

# **The Risks of Radiological Dispersal Devices (“Dirty Bombs”)**

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# Why Study Dirty Bomb Risks?

- Thousands of radioactive materials in the U.S. and abroad
- Many lost sources
- Relatively easy to buy or steal
- Potential for massive psychological and economic effects

# Risk Analysis

- Develop attack scenarios: Sources x delivery mechanism x location
- Estimate relative probabilities: Project risk analysis
- Radiological source term and plume modeling
- Consequence assessment

# Example Sources

- Medical, Research, Food Facilities
  - Blood irradiator (1-5,000 Curies)
  - Research irradiator
  - Industrial irradiator (50-250,000 Curies)
- Nuclear Waste
  - LLW
  - HLW
  - Spent Fuel (1 million Curies per fuel assembly)
- Special Nuclear Materials
  - Enriched Uranium
  - Plutonium

# LA and Long Beach Ports



3<sup>rd</sup> busiest port in the world

36% of US imports

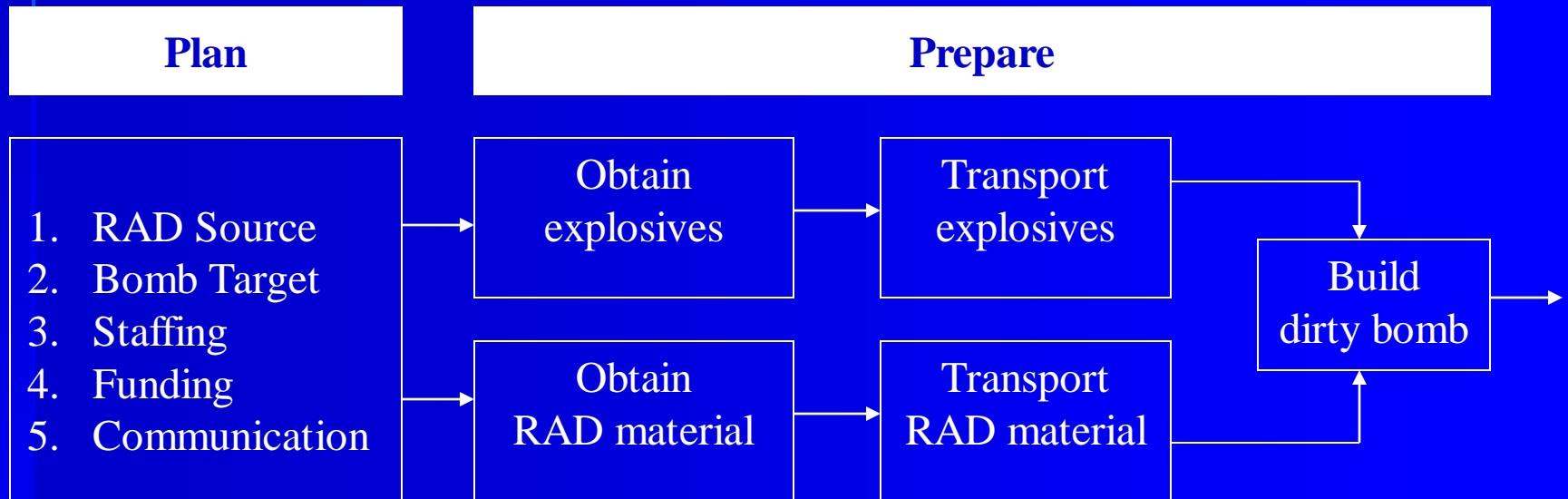
11.4 million TEUs per year

\$212 billion cargo value

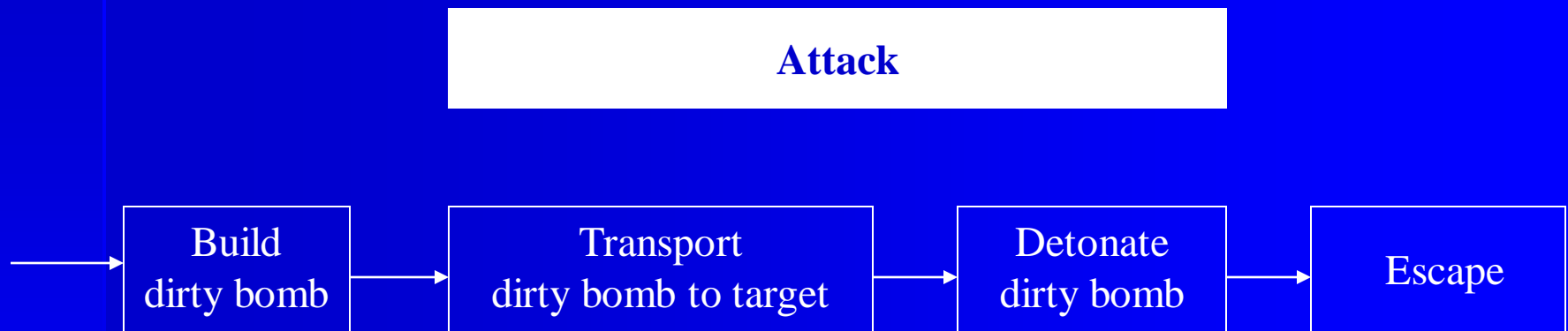
# Theft of an Industrial Irradiator

		TRANSPORTATION			
		Car/Truck	Ship	Train	Plane/Heli
LOCATION	Bridge	High Risk	High Risk	High Risk	Low Risk
	Ground	High Risk	Low Risk	Low Risk	Low Risk
	Elevated	High Risk	Low Risk	High Risk	Low Risk

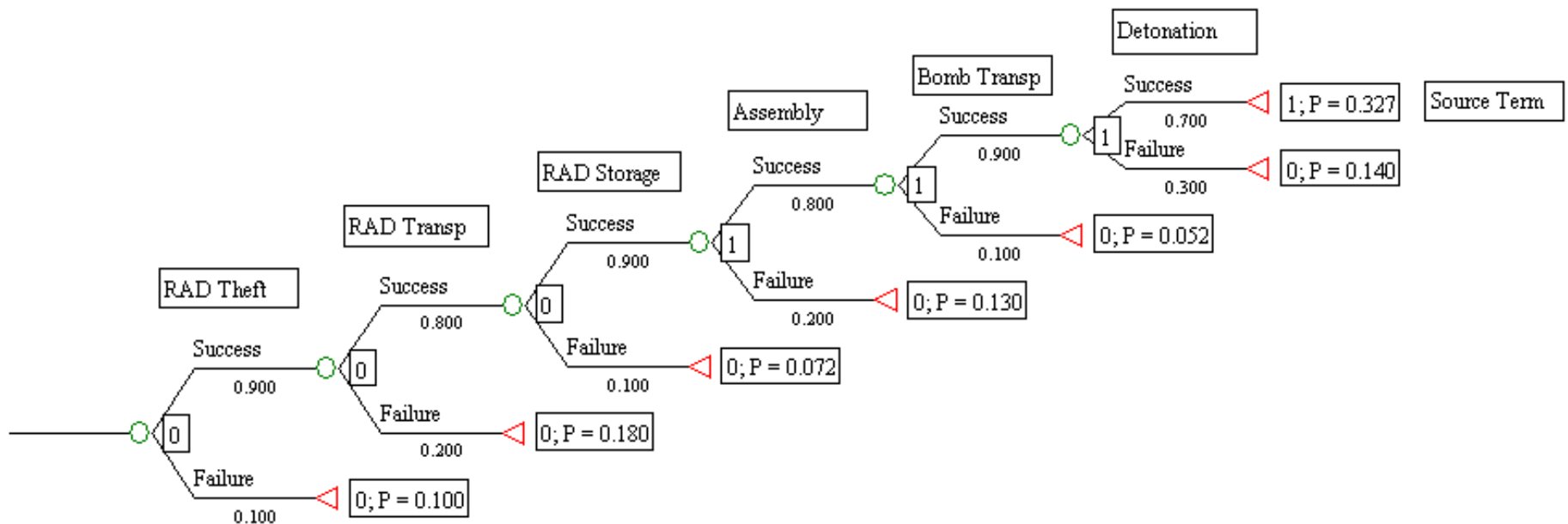
# The Project Begins....



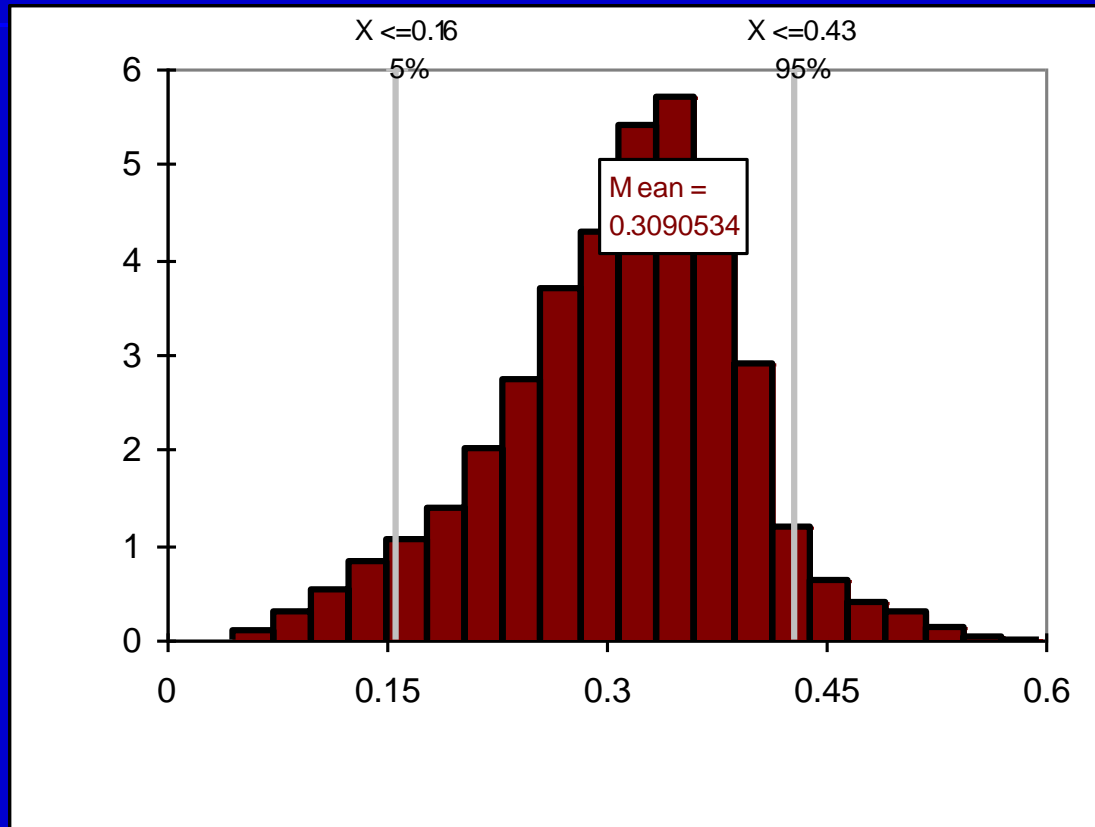
# ... and is completed



# Event Tree



# Probability of Success



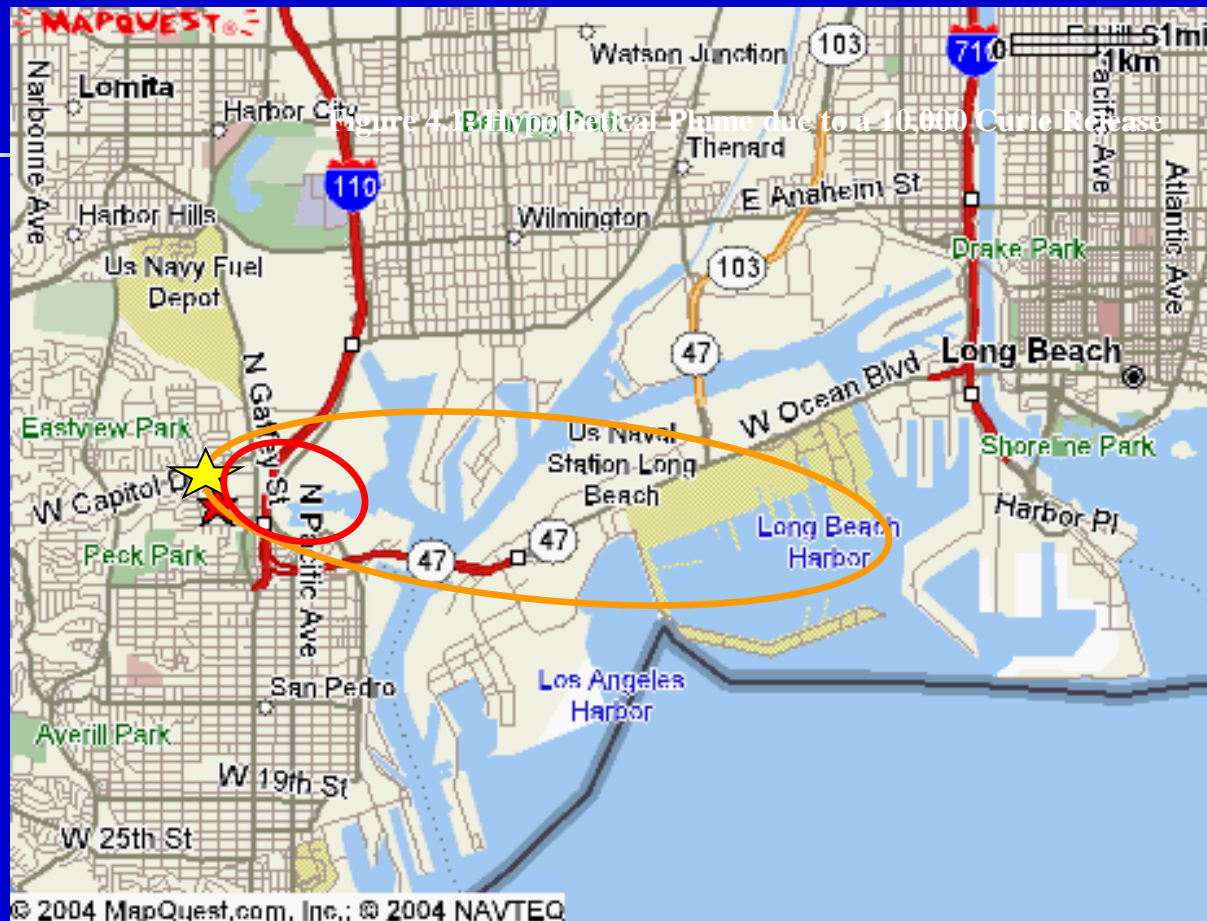


Figure 4.2: Hypothetical Plume due to a 200,000 Curie Release



# Fatalities

- Blast effect and acute radiation impacts: a few fatalities
- Four day dose from plume: tens to hundreds of latent cancers
- Ground shine: tens to hundreds of latent cancers

# Cost of Shutting Down the Ports

- 15 days: \$138 million
- 120 days: \$ 35 billion
- 365 days: \$100 billion

# Other Costs

- Evacuation: up to \$100 million
- Property Values: up to \$200 million
- Business Loss: up to \$3 billion
- Decontamination: up to \$100 billion

# Conclusions

- A dirty Bomb is nor a weapon of mass destruction.....
  - Very few immediate fatalities
  - At worst hundreds of latent cancers
- ....but psychological and economic impacts can be massive:
  - Shut down of facilities and businesses
  - Decontamination
- .... and the probability of a dirty bomb attack is unknown