UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, DC 20555 - 0001

ACNWR-0252

November 28, 2006

The Honorable Dale E. Klein
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: SPENT FUEL TRANSPORTATION PACKAGE RESPONSE TO THE BALTIMORE TUNNEL FIRE SCENARIO

Dear Chairman Klein:

In September 2005 an updated, three-dimensional analysis of the 2001 Howard Street tunnel fire scenario was published as NUREG/CR-6886 (Adkins and others, 2005). The National Institute of Standards and Technology and the Center for Nuclear Waste Regulatory Analyses assisted in the report's preparation.

At its 167th meeting on January 10–12, 2006, the Spent Fuel Project Office[1] (SFPO) staff provided the Advisory Committee on Nuclear Waste (the Committee) with an overview of the NUREG/CR-6886 tunnel fire analysis. This overview included the identification of key modeling assumptions, conservatisms, and results. The staff modeled the effect of the fire on three NRC-approved cask designs: the NAC-LWT, the HI-STAR 100, and the TN-68. The staff study postulated a 500-megawatt fire and a peak temperature of about 1830 degrees Fahrenheit at the cask, lasting for 7 hours. Citing from that draft report, SFPO representatives observed that the likelihood of such an event occurring and including a spent nuclear fuel transportation cask was extremely low.

The draft report concluded that, although the temperatures in the regions of the cask lid and vent could exceed the rated temperature of the seals, neither spent nuclear fuel particles nor fission products would be released. Moreover, should the event occur, the staff noted that if there were releases of radioactive material from fuel rod surfaces, those releases would be extremely small and pose no significant danger to the public or first responders. In light of these findings, SFPO staff expressed the view that no regulatory action was needed by the NRC to ensure public health and safety. The staff noted that public comments on NUREG/CR-6886 had been received from the Northeast High-Level Radioactive Waste Transportation Project, the Brotherhood of Locomotive Engineers, and the State of Nevada. Staff reported that they were in the process of reviewing the public comments and agreed to brief the Committee on the disposition of those comments as part of completing the tunnel fire analysis documentation.

[1]Renamed the Division of Spent Fuel Storage and Transportation as of October 1, 2006.

At the ACNW's 173rd meeting, on September 18–21, 2006, the SFPO staff briefed the Committee on the public comments received on NUREG/CR-6886 as well as the disposition of those comments in the final report (Adkins and others, 2006b). The SFPO staff received and addressed comments regarding:

- the location, severity, and duration of the fire
- loss of gamma shielding due to lead melt for the NAC-LWT cask
- the assumption that radioactive material on the fuel rod surfaces was all cobalt-60
- shipping of damaged or high burn-up fuel
- the performance of cask seals, and
- the lack of risk perspective.

The staff constructed a revised analytical model based on a tank car, a buffer car, and a spent fuel car separated by about 20 meters. The fire was assumed to have started in a leak in the tank car and then engulf the whole tunnel, heating the tunnel and then radiating heat to the cask. The fire lasted 7 hours followed by 23-hour cool-down. The study concluded that the Department of Transportation regulations for buffer cars would have prevented the burning tank car from getting close enough to the cask to engulf the cask in flames.

The SFPO staff also introduced and summarized a second study of a road tunnel fire (the Caldecott tunnel in California). See Adkins and others (2006a). This fire occurred in a road rather than a rail tunnel and lasted for a shorter time than the Baltimore tunnel fire. This second study concluded that had the NAC-LWT cask been involved in a fire similar to the Caldecott tunnel fire, it would have also performed within regulatory limits.

ACNW Observations

The final reports on the two tunnel fires addressed the comments on earlier drafts thoroughly and completely. Releasing drafts of these reports to the public for stakeholder comments resulted in improved reports. The staff has modeled both realistic and bounding scenarios, and the models appear to reflect the tunnel fire situation adequately. The makeup of a train that carries spent nuclear fuel is such that a flammable cargo will never be close enough to a spent fuel cask for a fire in that flammable cargo to engulf the cask and to heat the cask to a temperature that would result in significant release of radioactive material. The final reports show that the casks analyzed would have performed within regulatory limits.

ACNW Recommendations

The analyzed casks, which are representative of spent fuel transportation casks, appear to withstand the thermal stress of a tunnel fire adequately to protect public health and safety, even though the seals might be damaged.

Draft contractor reports dealing with a topic that enjoys a high degree of public visibility, like spent nuclear fuel transportation, can benefit by release for public comment before finalization.

Sincerely,

/RA/

Michael T. Ryan
Chairman

References:

1. Adkins, H.E., Jr., J.M. Cuta, and B.J. Koeppel, "Spent Fuel Transportation Package Response to the Baltimore Tunnel Fire Scenario – Draft Report for Comment," U.S. Nuclear Regulatory Commission, NUREGCR-6886, November 2005.

2. Adkins, H.E., Jr., B.J. Koeppel, and J.M. Cuta, "Spent Fuel Transportation Package Response to the Caldecott Tunnel Fire Scenario – Draft Report for Comment," U.S. Nuclear Regulatory Commission, NUREGCR-6894, February 2006.

3. Adkins, H.E., Jr., J.M. Cuta, B.J. Koeppel, A.D. Guzman, and C.S. Bajwa, "Spent Fuel Transportation Package Response to the Baltimore Tunnel Fire Scenario – Final Report," U.S. Nuclear Regulatory Commission, NUREGCR-6886, Revision 1, November 2006.