Yucca Mountain Transportation: Critical Issues

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Yucca Mountain Transportation Critical Issues

- Spent Fuel Transportation Hazards
- Risk Management Recommendations
- Rail Access to Yucca Mountain
- Highway Access to Yucca Mountain
- Potential Shipment Scenarios
- Potential Cross-Country Routes

Additional documentation available at www.state.nv.us/nucwaste/trans.htm
Fresh Fuel Assemblies
Spent Fuel Storage Pool
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

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
Rail Access is Desirable

- **Truck Shipments (Most Rail Scenario)**
  - Rail: 3,122
  - Truck: 3,122
  - Proposed Action: 1,079

- **Rail Shipments (Most Rail Scenario)**
  - Rail: 9,646
  - Truck: 18,243

- **Truck Shipments (Most Truck Scenario)**
  - Rail: 355
  - Truck: 300

- **Rail Shipments (Most Truck Scenario)**
  - Rail: 300
Yucca Mountain Rail Issues

- Currently no rail access to Yucca Mountain
- 3 DOE rail options infeasible (land use conflicts)
- Caliente & Carlin options would be longest new rail construction in US since 1930s
- Construction cost could exceed $1 billion
- Significant environmental challenges & conflicts with ranching, mining, recreation, and Native American lands & cultural resources
- Caliente option impacts City of Las Vegas
- Heavy Haul Truck (HHT) options infeasible
Potential Nevada Rail Routes to Yucca Mt

- Carlin
- Caliente
- Chalk Mountain
- Valley
- Jean/Sloan

Yucca Mountain
Valley Corridor Land Use Conflicts

Sheep Mountains

Proposed Valley Rail Siding

Map Layers
- Indian Reservation
- 2002 Disposal Boundary
- Valley Rail
- Valley Railroad
- Highway
- Interstate Highway

Miles
0 1 2 3
Caliente Chalk-Mountain Land Use Conflicts

Map Layers
- Indian Reservation
- Valley Rail
- Valley Railroad
- Yucca Mt Controlled Area

Caliente
Carlin
Yucca Mt
Chalk Mt
Nellis Range
Endangered Species
Bennett Pass
(Caliente Rail Route)
Timber Mountain Pass
(Caliente Rail Route)
Beowawe - Crescent Valley
(Carlin Rail Route)
Southern Crescent Valley
(Carlin Rail Route)
Union Pacific RR – Las Vegas
(Looking West from Stratosphere)
Heavy Haul Truck Rig for Use With Yucca Mountain Shipments
Rail Access Summary

- Direct rail access to national rail network is highly desirable for repository site
- Yucca Mountain site lacks rail access
- DOE has not demonstrated feasibility of any of the 5 rail access options identified in the FEIS
- Alternative to rail spur, HHT delivery from intermodal transfer station, probably not feasible
- Rail shipments through downtown Las Vegas will be a major issue in any future DOE transportation planning activities
Legal-Weight Truck Access

DOE FEIS Proposed Truck Routes

Approximately 45,919 shipments over 24 years under the mostly legal-weight truck scenario

Approximately 6,667 shipments over 24 years under the mostly legal-weight truck scenario
NDOT B ROUTE
I-80/US93A: West Wendover
NDOT B ROUTE
US6: Murry Summit
POSSIBLE LWT/HHT ROUTE

US93: 9-Mile Ascent to Summit
POSSIBLE LWT/HHT ROUTE
SR375: Crystal Springs
POSSIBLE LWT/HHT ROUTE

SR375: Hancock Summit
POSSIBLE LWT/HHT ROUTE

SR375: Rachel
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)
Most Likely Highway Routes to Yucca Mountain
Most Likely Rail Routes to Yucca Mountain
Affected Jurisdictions & Populations Along Yucca Mountain Routes

- Truck and rail routes could traverse 45 states, 700 counties, and 50 Indian Reservations
- More than 120 million people live in counties traversed by truck routes
- More than 100 million people live in counties traversed by rail routes
- More than 11 million people live within one-half mile (800 meters) of a potential highway route

Source: Dilger & Halstead, Many Roads to Travel, WM’03, February 2003