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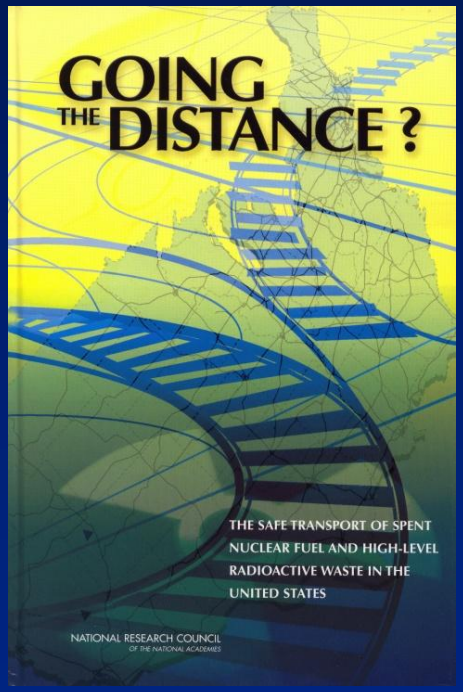
NAS Transportation Study - an NRC Perspective



Earl P. Easton
U.S. Nuclear Regulatory Commission

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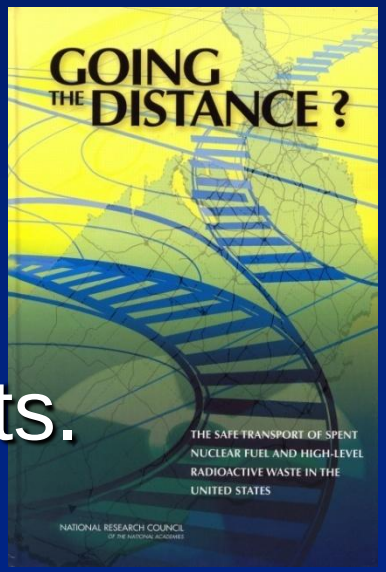
National Academies of Science Study on Spent Fuel Transportation

- Going The Distance? - The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States
- Released February 9, 2006.
- Multi-year Study by Panel of 16 Physical and Social Scientists.



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National Academies of Science Study on Spent Fuel Transportation

- Divided into Two Major Areas
  - Adequacy of Current Regulatory Framework
  - Societal Risk
- NRC focused primarily on Current Regulatory Framework

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Principal Finding – Low Risk

- No fundamental technical barriers to the safe transport of spent nuclear fuel and high-level waste.

- Transport by highway and rail is a low-radiological risk activity when conducted in strict adherence with existing regulations.

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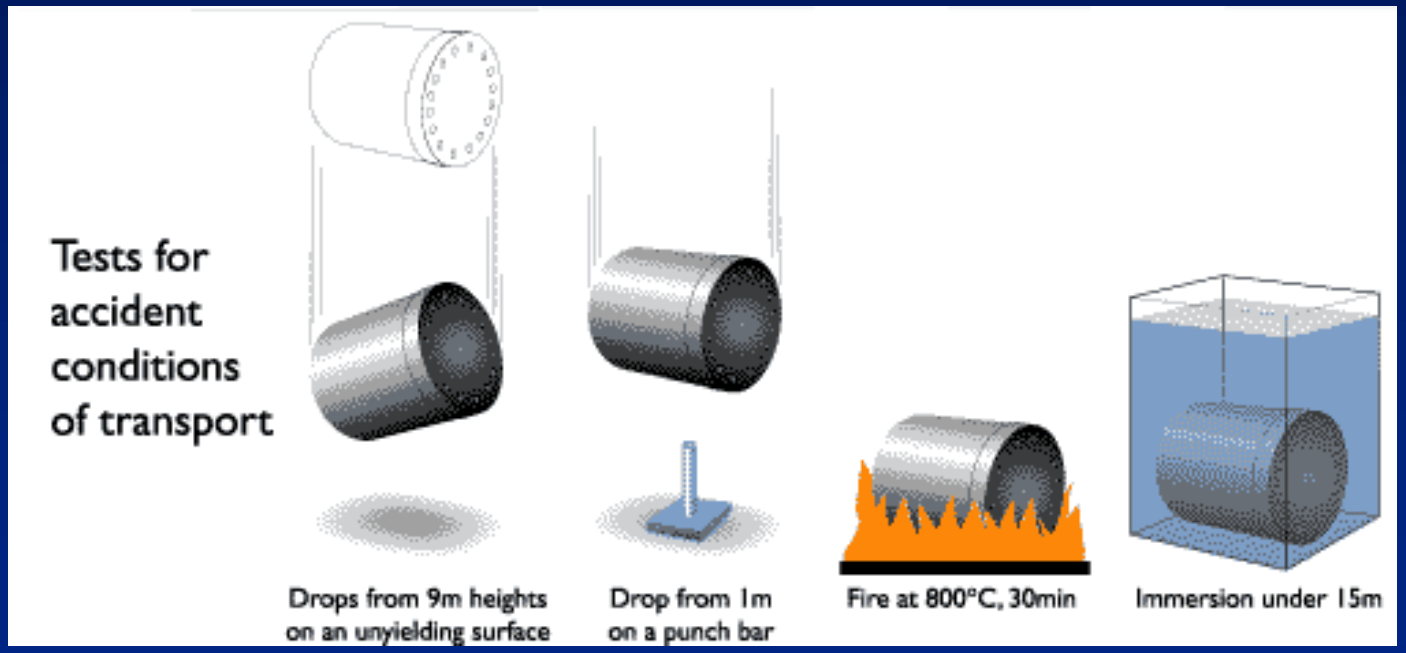
Principal Finding – Adequate Regulations

- NRC safety regulations are adequate to ensure package containment effectiveness over a wide range of transport conditions, including most credible accident conditions.



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Principal Recommendation - Need for Additional Analyses for Severe Fires

- NRC should undertake additional analyses of very long duration fire scenarios that bound expected real world accidents.

- Based on the results NRC should implement operational controls and restrictions on spent fuel shipments as necessary to reduce the chances of such scenarios.

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Severe Fire Accident Studies by NRC

- Studies of Severe Fire Accidents
  - Baltimore Tunnel Fire (2001)
  - Caldecott Tunnel Fire (1982)
  - MacArthur Maze (2007)
  - Newhall Pass (2007)
- Identified set of Accidents that could potentially challenge current regulations
- Findings to date- no significant releases in BTF or CTF

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Caldecott Tunnel Fire Study

- Occurred July 4, 1982
- Gasoline tanker truck
  - Collided with bus and car
  - About 8,600 gallons of gasoline
- Seven fatalities

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Baltimore Tunnel Fire Study
July 18, 2001


Photo: John Makely, The Baltimore Sun


Photo: Kim Hairston, The Baltimore Sun

- Eleven of sixty cars derailed
- 29,000 gallons of tri-propylene spilt
- Three hour fire(oxygen starved)
- Hole punctured in car by car's brake mechanism

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MacArthur Maze Fire April 29,2007

- Gasoline double tanker truck
  - 32,500 liters [8,600 gallons] of gasoline
- The I-580 overpass directly above I-880 collapsed approximately 17 minutes after the fire started

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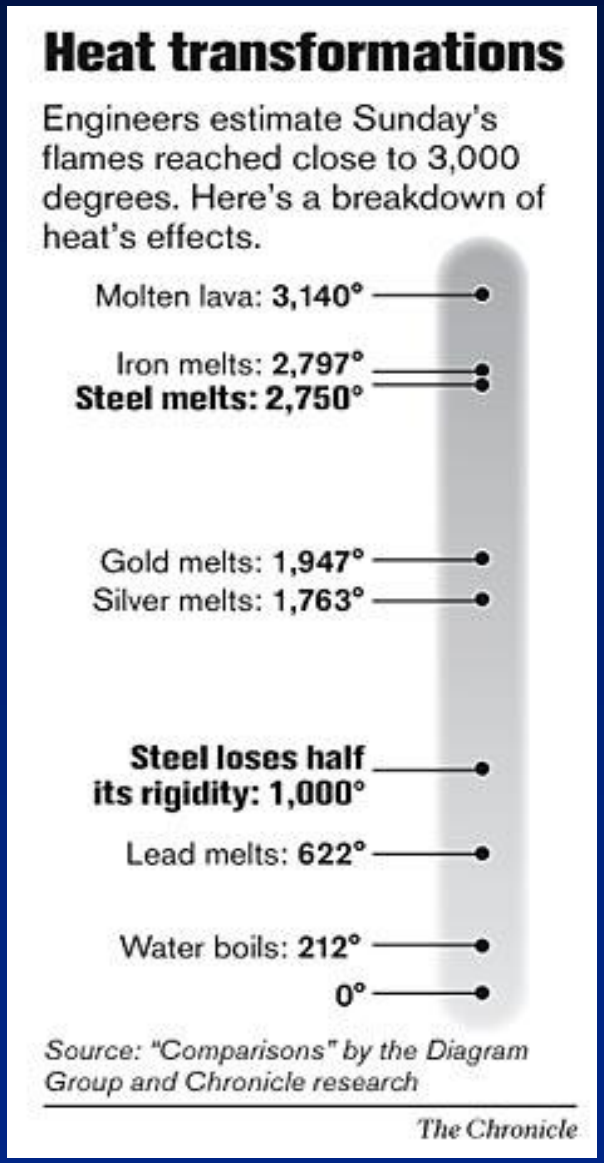
THE MAZE MELTDOWN



SAFETY: Nuclear shipments questioned

Keay Davidson, Chronicle Science Writer

Wednesday, May 2, 2007

Sunday's fire reportedly grew as hot as 3,000 degrees -- almost one-third the surface temperature of the sun -- and burned for two hours. Federal agencies have tested nuclear shipments in so-called "fully engulfing" fires that last only 30 minutes and don't exceed 1,475 degrees.

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Newhall Pass (I-5) Fire October 12, 2007

- 24 Tractor trailer rigs and 1 car involved
- Severe fire lasting several hours
- 3 deaths
- 1/10 mile (550 ft) tunnel (truck bypass)


Photo by Gene Blevins/LACOFD/Photo

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A Simple Fix ?

- Can simple operational controls
  make an already low risk even lower?
- General use of dedicated trains
  - Severe fires result most often from derailment of single trains
- No pass rule in tunnels
  - Tunnel fires are the most credible accidents that could result in “fully engulfing” fires
  - At the request of the NRC, the Association of American Railroads revised Circular OT-55.

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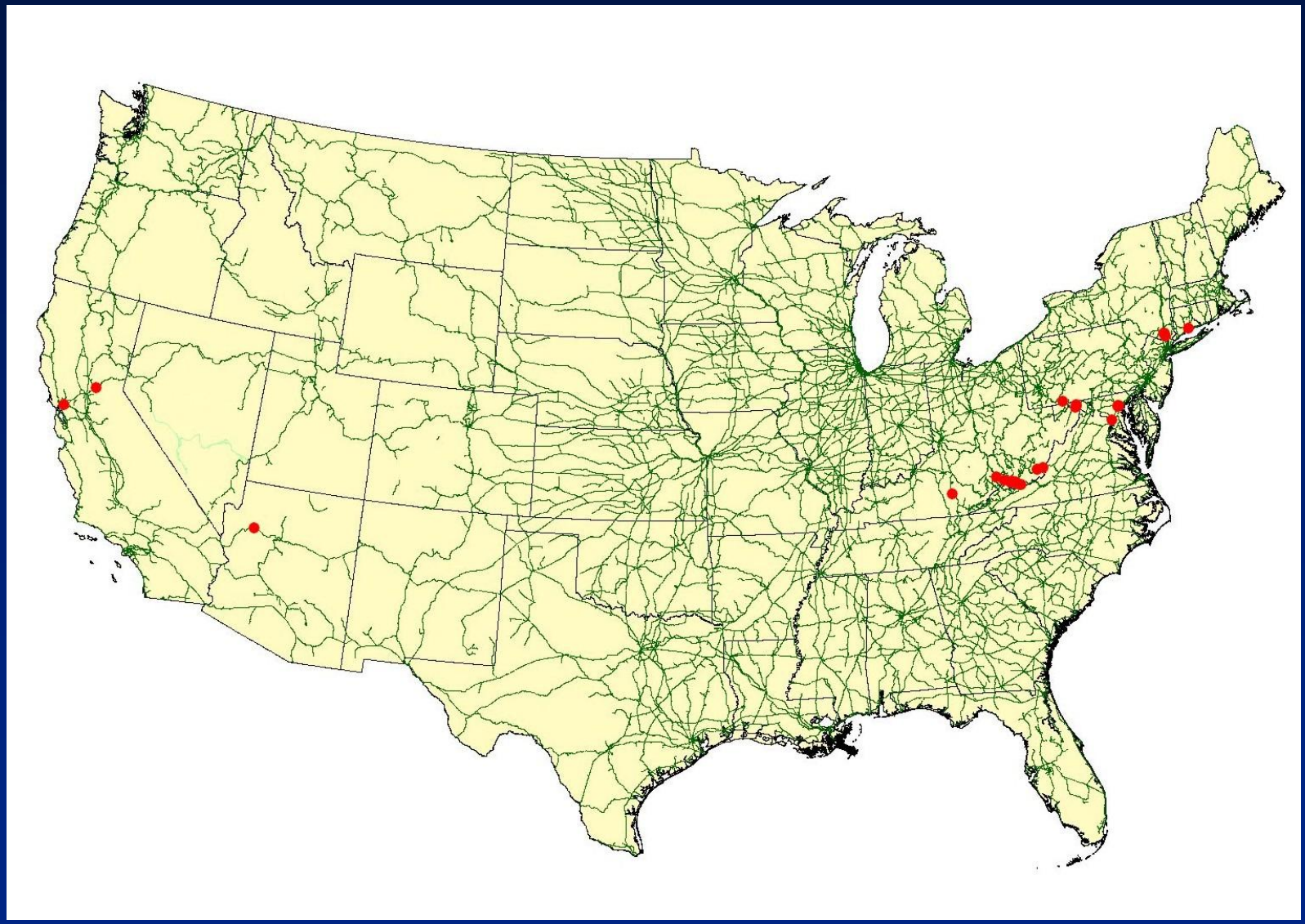
Location of Single Bore Double Track Rail Tunnels



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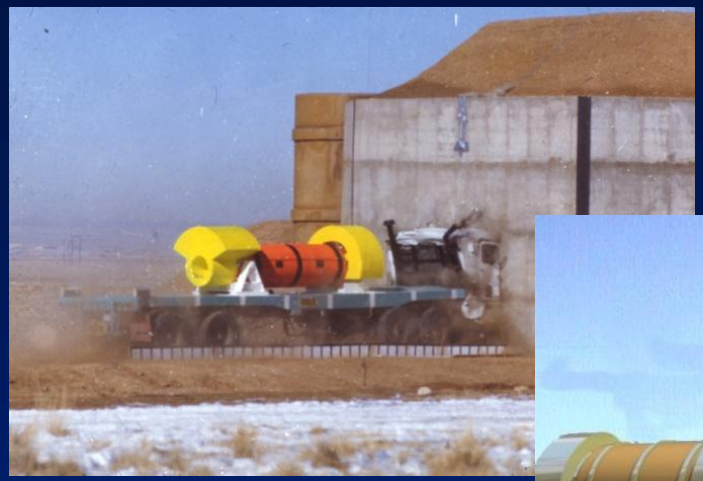
Full-scale package testing



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Principal Recommendations - Safety

- Full-scale package testing should continue to be used as part of integrated approach to validate the performance of spent fuel packages.
- Testing to “failure” is not necessary and does not add any useful information.
- Full-scale testing is not necessary to license individual package designs

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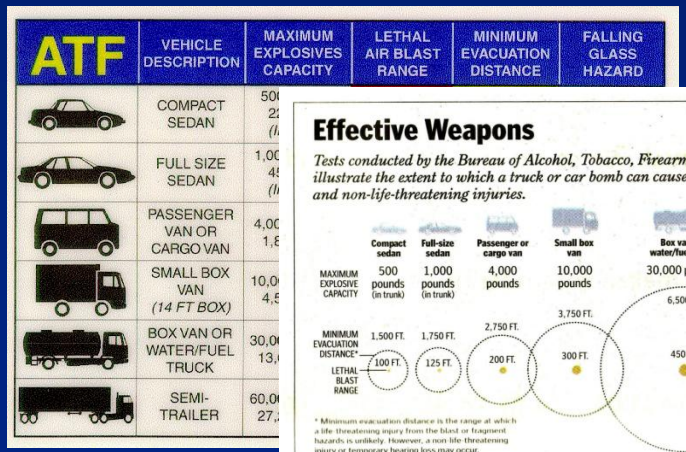
Principal Finding - Security

- Malevolent acts against spent fuel shipments are a major technical and societal concern. The NAS report was unable to perform an in-depth examination of transportation security because of information constraints.



ATF	VEHICLE DESCRIPTION	MAXIMUM EXPLOSIVES CAPACITY	LETHAL AIR BLAST RANGE	MINIMUM EVACUATION DISTANCE	FALLING GLASS HAZARD
	COMPACT SEDAN	50(2			
	FULL SIZE SEDAN	1,00 4			
	PASSENGER VAN OR CARGO VAN	4,00 1,8			
	SMALL BOX VAN *(14 FT BOX)*	10,0 4,5			
	BOX VAN OR WATER/FUEL TRUCK	30,0 13,			
	SEMI-TRAILER	60,0 27,			

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Principal Recommendation - Security

- An independent examination of spent fuel transportation security should be carried out prior to the commencement of a large-scale shipping campaign to a repository or interim storage.

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NRC Perspective on Security

- Focus on security is not new, its been continual since at least the late 1970's.

- Comprehensive security assessments of cask performance completed since 9-11, basically confirms earlier work.

- Additional security measures were implemented after 9-11, to meet today's threats.

NRC Perspective on Security (continued)

- Bottom Line
  - Robust safety standards result in robust cask designs that perform well in both severe accidents and credible threat environments.
  - Additional security measures that might be needed to meet today's threats have been implemented.

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Thoughts on Addressing Societal Risk

- Plan Early
- Seek Meaningful Stakeholder Involvement
- Craft the right message

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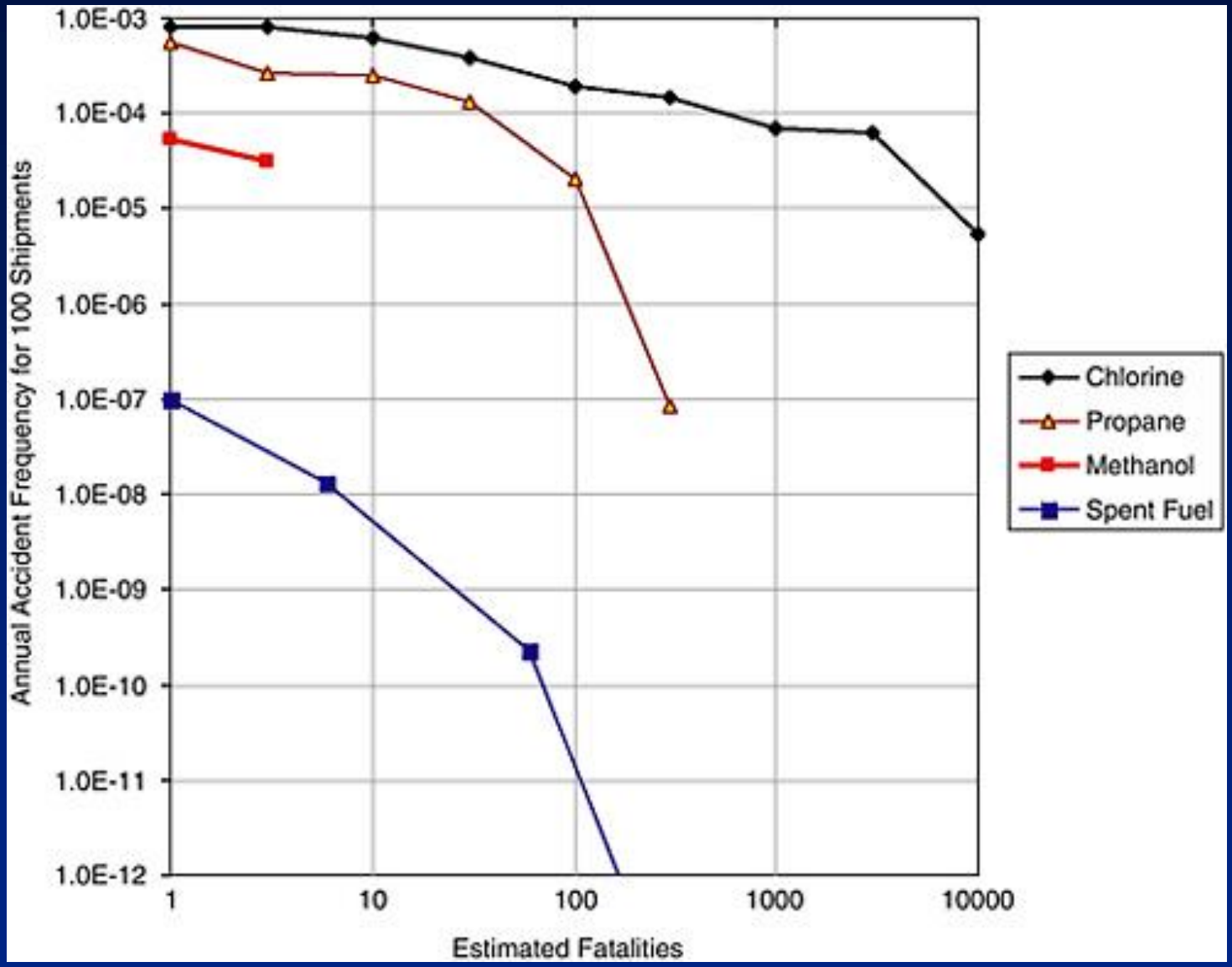
Comparison of Transportation Risks for Selected Hazardous Materials



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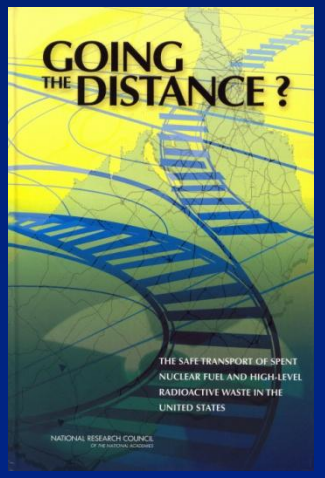

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Final Thoughts

- The overall conclusion of the NAS study is that spent fuel is and can be shipped safely with very low risk to the public.
- NRC periodically re-assesses the effectiveness of its packaging standards to reflect changes in package design and accident statistics.
- Operational restrictions can further reduce the already low risk of transporting spent nuclear fuel.