

What's Wrong With Yucca Mountain

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Sierra Nevada Forum

October 10, 2017

Carson City, Nevada

Documentation at <http://www.state.nv.us/nucwaste/>

What Should Be Done With Nuclear Waste?

- Walk away from Yucca Mountain
- Restructure nuclear waste program as recommended by BRC (2012)*
- Implement BRC recommendations about generic repository performance standards and repository consent-based siting
- Address stakeholder concerns about at-reactor storage
- Implement NAS (2006)** and BRC transportation recommendations
- Implement BRC recommendations about consolidated interim storage

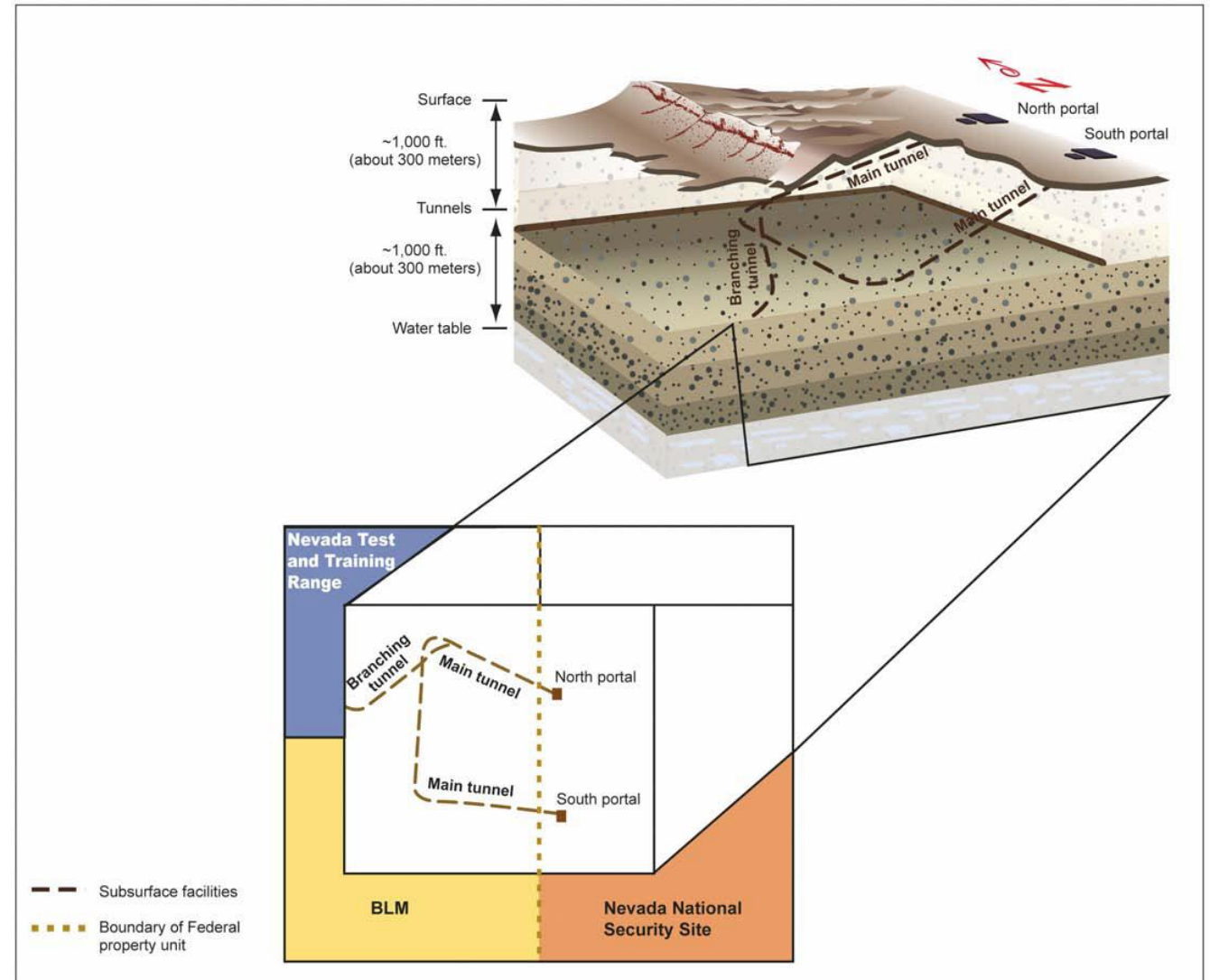
*Available on-line at: <https://energy.gov/ne/downloads/blue-ribbon-commission-americas-nuclear-future-report-secretary-energy>

** Free download available at: <https://www.nap.edu/read/11538/chapter/1>

What Exists Today at Yucca Mountain

Only 5-Mile Exploratory Tunnel that cannot be used for storage or disposal

- No waste disposal tunnels (Over 40 miles needed)
- No waste handling facilities
- No state water permit
- No construction authorization
- No railroad
- Expired BLM land withdrawal

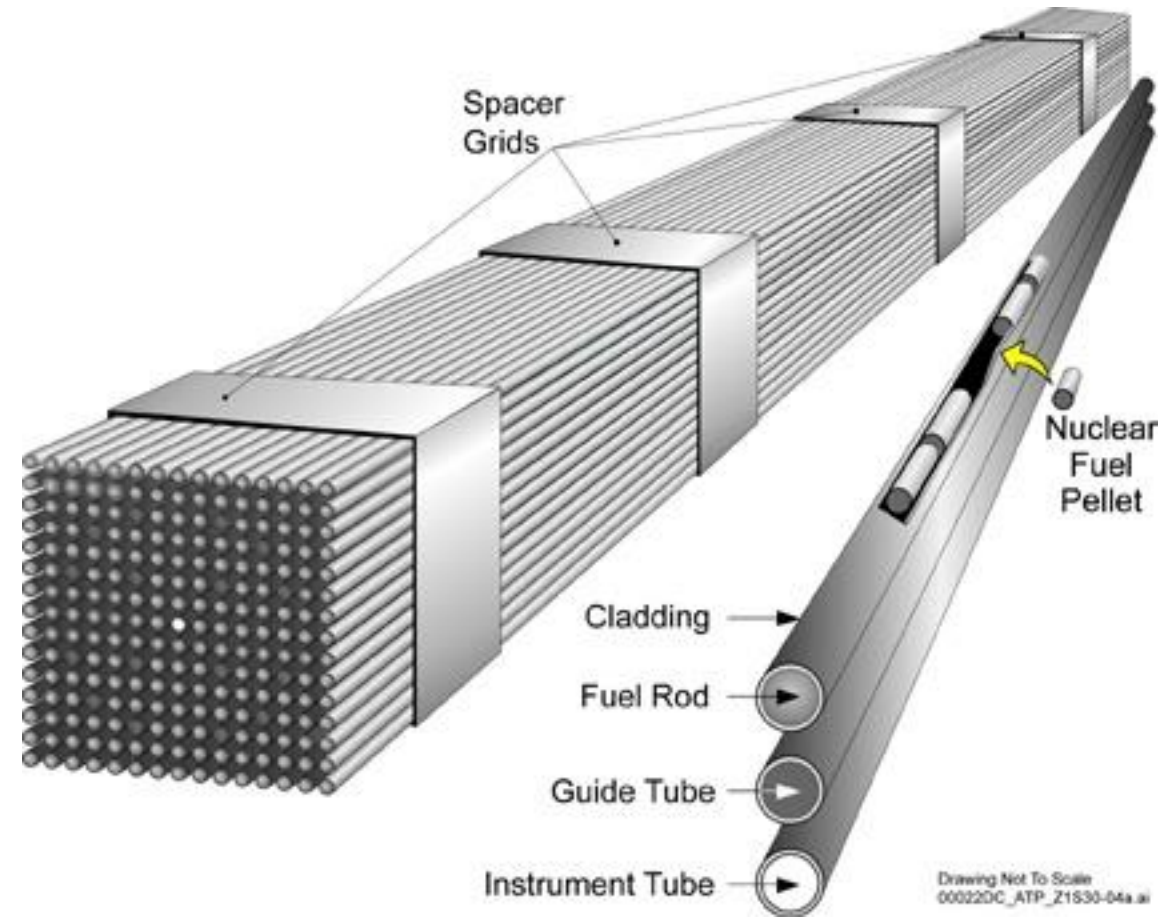


Nevada Opposition to Yucca Mountain

- Governor Brian Sandoval
- Commission on Nuclear Projects
- Attorney General Adam Paul Laxalt
- Secretary of State Barbara Cegavske
- Congressional Delegation
- Mayor of Las Vegas, Las Vegas City Council, Clark County Commission
- Majority and Minority Leaders of the Legislature
- AJR 10 Resolution of Opposition: Assembly 32-6-4; Senate 19-2
- Nevada Opinion Polls (2010, 2017): Oppose – 58%; Favor – 33%

Nuclear Fuel Assembly

(Commercial spent fuel would be 90% of 70,000 MTHM repository limit)



Spent Fuel Radiological Hazards Decline Over Decades

Age (years)	Activity (curies/assembly)	Surface Dose Rate (rem/hr)	Lethal Exposure (time to 450 rem)
1	2,500,000	234,000	7 seconds
5	600,000	46,800	35 seconds
10	400,000	23,400	70 seconds
50	100,000	8,640	188 seconds
100	50,000	2,150	750 seconds

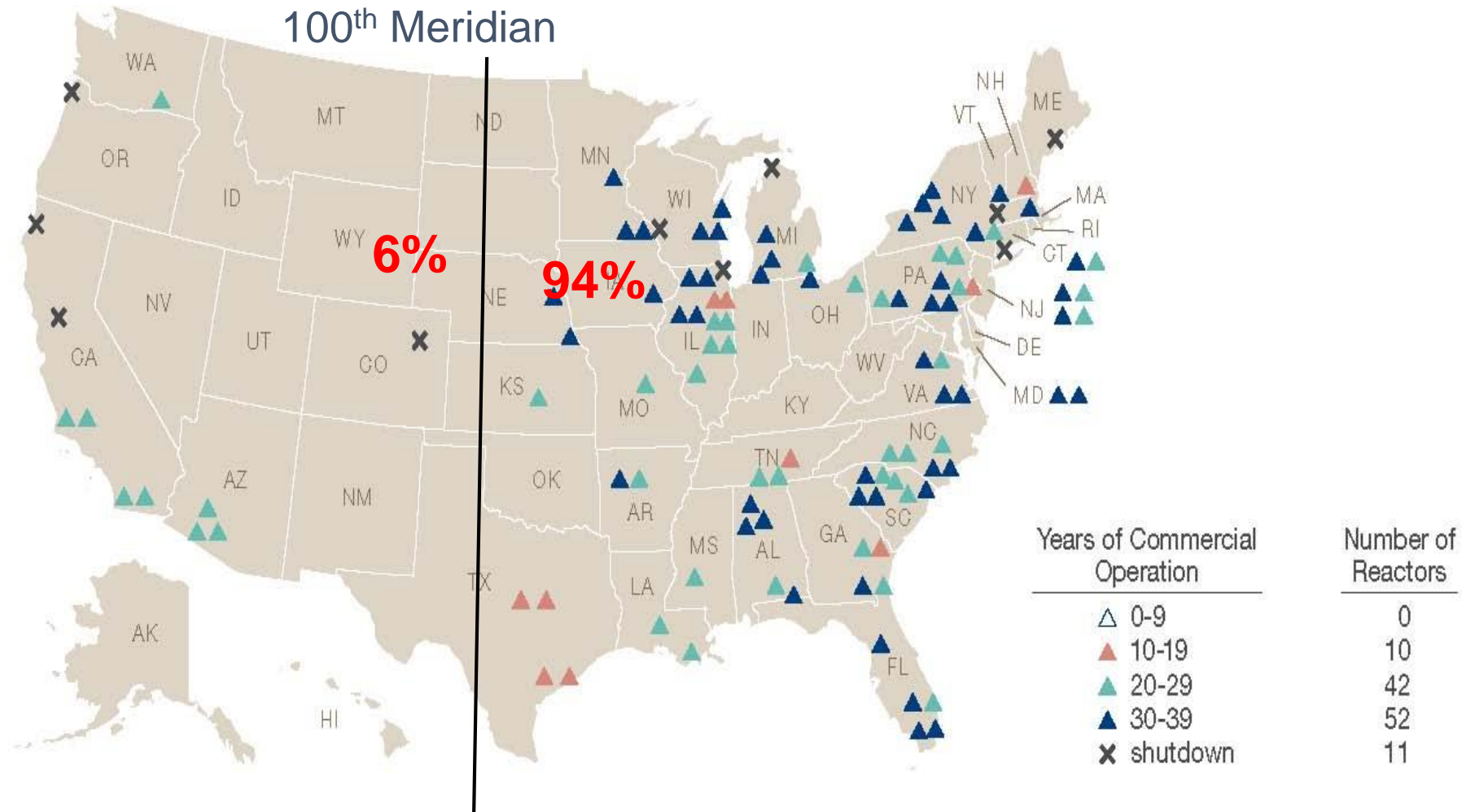
Source: Waste Confidence Rulemaking, DOE/NE-0007 (April 15, 1980) Table II-4, p. II-56; NRC Glossary, <http://www.nrc.gov/reading-rm/basic-ref/glossary/lethal-dose-ld.html>

Spent Fuel Removed from Reactors and Stored On-site is Highly Radioactive and Thermally Hot

Pool storage at reactors usually needed for 5-10 years, regulated by NRC

Dry Cask storage at reactors has been approved by NRC for up to 160 years

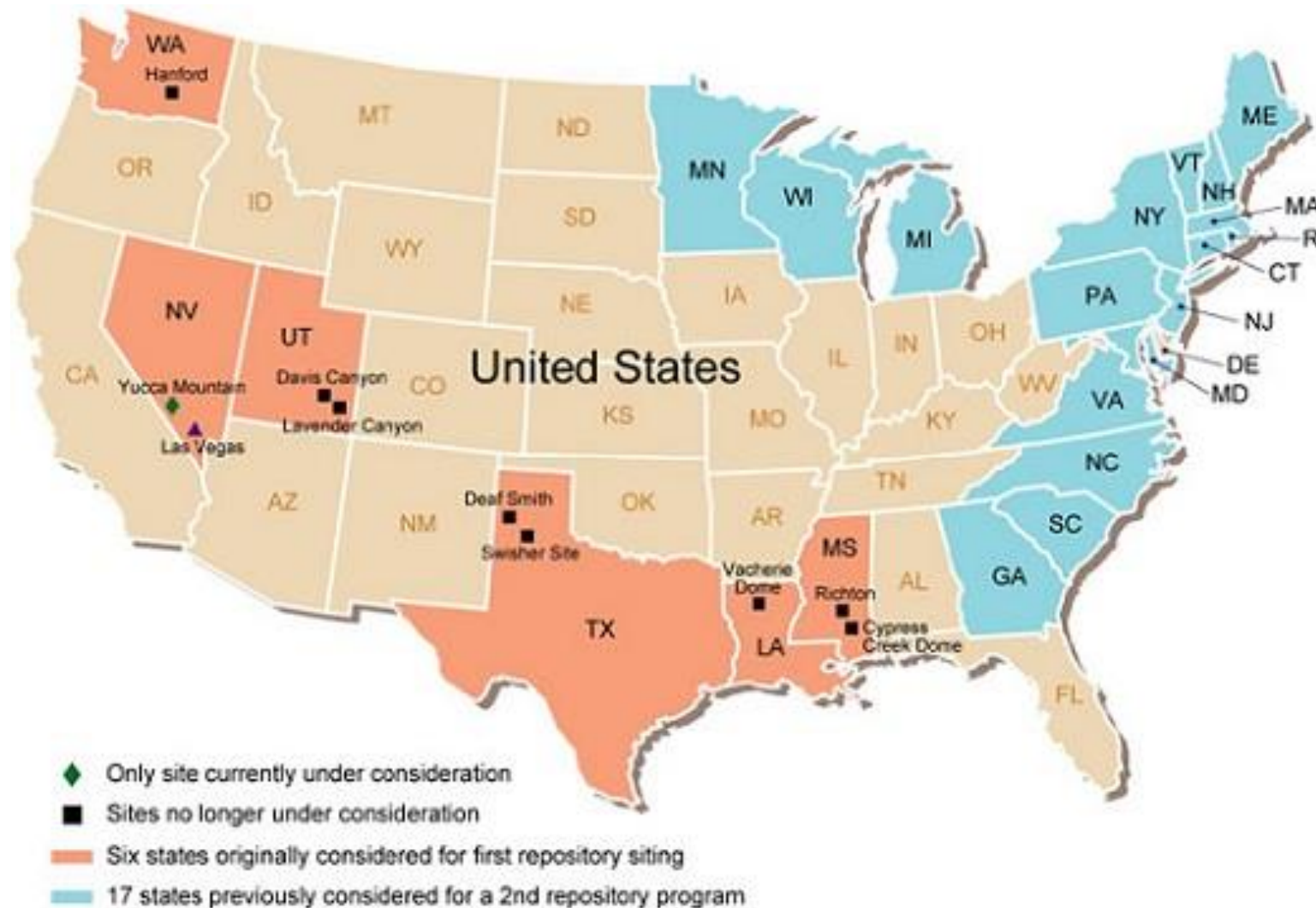




SNF in Storage: East-West Distribution (2012)

Repository Sites Considered 1982 NWPA

All Except Nevada Eliminated by 1987 NWPA Amendments



Nuclear Waste Policy Amendments Act, 1987

- NWPAA enacted Dec. 22, 1987 (100th Congress, first session, last day) made Yucca Mountain sole candidate site for first repository
- Five states that “got off the hook” for first repository were represented by powerful congressional leaders (LA: Sen. J. Bennett Johnston (1972), Chairman, Energy and Natural Resources Committee; MS: Sen. Speaker Protemp John Stennis (1947) & House Minority Whip Trent Lott (1972); TX: Sen. Lloyd Bentsen (1970), Chairman, Finance, & Speaker of the House Jim Wright (1954); UT: Senior Republican Senators Jake Garn (1974) & Orrin Hatch (1976) WA: House Majority Leader Tom Foley (1964) & Sen. Brock Adams (1986) (former cabinet member)
- Seventeen States Considered for Second Repository led by Wisconsin (Sen. William Proxmire (1957), Chairman, Banking, Housing and Urban Affairs, Rep. Les Aspin (1970), Chairman, Armed Services Rep. Dave Obey (1969), Appropriations)
- Nevada lacked powerful voice in Congress (Sen. Chic Hecht elected 1982, replaced four-term incumbent Howard Cannon; Sen. Reid elected 1986, replaced two-term incumbent Paul Laxalt; Rep. Barbara Vucanovich elected 1982; Rep. James Bilbray elected 1986)
- Twenty Two Potential Repository States Play the NIMBY Card and Sustain State of Tennessee Veto of DOE Interim Storage Facility (MRS) at Oak Ridge

Yucca Mountain Repository Time Frames

- **Transportation, 50 Years or more**

- Construction of railroad
- Shipment of 9,495 rail casks (2,800 trains) & 2,650 truck casks
- If No 2nd Repository: 21,909 rail casks (about 6,700 trains) & 5,025 truck casks
- Concerns include accidents, sabotage, disruption of shipments by natural events

- **Preclosure Operations, 100 Years or more**

- Construction of surface facilities, underground tunnels and drifts
- Emplacement of 11,200 waste packages, and 11,500 drip shields (90 years later)
- If No 2nd Repository: 25,900 waste packages and 26,200 drip shields
- Concerns include human factors, military aircraft crashes into surface facilities, earthquake induced accidents in surface facilities and rock falls in drifts

- **Postclosure Performance, One Million Years**

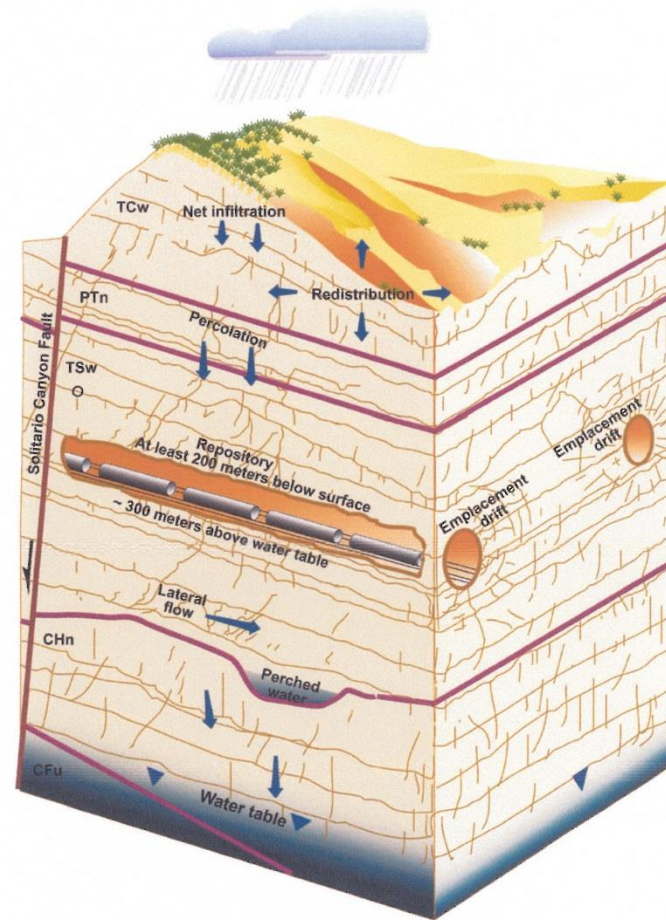
- Repository closure, surface restoration, monitoring, and retrieval of waste if necessary
- Concerns include groundwater contamination, human intrusion, erosion, volcanism

If Yucca Mountain Licensing Resumes...

- State of Nevada plans to fully adjudicate 218 admitted contentions in opposition to DOE license application (LA) and submit 30-50 new contentions based on new information and NRC EIS Supplement
- Nevada estimates over 400 hearing days would be needed to adjudicate 250 contentions, plus time for discovery, motions and appeals, so legally mandated proceeding could require 4-5 years, and cost DOE \$1.66 billion, NRC \$330 million, Nevada \$50 million
- Nevada contentions challenge all aspects of DOE LA and EISs – Postclosure Safety, Preclosure Safety, NEPA Transportation

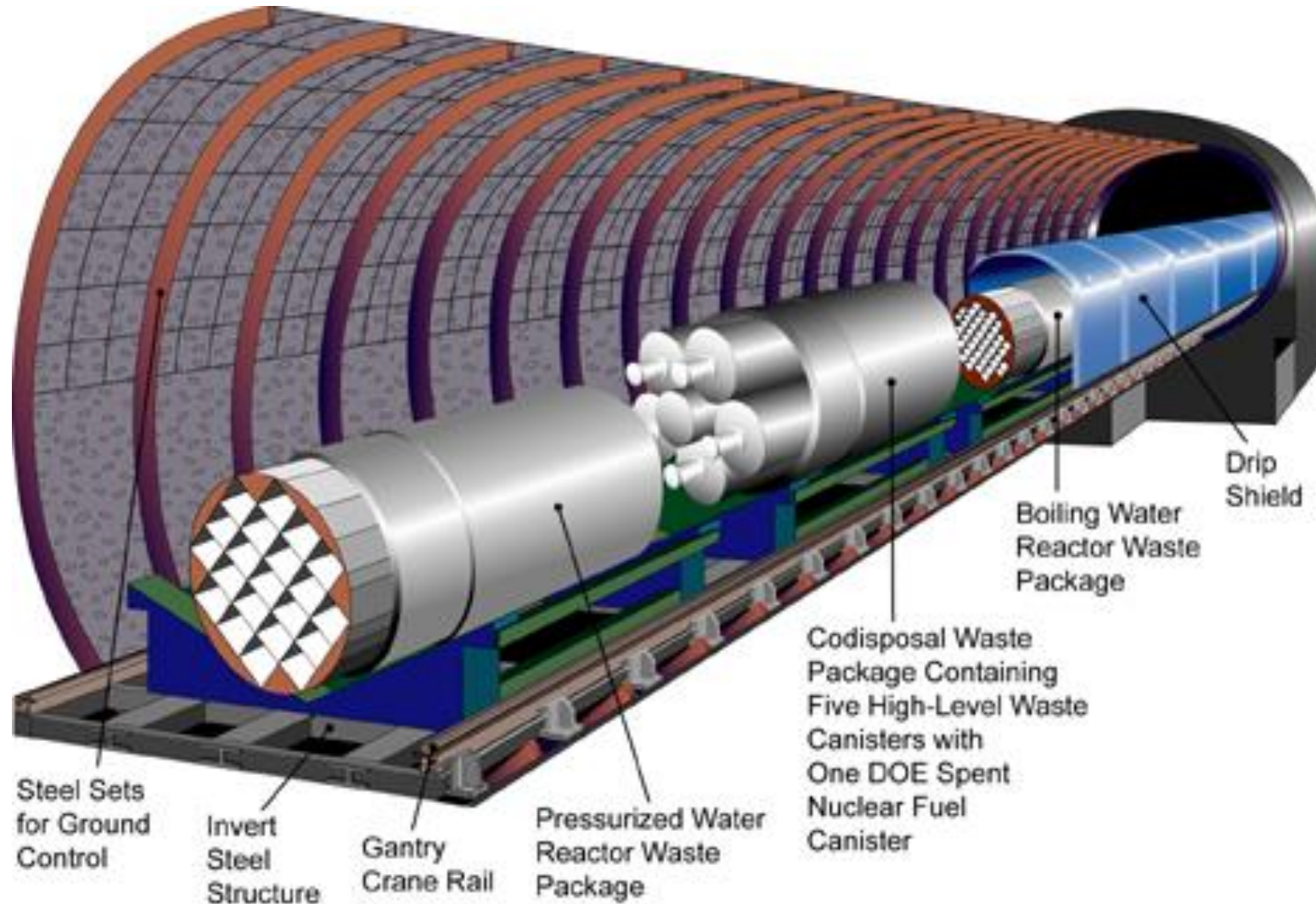
Contentions Challenge Site Suitability

Fractured rock, oxidizing groundwater, above water table

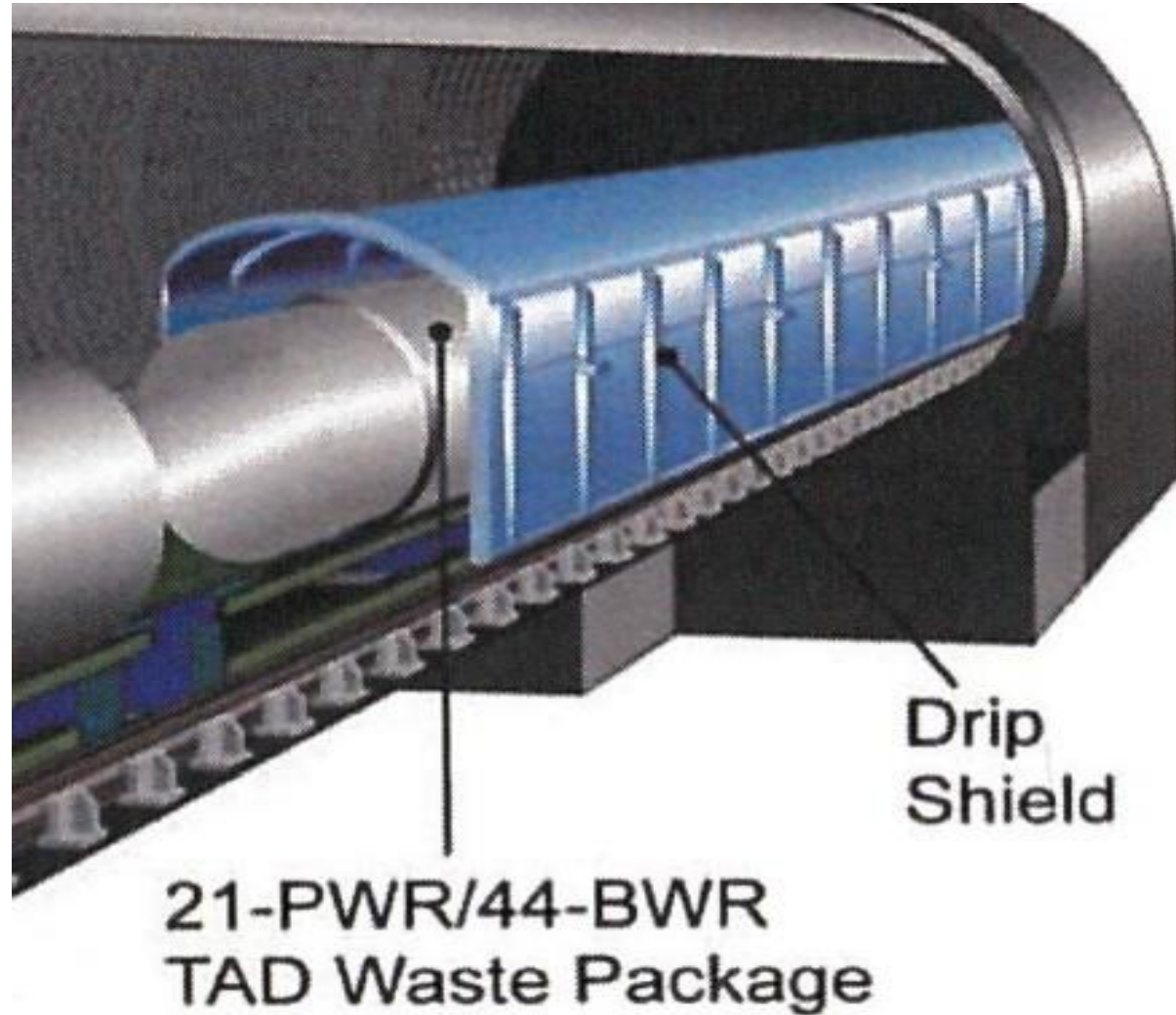


Contentions Challenge Disposal Concept

Titanium Drip Shields over Each Waste Package



Drip Shields Installed (as Proposed by DOE)



Contentions Challenge Hot Repository Concept

Drifts will remain above water boiling point for about 1,000 years

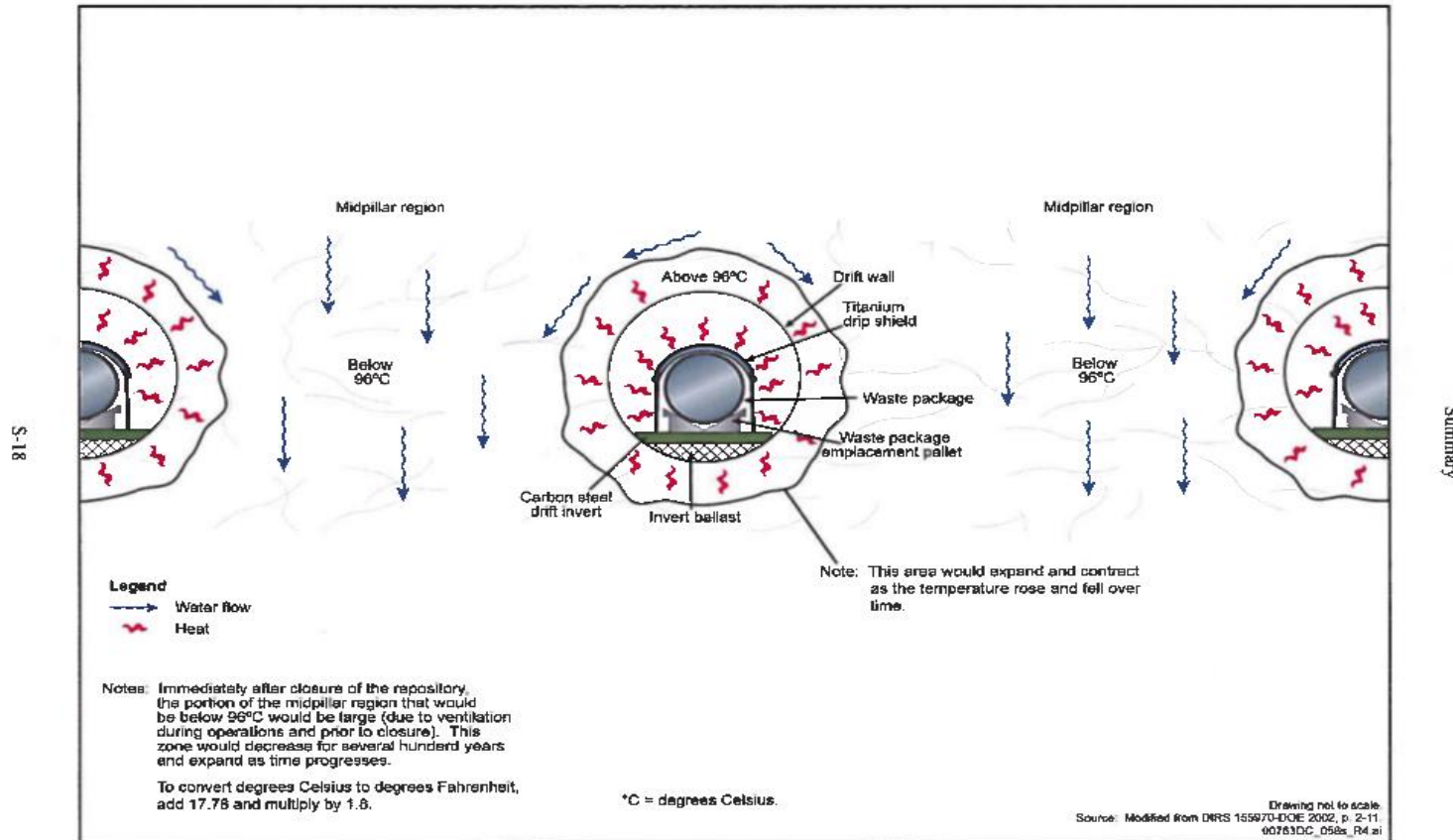
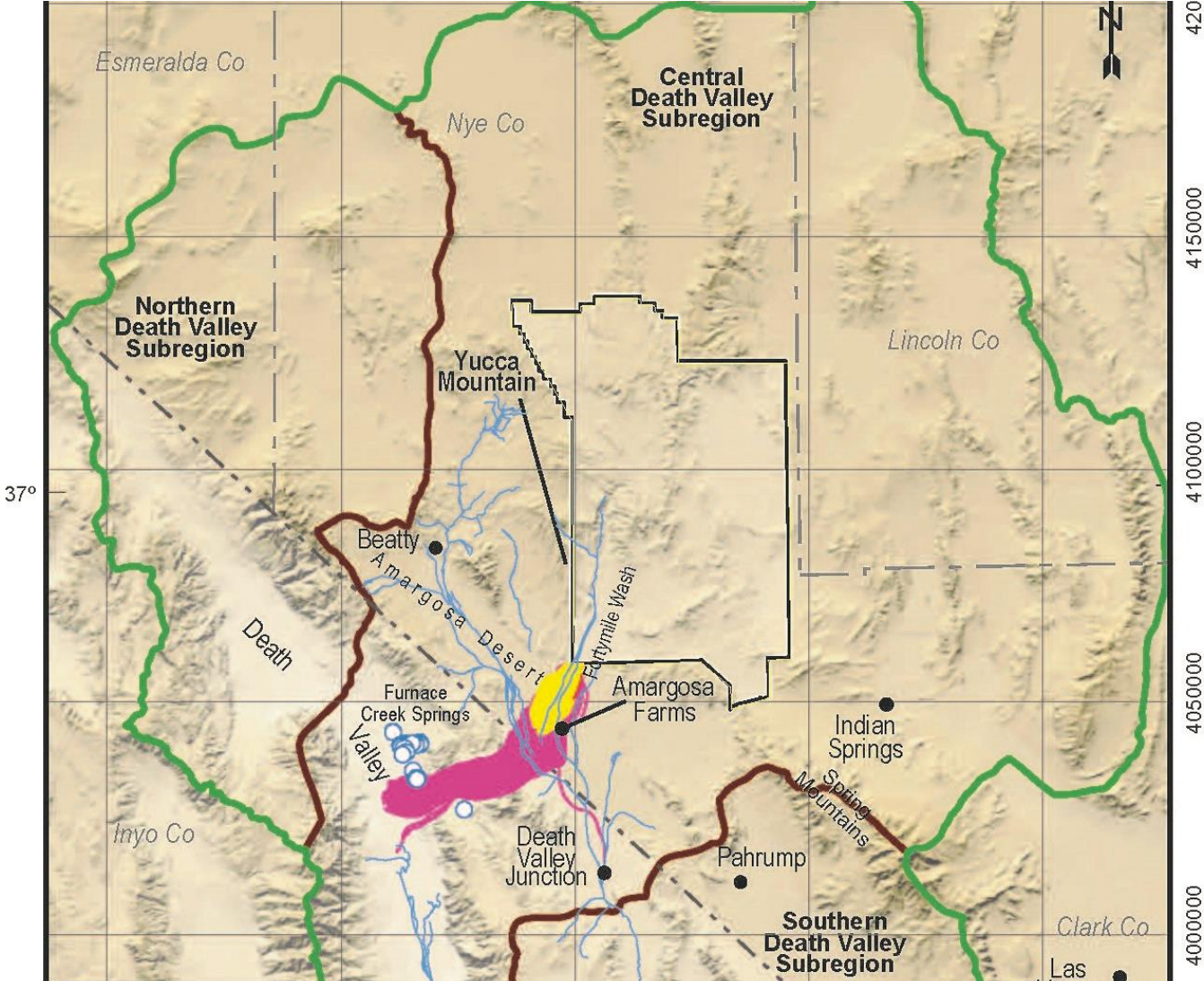


Figure S-8. Management of waste package emplacement using thermal energy density (artist's concept).

New Contentions Challenge Groundwater and Native American Cultural Impacts (NRC EIS Supplement NUREG-2184)

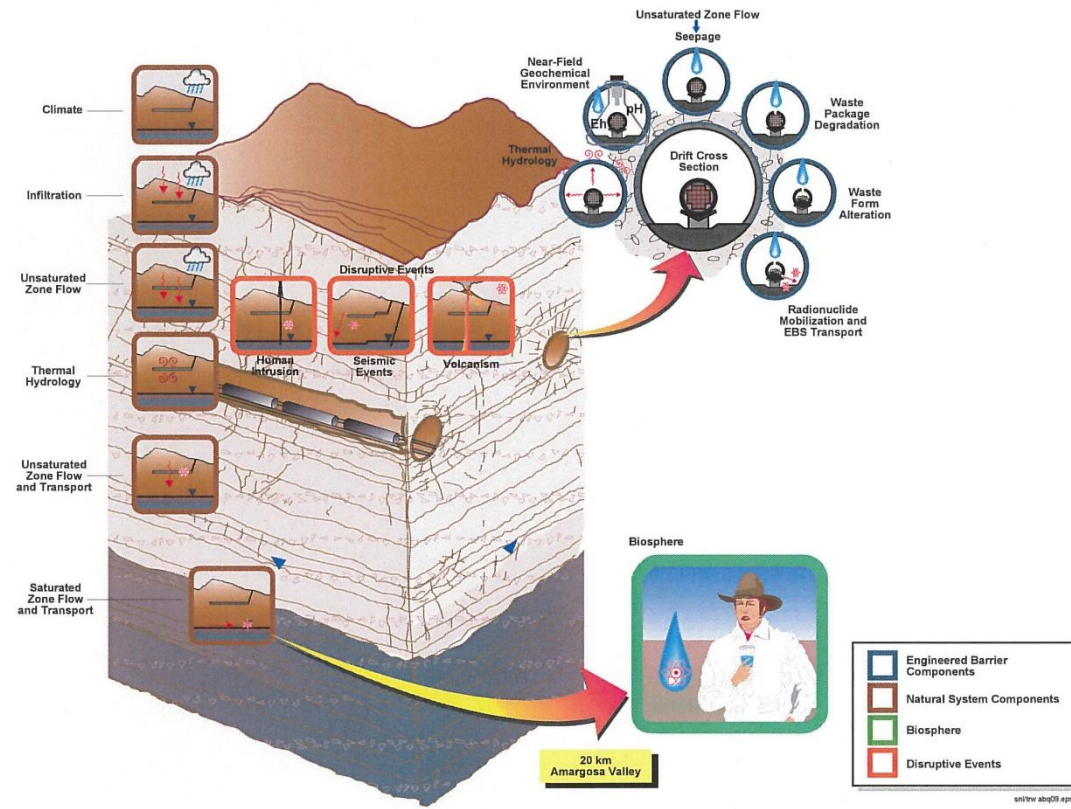
Figure 2-5, Groundwater Flow Paths for Contaminants for the Pumping (Yellow) and No Pumping (Fuchsia) Analysis Cases

-  Death Valley Regional Groundwater Flow System Model Boundary
-  NNSS Boundary
-  Populated Area
-  River Channels
-  State Boundary
-  County Boundary
-  Subregion Boundary
-  Groundwater Flow Paths for Contaminants for the No-Pumping Analysis Case
-  Groundwater Flow Paths for Contaminants for the Pumping Analysis Case
-  Regional Springs



Nevada Challenges DOE Compliance with EPA Groundwater Radiation Protection Standard Total System Performance Assessment (TSPA)

TSPA Model Components



Yucca Mountain Shipments (New Casks) Compared to Past Shipments

- 43 Times More SNF Shipped Per Year
- 8 - 38 Times More Casks Per Year
- 5 - 40 Times More Shipments Per Year
- 443% Increase In Average Rail Miles
- 280% Increase In Average Truck Miles
- Western Route Conditions
- Potential Heavy Haul Trucks and Barges

Source: Halstead & Dilger, "How Many Did You Say? Historical and Projected Spent Nuclear Fuel Shipments in the United States, 1964-2048," Waste Management'03 Conference, February 25, 2003, Tucson, AZ

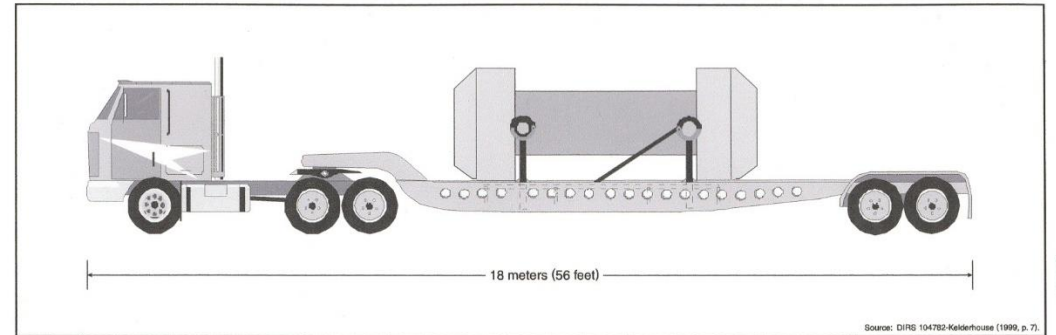


Figure J-3. Artist's conception of a truck cask on a legal-weight tractor-trailer truck.

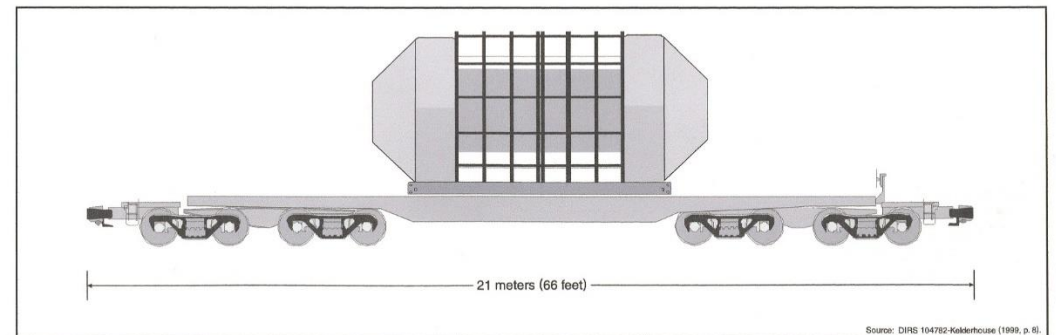
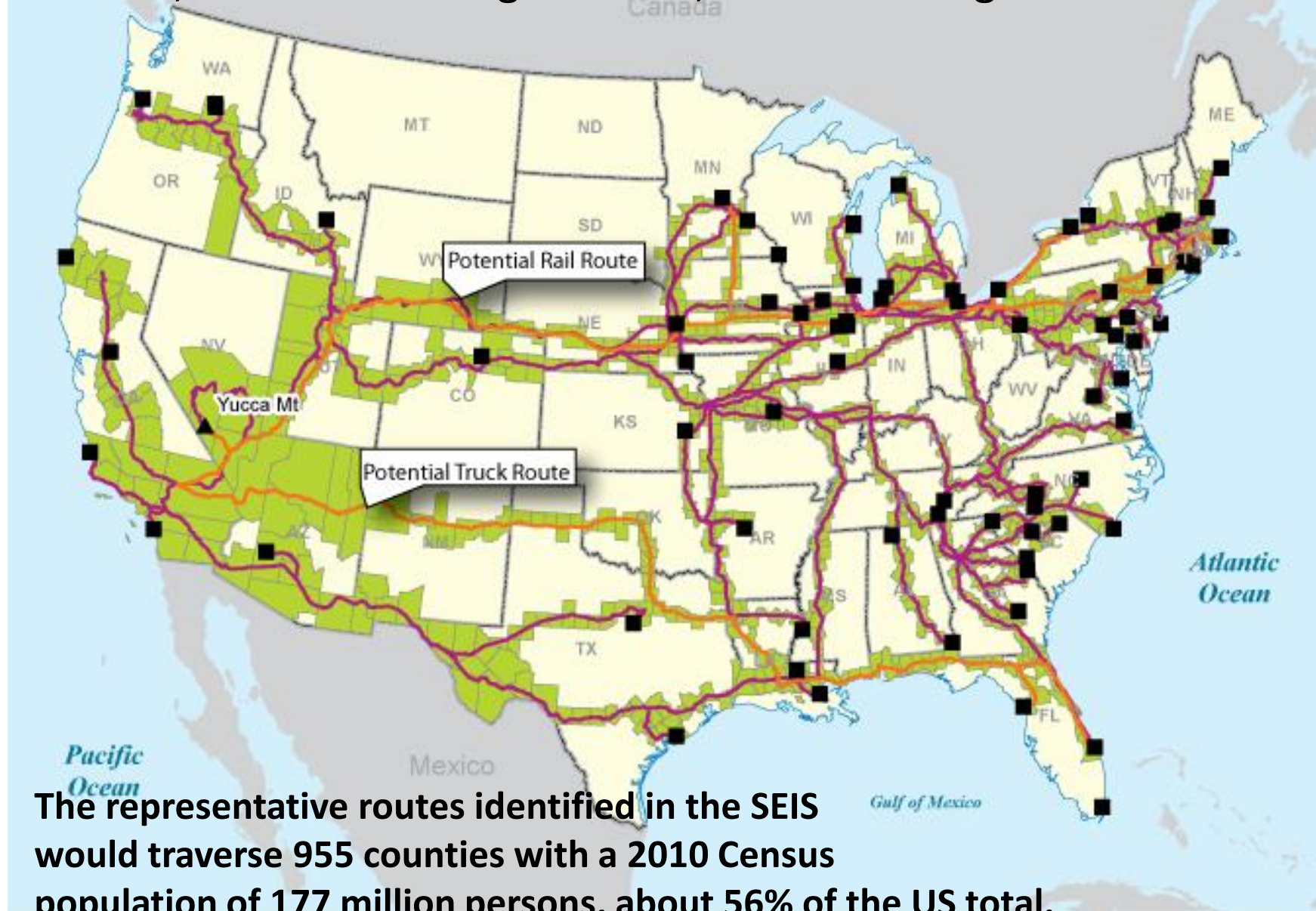


Figure J-4. Artist's conception of a large rail cask on a railcar.

Contentions Challenge National Transportation Impacts

Rail/Truck Modal Mix, Use of Overweight Trucks, & Rail Routing



The representative routes identified in the SEIS would traverse 955 counties with a 2010 Census population of 177 million persons, about 56% of the US total.

Contentions Challenge Impacts of Transportation Accidents (Long-Duration, High-Temperature Fires)

MacArthur Maze - 2007

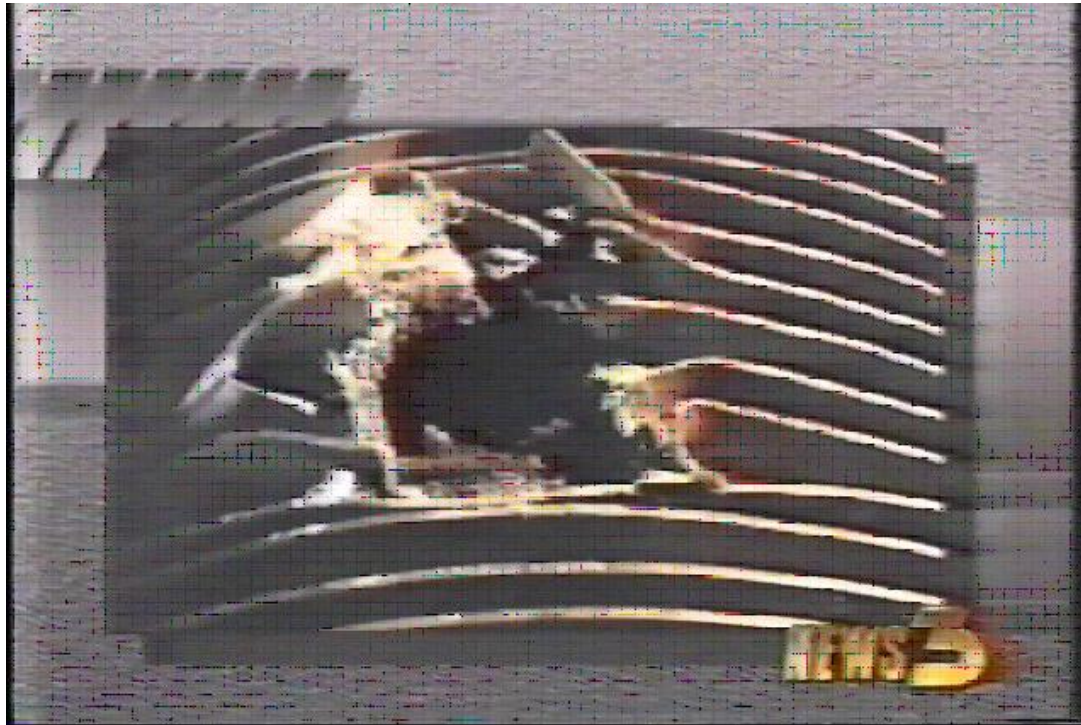


Baltimore Rail Tunnel - 2001



Contentions Challenge Impacts of Transportation Radiological Sabotage (Terrorist Attacks)

Truck Cask Test, 1982



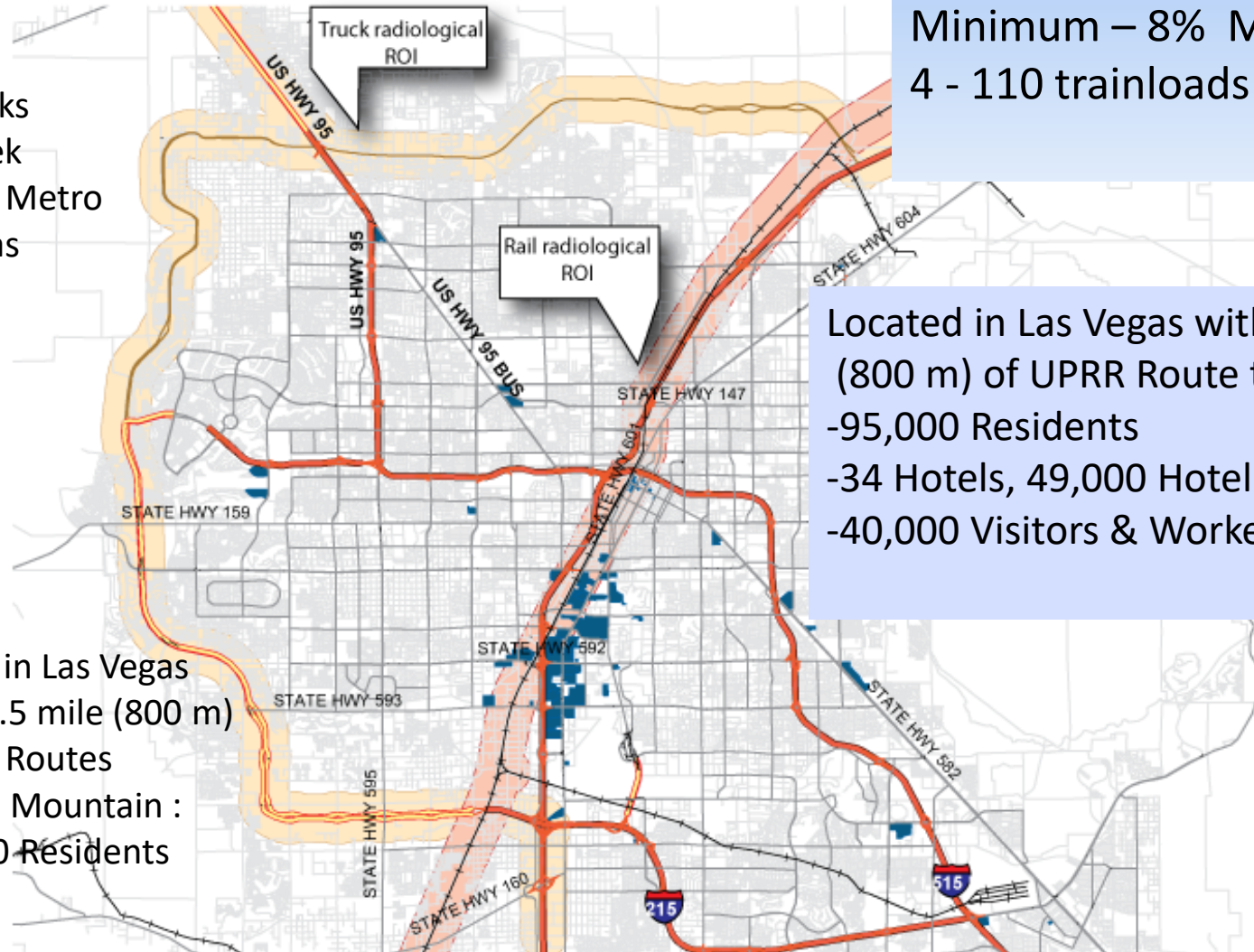
Rail Cask Test, 1998



Contentions Challenge Las Vegas Impacts

1-2 Trucks
per Week
through Metro
Las Vegas

Located in Las Vegas
within 0.5 mile (800 m)
of Truck Routes
to Yucca Mountain :
-113,000 Residents



Rail Casks through Las Vegas
to Yucca Mountain via Caliente
Minimum – 8% Maximum – 79%
4 - 110 trainloads per year

Located in Las Vegas within 0.5 mile
(800 m) of UPRR Route to Caliente :
-95,000 Residents
-34 Hotels, 49,000 Hotel Rooms
-40,000 Visitors & Workers



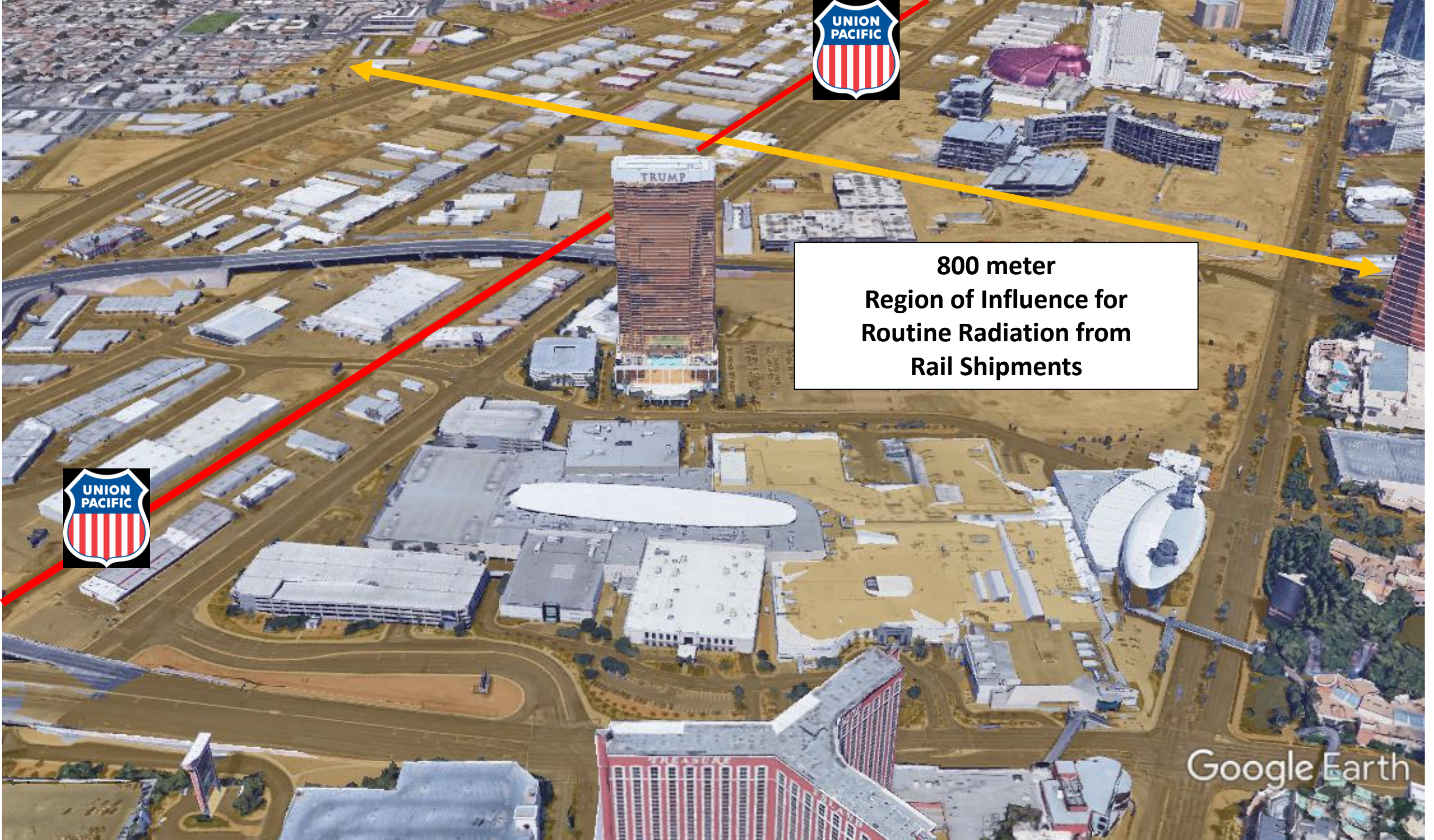
**800 meter
Region of Influence for
Routine Radiation from
Rail and Truck Shipments**

Las Vegas Strip

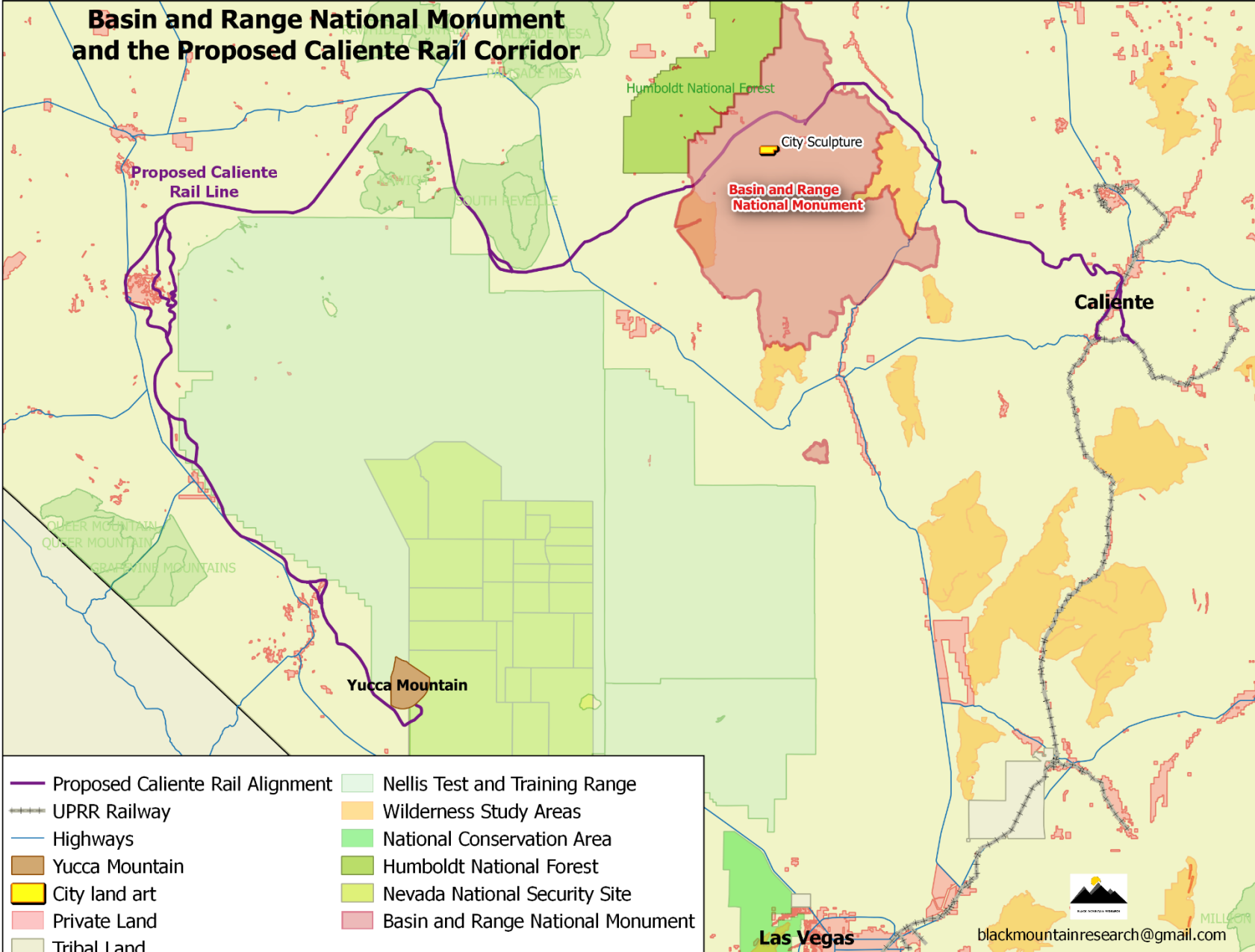


**800 meter
Region of Influence for
Routine Radiation from
Rail Shipments**

Google Earth

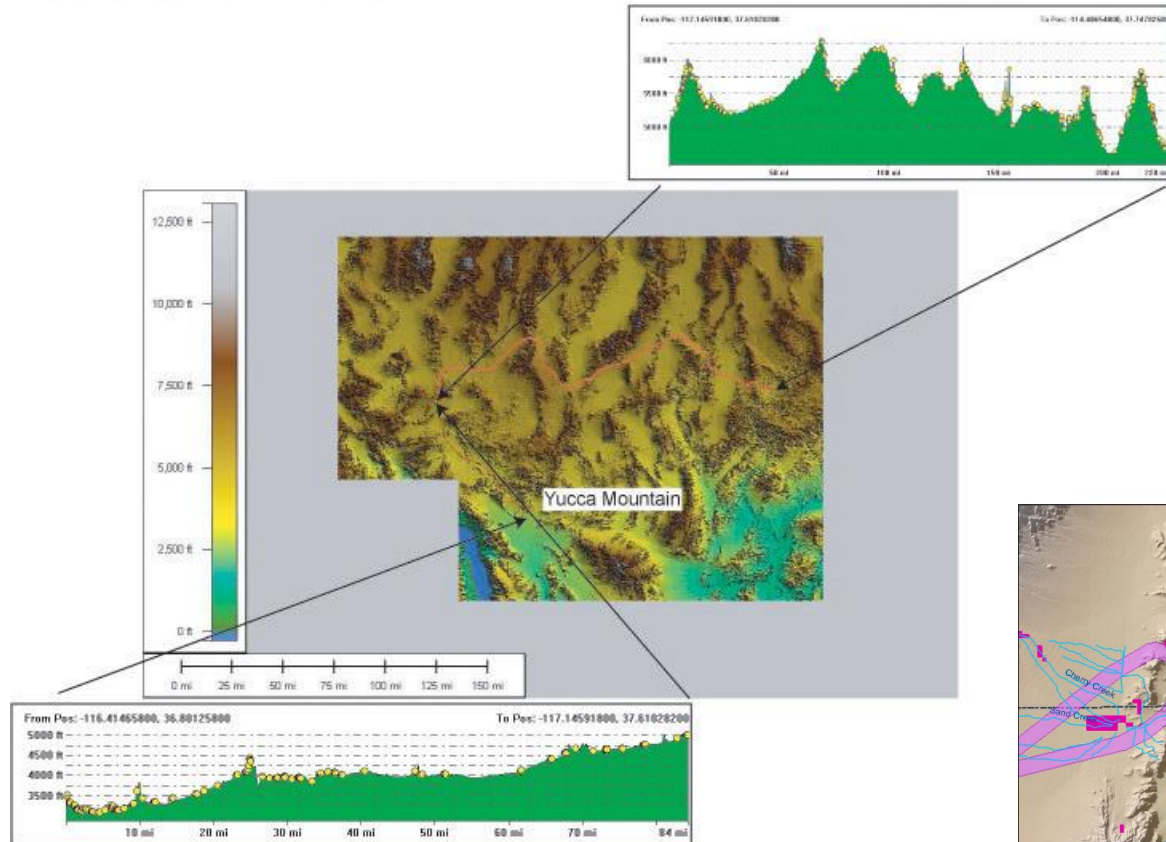


Contentions Challenge Caliente Rail Impacts

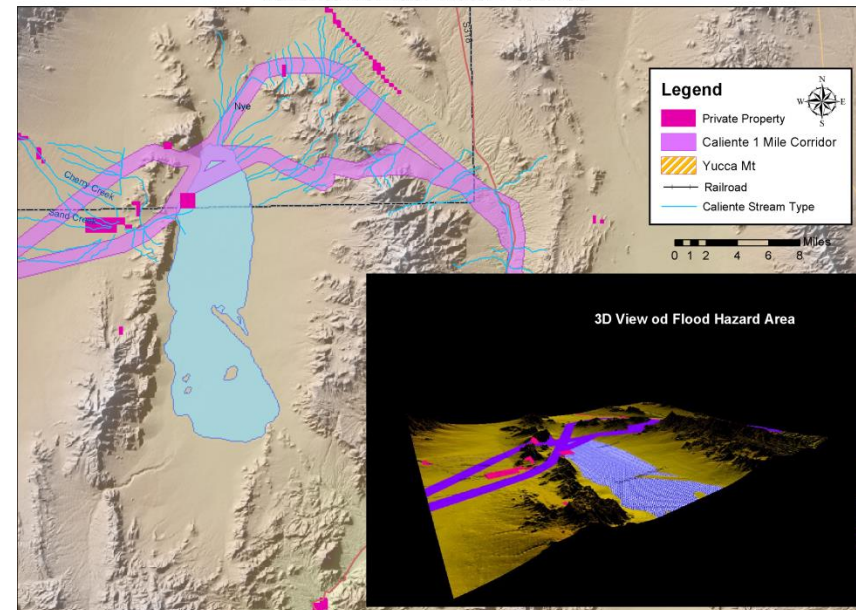


Caliente Corridor Terrain Challenges

Caliente Rail Profile



Caliente Corridor Water Features



Caliente Corridor NEPA Issues



Mountains = Cuts, Fills, Grades, Curves



Land Use Conflicts



Bridges & Flood Hazards



Limited Economic Benefits

Michael Heizer & "City"

An Artist at the End of the World

...ment to finish what may be the biggest sculpture on earth.

By Michael Kimmelman



Caliente Rail Alignment Impacts on Aesthetic Resources Garden Valley Viewshed Around Michael Heizer's "City" Installation

