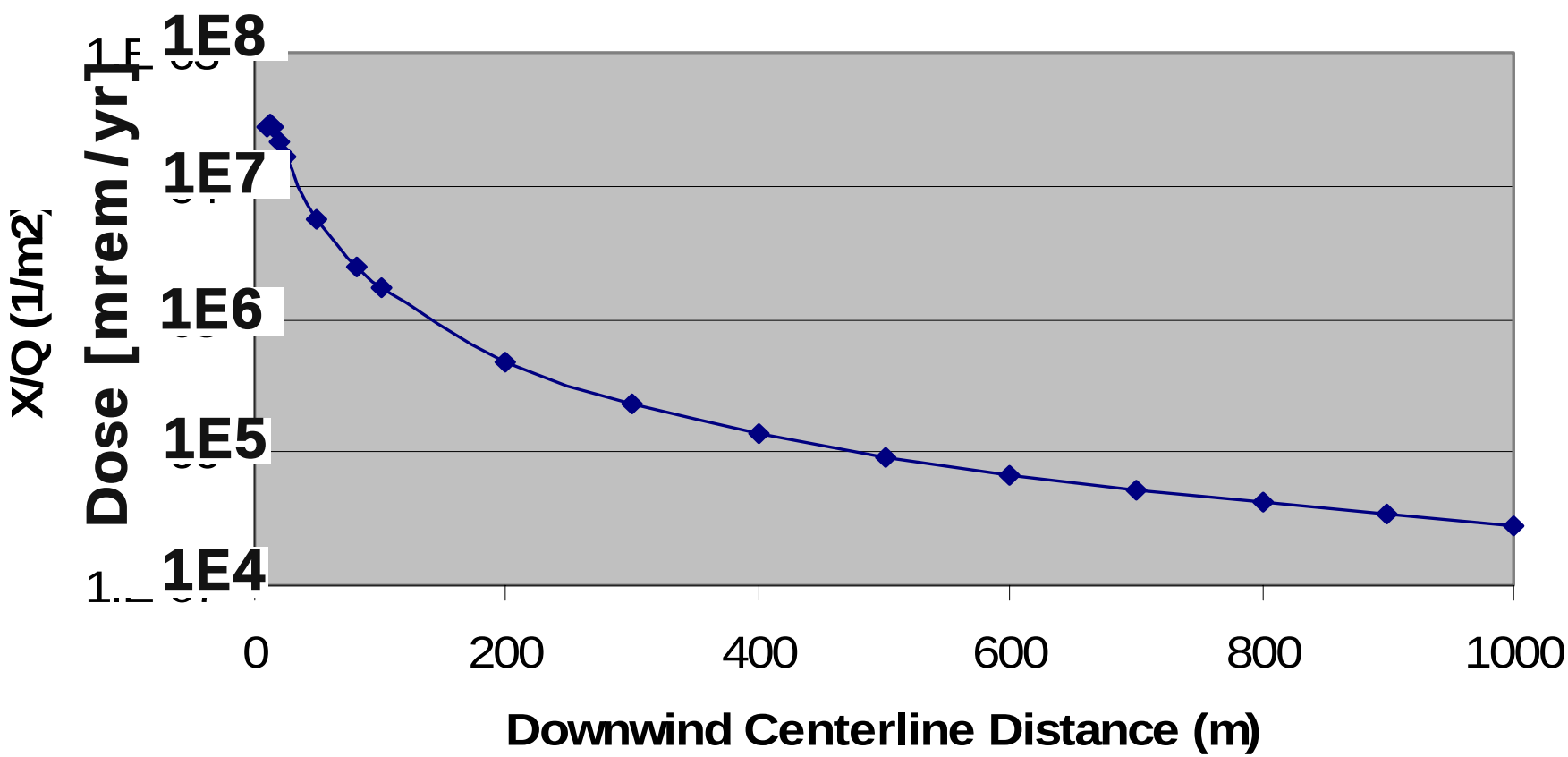
Chronic Cancer Effects at Low Doses



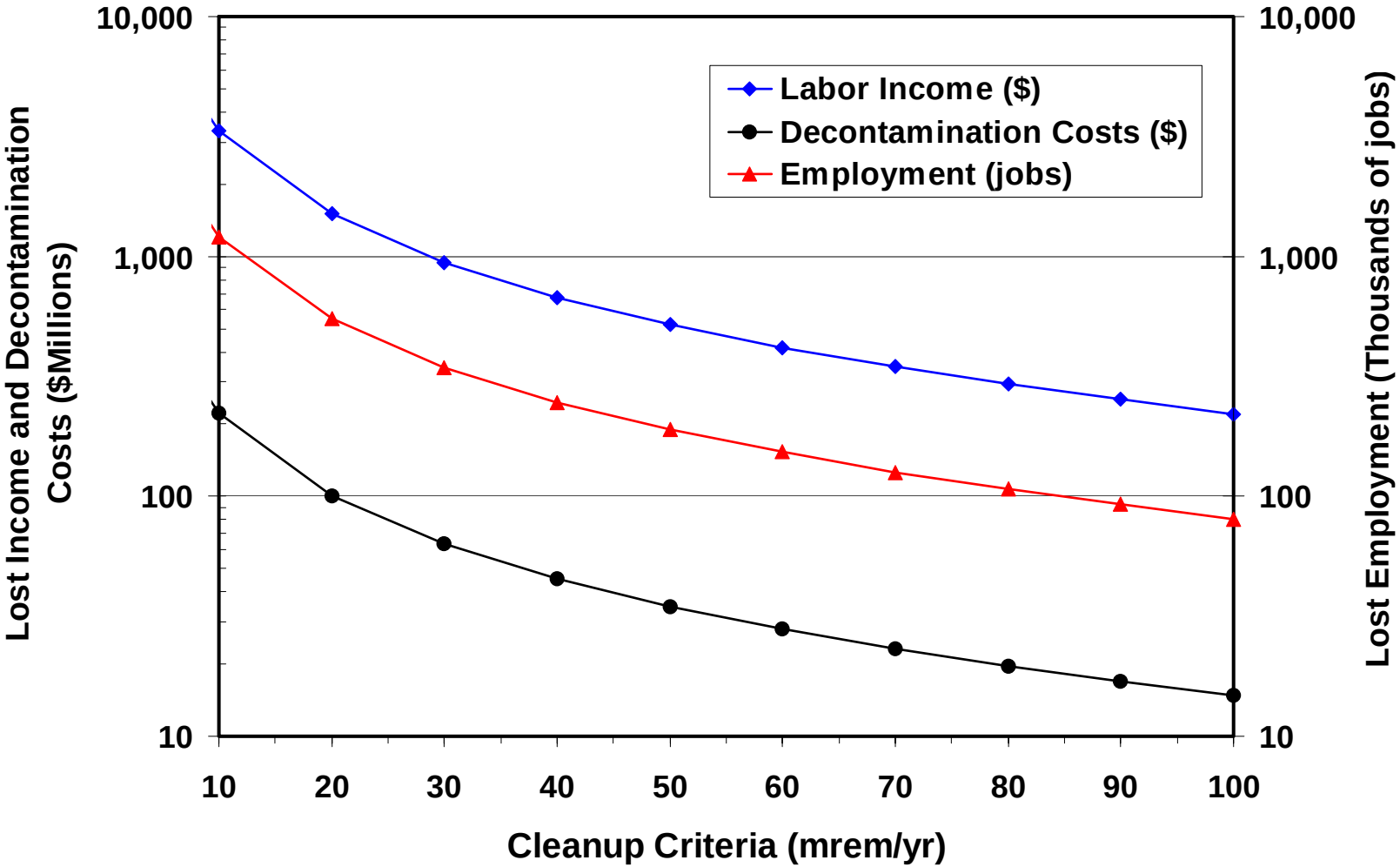
The current protection approach Is based on LNTH (curve B)

Acute Radiation Effects	
Dose (Rad)	Health Effects
20 – 100	Temporary decrease in while blood cell count
100 – 200	Nausea, vomiting, while blood count suppressed
200 – 300	Vomiting, diarrhea, death in some cases
300 – 600	Hemorrhaging, 50% death around 350 without medical treatment
> 600	Death in almost all cases

A Hypothetical Dose Profile Under a Plume Passage



Economic Impact is a Critical Consideration



Other Important Considerations

- Weather conditions (dispersion of the plume)
- Particle size distribution (radioactivity distribution)
- Deposition of radioactive contaminants
- Cleanup of the contaminated areas
- Societal factors
  - Restoring societal orders
  - Psychological factors
  - Economic issues
  - Long-term recovery

Summary

- Responses to RDD incidents depend on the potential consequences to humans (i.e., the **"risk-informed" decision making**)
- In general, the health consequences from an RDD event would not be high (limited dose levels and ranges of dispersion) – **not a particularly effective weapon of choice**
- RDD – is a weapon of **mass disruption** rather than **mass destruction**; its has a potential for causing widespread contamination and public fear
- However, one must be highly vigilant – **expecting the unexpected** should be the rule (the Po-210 poisoning of a former Soviet spy was an example)