Testing to Failure: Design of Full-Scale Fire and Impact Tests for Spent Fuel Shipping Casks

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Additional documentation available at
www.state.nv.us/nucwaste/trans.htm
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 Perspective on Controversy Over Baltimore Fire Studies

- Nevada publishes report on Baltimore Fire September 2001
- Nevada raises Baltimore Fire issues relative to NRC PPS full-scale testing proposal May 2002-Present
- NRC excludes Nevada consultants from technical meetings with NRC contractors (NIST) June-August, 2002
- NRC withholds draft reports and technical analyses requested by Nevada under FOIA August 2002-April 2003
- Baltimore Fire discussed at WM’03 Conference February 2003
- Baltimore Fire discussed at NRC PPS meetings March 2003
- NRC invites Nevada consultants to meet with NRC staff and contractors, provides requested data, and initiates open and ongoing dialogue April 2003-Present
- NRC Inspector General investigation May 2003-Present
Nevada Perspective on Baltimore Fire Study Issues to be Resolved

• NIST fire model & tunnel experiments
• Significance of water main break and oxygen supply
• Fire history reconstruction (duration, temperatures, cool down period)
• Hypothetical accident conditions (e.g., cask lid proximity to hottest region of fire)
• Selection of cask(s) to be evaluated and significance of welded internal canister
• Cask and fuel performance modeling
• Implications for extra-regulatory cask testing
• Need for independent peer review
Nevada Comments on NUREG-1768
NRC PPS Draft Test Protocols

• Good stakeholder participation process though March, 2003: public meetings, transcripts, website
• The draft testing protocols are wholly unacceptable
• NRC must reissue new draft for public comment
• NRC program costs >$20 million but would not determine if two casks tested meet NRC accident performance standards
• NRC program costs >$20 million but would not determine failure thresholds of the two casks tested
• NRC program results would not validate models
  - Impact test: expected cask deformations too small to be accurately measured
  - Fire test: unclear fire duration
Nevada Recommendations to NRC Extra-regulatory Full-Scale Tests

- Test Casks to be used for Yucca Mountain Shipments (Truck-GA/4; Rail-TBD)
- Load Casks with one PWR assembly, plus dummy or surrogate assemblies and heaters (simulate 5 YR SNF)
- Rail Impact Test: Tower drop; Lid end, Center of gravity over corner impact; No impact limiter; Speed TBD, based on modeling failure (probably >75 mph)
- Truck Impact Test: Tower drop; Lid end or backbreaker, TBD; No impact limiter; Speed TBD, based on modeling failure (probably >75 mph)
- Fire Test: Engulfing fire, Minimum 3 hours @ 1800°F (1000°C) or 6 hours @ 1475°F (800°C)