

Spent Nuclear Fuel Transportation Security Concerns

**Robert Halstead
Transportation Advisor
Nevada Agency for Nuclear Projects**

**Blue Ribbon Commission on
America's Nuclear Future
Transportation & Storage Subcommittee Meeting
Washington, DC
September 23, 2010**

Overview

- Focus on radiological sabotage
- National impact of repository shipments
- Cask vulnerability to attack
- Consequences of attacks
- Recent regulatory developments
- Recommendations for managing and reducing risk

Three Decades of Debate

Radiological Sabotage

- 1977 - Sandia: Transportation of Radionuclides in Urban Environs
- 1979 - NRC interim requirements for physical protection
- 1980 - NRC physical protection requirements (10 CFR 73.3)
- 1984 - NRC proposal to modify physical protection requirements
- 1987 - NRC proposed rule “terminated”
- 1999 - PRM 73-10 Nevada petition for rulemaking
- 1999 - DOE Draft EIS for Yucca Mountain
- 2001 - September 11 Terrorist Attacks, NRC guidance to licensees
- 2002 - NRC: DOE shipments exempt from 10 CFR 73.37
- 2008 - DOE Final Supplemental EIS for Yucca Mountain
- 2008 - TSA and PHMSA promulgate rail security rules
- 2009 - NRC CAB admits contentions on sabotage consequences
- 2010 - NRC to develop proposed rule based on SECY-09-0162

Impacts of Storage and Disposal Transportation

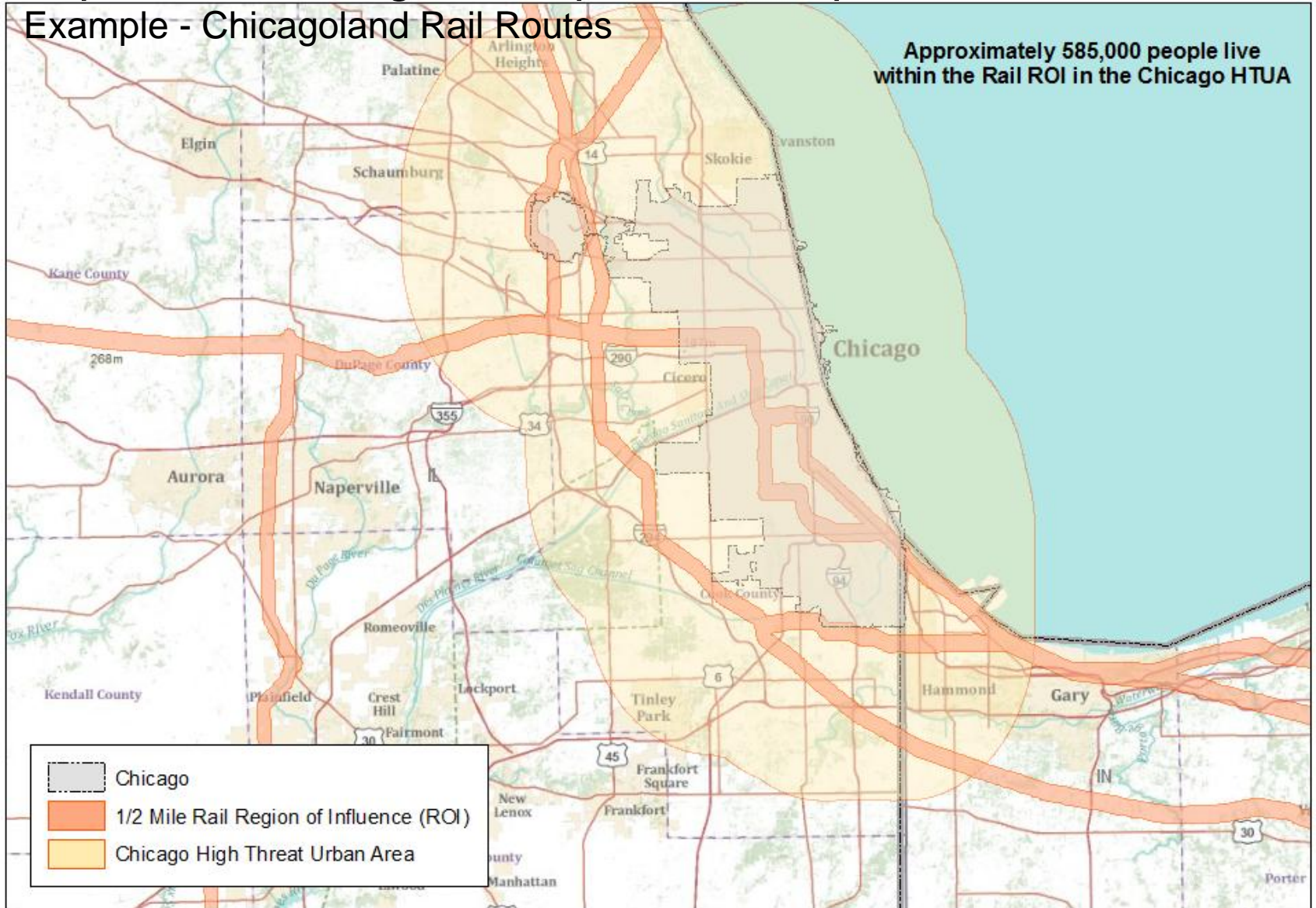
Example – Rail Routes to Yucca Mountain

Would Have Impacted 44 States

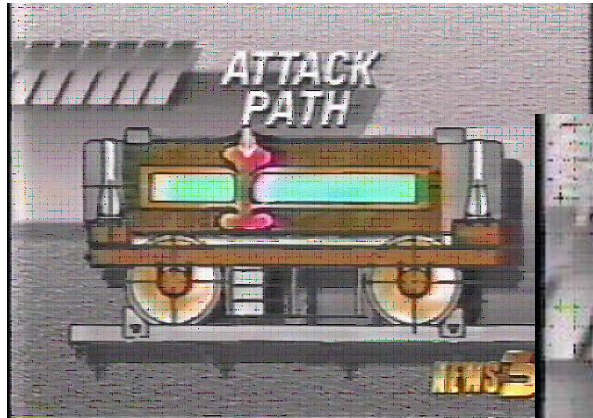


Impacts of Storage & Disposal Transportation

Example - Chicagoland Rail Routes



Truck casks are vulnerable to attack: DOE test, Sandia National Laboratories, 1982



Rail casks are vulnerable to attack: IFCI test, Aberdeen Proving Ground, 1998



DOE Acknowledges Cask Vulnerability to Sabotage

- DOE 2008 SEIS evaluated range of weapons
- DOE estimated consequences of sabotage events in which a high-energy-density device penetrated a rail or truck cask, for urban and rural locations
- Truck cask in urban area: population-dose of 47,000 person-rem and 28 latent cancer fatalities
- Rail cask in urban area: population-dose of 34,000 person-rem and 19 latent cancer fatalities
- No specific estimate of cleanup cost; SEIS implies same cost as for severe transportation accident in which radioactive material was released: “could be in the range of \$300,000 to \$10 billion” [CR-467]

Sabotage Consequences Could Be Significantly Greater

- DOE failed to consider reasonably foreseeable attack scenarios that could completely perforate casks, significantly increasing releases and consequences
- DOE failed to consider reasonably foreseeable attack scenarios that could significantly increase releases and consequences, without fully perforating casks
- DOE failed to specifically assess economic impacts of sabotage events
- DOE failed to assess social impacts
- DOE failed to assess health effects other than latent cancer fatalities

NRC Proposed Rule Would Enhance Physical Protection

- NRC proposed rule (10 CFR 73.37) expected in 2010
- Responds to post 9/11 experience, NRC consequence analyses, and PRM 73-10: “there have been significant changes in the threat environment”
- Addresses PRM 73-10: definition of radiological sabotage, advance route approvals, equal armed escorts in urban and rural areas, planning and coordination
- Major NRC initiatives: Coordination with affected states, continuous monitoring, telecommunications systems, status and event reporting, enhanced response training including use of deadly force, near-site shipments
- Major unresolved Issue: DOE shipments remain exempt

DHS & DOT Rules Protect Urban Areas and Iconic Targets

- DHS (TSA) and DOT (PHMSA) adopted regulations in 2008 to enhance safety and security of rail shipments of hazardous materials, including SNF (49 CFR 172, 179, 209, 1520, 1580)
- Designate 46 High Threat Urban Areas (HTUAs) requiring chain of custody and control procedures
- Require rail route evaluations using 27 risk factors, including proximity to densely populated areas, iconic targets, and places of congregation
- Potential implications for cross-country rail shipments of SNF (For example, rail routes to Yucca Mountain would have impacted 30 HTUAs in 25 states, 20 other major cities, and required coordination among 18 railroads)

Manage and Reduce Risks

- Select sites and design system to minimize numbers of shipments & shipment-miles
- Ship oldest fuel first
- Maximize rail, require dedicated trains
- NRC regulation of all shipments
- Assess TSA-PHMSA regulations
- Require Full-scale testing of casks
- Adopt WIPP transportation protocols
- Human Factors management