

April 2, 2002

The Honorable Harry Reid  
United States Senate  
Washington, D.C. 20510

Dear Senator Reid:

I am responding on behalf of the U.S. Nuclear Regulatory Commission (NRC) to your letter of March 12, 2002, in which you requested information on how NRC evaluates the safety of containers used to transport spent nuclear fuel by rail and road. I am providing specific information on the container designs, how they are tested, and how the NRC staff evaluates the results of the tests. As discussed with and agreed to by your staff, more detailed test information for specific newer cask designs will be provided by April 20, 2002.

You requested the following information:

1. A list of all approved waste canisters, both those designed for a specific one-time use and those that would serve a more general purpose.

Enclosure 1 is a list of transportation casks that have been certified by NRC for shipping commercial spent fuel. Casks that are intended for a single use are noted as such. In addition, cask designs most likely to be used for large shipping campaigns to a disposal facility are noted with an asterisk following the certificate number.

2. A physical description of each approved waste canister, including the intended transportation mode, the design waste volume, and associated impact limiter.

This information can be found in the second column in Enclosure 1. Each cask design is normally approved for highway, rail, and sea transport. The weight of the loaded cask typically governs its use. Casks exceeding about 23,000 kilograms (50,000 pounds) are normally transported primarily by rail or barge.

3. A list of all tests performed to determine the safety of each approved waste canister, including associated impact limiters.

Enclosure 1 lists physical tests that were performed to support NRC certification for each design. The hypothetical accident test sequence defined in NRC regulations (10 CFR Part 71) includes a 9-meter (30-foot) free drop onto an unyielding surface; a 1-meter (40-inch) drop onto a puncture bar; a 30-minute fully engulfing fire with an average flame temperature of 800°C (1475°F) or higher; and immersion under 0.9 meter (3 feet) of water. The free drop and puncture tests must consider the most damaging drop orientation. The cask

must also withstand an external pressure equivalent to immersion in about 200 meters (656 feet) of water. A combination of physical tests and computer analyses is normally used to evaluate the structural integrity of the cask under the free-drop test. The cask performance in the puncture, fire, and immersion tests is normally evaluated by analysis. Enclosure 2 provides a description of how tests are performed and evaluated. Additional test information will be provided by April 20, 2002, for those cask designs marked with an asterisk in Enclosure 1.

4. The criteria used to determine the safety of each approved waste canister for certification.

NRC regulations (10 CFR Part 71) specify performance standards for spent fuel packages under normal conditions of transport and hypothetical accident conditions. These regulations are consistent with International Atomic Energy Agency (IAEA) Safety Standard TS-R-1, "Regulations for the Safe Transport of Radioactive Material." The IAEA and NRC regulations require the package design to be evaluated either by subjecting a specimen or scale model to a specific test, or by other methods, such as analyses. The cask must: (1) prevent or limit the release of radioactive material; (2) limit the external radiation dose rates; and (3) maintain the nuclear fuel in a safe, subcritical condition. The maximum allowable dose rates and releases under accident conditions are listed in NRC regulations, and are limited to assure that there would be no significant radiological hazard to first responders to a transportation accident. The procedures that are used by the NRC staff in performing its review for cask approval are documented in a standard review plan (NUREG-1617). The standard review plan and associated guidance documents contain detailed criteria that are used to evaluate cask designs.

5. A description of the methods or analyses used in tests to measure canister performance for each of the criteria.

The primary technical areas that bear on the evaluation of a cask design include structural, thermal, containment, radiation shielding, and nuclear criticality considerations. For each technical area, results from physical testing are used in combination with analyses to show that the cask design meets the applicable performance standards. Enclosure 2 provides a description of how the results of tests are used in the design review.

6. The results of all tests on each approved waste canister and associated impact limiter.

The results of physical tests of a particular spent fuel cask are documented in the application for cask approval that is reviewed by NRC staff as part of the design certification process. Enclosure 2 includes general information on the way test data are used in the technical review. Additional information will be provided by April 20, 2002, for those cask designs marked with an asterisk in Enclosure 1.

If I can be of further assistance, please contact me.

Sincerely,

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Richard A. Meserve

Enclosures:

1. "Table of Commercial Spent Fuel Transport Casks"
2. "Physical Testing of Spent Fuel Transport Casks"