Beyond the Mountains: Nuclear Waste Transportation and the Rediscovery of Nevada

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Additional documentation available at
www.state.nv.us/nucwaste/trans.htm
Beyond the Mountains

- Rediscovery of Nevada Recommendations:
  - Routine Radiation
  - Severe Accidents
  - Terrorism and Sabotage
- Rediscovery of Nevada along Caliente Corridor:
  - Physical Geography
  - Native American Interests
  - Ranching Operations
  - Las Vegas
Potential Shipment Scenarios Over 38 Years, 2010-2048

- Mostly Truck: 109,000 Cask-Shipments (about 8 trucks per day)
- Mostly Rail: 22,000 Cask-Shipments (about 10 rail casks and 2 truck casks per week, plus barge or HHT shipments from 24 reactors)
- Current Capabilities: 42,000 Cask-Shipments (about 2 truck casks and 1 rail cask per day, assuming rail spur can be built)
Spent Fuel Transportation Hazards

- Direct SNF exposure deadly for 50+ years
- Each cask contains enormous amount of dangerous radioactive materials
- Routine radiation from casks hazardous to workers and to some members of public
- Cask breach in worst-case accident: 5-4,000+ latent cancer fatalities (LCFs) and $300,000-10 billion+ cleanup costs
- Cask breach in successful terrorist attack: 48-1,800+ LCFs and $10 billion+ cleanup costs
- Shipping casks not tested full-scale
Nevada Recommendations
Routine Radiation Impacts

• Reassess doses
• Use more conservative dose conversion factors for LCFs
• Consider health effects other than LCFs
• Adopt ALARA system-wide before cask procurement
• Ship oldest fuel first (OFF)
• Assess unique local conditions along Nevada potential routes
Nevada Recommendations
Comprehensive Risk Management

• Comprehensive risk assessment (CRA) should cover all transportation system phases, events, and consequences (Golding and White, 1990)
• CRA calculates probabilities only where existing data, theories, and models are sufficient to support use of rigorous quantitative methods, and uses sensitivity analysis to illustrate impact of differing assumptions and variations in quality of data
• CRA should be used as working risk management tool throughout life of project, with ongoing public participation
• CRA should be basis of risk communication throughout life of the project
Nevada Recommendations
Preferred Transportation System

• Dual purpose casks for at-reactor storage and transport
• Ship oldest fuel first (at least 20 years at-reactor cooling)
• Maximum use of rail (mode of choice)
• Mandatory use of dedicated trains, special safety protocols, and special car designs as recommended by AAR
• Early DOE and carrier identification of preferred cross-country mainline routes in consultation with stakeholders
• Early involvement of corridor states and Indian Tribes, including financial assistance under Section 180(c)
Nevada Recommendations
Full-Scale Physical Testing of Casks

• Meaningful stakeholder role in development of testing protocols & selection of test facilities and personnel
• Full-scale physical testing (sequential drop, puncture, fire, and immersion) prior to NRC certification
• Additional testing (casks, components, models) and computer simulations to determine performance in extra-regulatory accidents and to determine failure thresholds
• Reevaluate Modal Study findings, and if appropriate, revise NRC cask performance standards
• Evaluate costs and benefits of-destructive testing of a randomly-selected production model cask
Nevada Recommendations
Accident Prevention & Emergency Response

• Maximize use of regional organizations such as Western Governors Association (WGA) and Western Interstate Energy Board (WIEB) for planning, implementation, and program evaluation
• Coordinate with Indian Tribes and local governments
• Develop comprehensive safety program modeled after WGA-State-DOE WIPP Transportation Program
• Adopt WIEB Sept., 1994 proposal for evaluation and final designation of preferred shipping routes
• Implement Section 180(c) Financial Assistance to State, local, & tribal governments through rulemaking
• Revise DOE Plan for Privatization of Transportation Services to emphasize safety and public acceptance
Nevada Petition for Rulemaking (1999)
Amend Safeguards Regulations

- Design Basis Threat - 10 CFR 73.1(a)(1)
- Definition of “Radiological Sabotage” – 10 CFR 73.2
- Advance Approval of Routes – 10 CFR 73.37(b)(7)
- Planning and Scheduling - 10 CFR 73.37(b)(7)
- Escort Requirements: Road - 10 CFR 73.37(c)
- Escort Requirements: Rail - 10 CFR 73.37(d)
- New Provision to Require Use of Dedicated Trains for All Rail Shipments – 10 CFR 73.37(d)
Nevada Petition for Rulemaking (1999)
Terrorism Risk Assessment

• Assess attacks against transportation infrastructure used during nuclear waste shipments
• Assess attacks involving capture of a nuclear waste shipment and use of explosives against a cask or casks
• Assess direct attacks upon a nuclear waste shipping cask or casks using anti-tank missiles or other military weapons
Nevada Recommendations
Terrorism Risk Assessment Post 9/11

• Assume use of multiple weapons and/or combinations of weapons designed to maximize release and dispersal
• Assume coordinated use of hijacked vehicles
• Assume larger groups and/or suicide attacks
• Consider terrorist infiltration of transport companies (“active insider” scenario)
• Consider attacks at locations with highly symbolic social, political, or economic value
• Assess standard socioeconomic impacts
• Assess perceived risk and stigma impacts
• Assess impacts on first responders
Yucca Mountain Rail Issues

• Currently no rail access to Yucca Mountain
• Heavy Haul Truck (HHT) options infeasible
• DOE FEIS identified 5 rail options
• DOE preference for Caliente, secondary preference for Carlin (FR, December 29, 2004)
• Caliente & Carlin options would be longest new rail construction in US since 1930s, cost >$1 billion
• Significant environmental challenges & conflicts with ranching, mining, recreation, and Native American lands & cultural resources
Potential Nevada Rail Routes to Yucca Mt
US93 Leaving Caliente
US93: 9-Mile Ascent to Summit
Bennett Pass
(Caliente Rail Route)
Timber Mountain Pass
(Caliente Rail Route)
Queen City Summit
(Caliente Rail Route)
Warm Springs
(Caliente Rail Route)
Beowawe - Crescent Valley
(Carlin Rail Route)
Southern Crescent Valley
(Carlin Rail Route)
Native American Concerns

- DOE & BIA failure to formally recognize affected tribe status and provide financial and technical assistance
- Protection of religious and cultural sites, and plants and animals, both on and off reservations
- Implications of rail spur right-of-way acquisition for Western Shoshone land claims (Ruby Valley Treaty)
- Cultural implications of possible radiological contamination and cleanup activities on tribal lands
- Stigma impacts on tribal businesses
- Tribal authority to regulate shipments across reservation lands, including pre-notification and monitoring
- Tribal roles in emergency response planning and training
Western Shoshone Land Claims
(Caliente Rail Route)
Coal Valley and Golden Gate
(Caliente Rail Route)
Oasis Valley
(Caliente Rail Route)
Union Pacific RR – Las Vegas
(Looking West from Stratosphere)
Western Rail Routes
Biological Resources
Biological Resources
Military Aircraft Over-flights