



Fact Sheet

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Transportation of Spent Fuel and Radioactive Materials

Roles of NRC and DOT

The transportation of radioactive materials is regulated jointly by the Nuclear Regulatory Commission (NRC) and the Department of Transportation (DOT). The responsibilities of the two agencies are generally divided as follows:

- DOT- Regulates shippers and carriers of hazardous materials, including radioactive material. It is responsible for such items as vehicle safety, routing, shipping papers, and emergency response information and shipper/carrier training requirements.
- NRC-Regulates users of radioactive material and approves the design, fabrication, use and maintenance of shipping containers for more hazardous radioactive material shipments. It also regulates the physical protection of commercial spent fuel in transit against sabotage or other malicious acts.

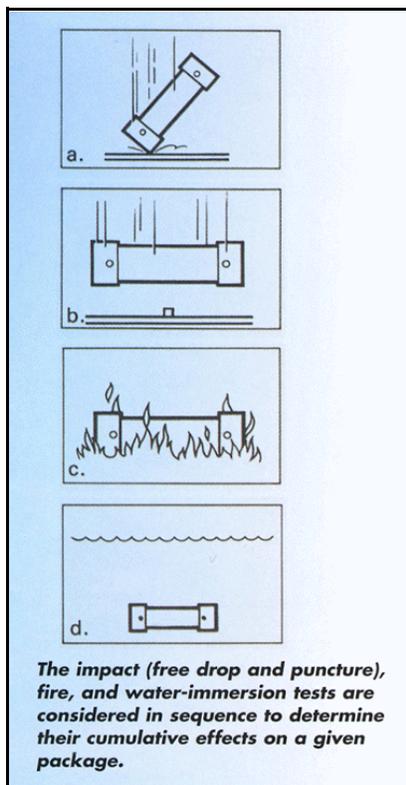
Transport of Radioactive Materials

The NRC requires radioactive materials to be shipped in accordance with the hazardous materials transportation safety regulations of DOT. Millions of packages of low-hazard radioactive material are shipped throughout the United States annually by rail, air, sea, and over roads. These packages contain small quantities of radioactive material that are typically used in industry and medicine. These packages are intended to provide a safe and economical means of transporting relatively small quantities of radioactive material. It is assumed that these packages may be damaged in an accident and that a portion of the contents may be released. The Regulations, therefore, prescribe limits on the maximum amounts of radioactivity that can be transported in these packages, such that doses from any accidents involving these packages will

have no substantial health risks. Examples could include transport of smoke detectors, watch dials, radiopharmaceuticals, and slightly contaminated equipment such as syringes used to administer radiopharmaceuticals.

Spent Fuel Shipping Container Safety Standards

Safety standards for spent fuel casks are set forth in NRC regulations (10 CFR Part 71). Casks must be designed to withstand a series of impact, puncture, fire environments, and a deep water immersion test, thereby providing reasonable assurance that packages will withstand serious transportation accidents. After the NRC reviews the cask design and verifies that the design meets prescribed accident conditions, it issues a certificate. An approval certificate for the design must be issued by the NRC before a cask can be used to transport spent fuel.



The standards established in NRC regulations require that shipping containers, or casks, prevent the loss or dispersion of radioactive contents, provide adequate shielding and heat dissipation, and prevent nuclear criticality (a self-sustaining nuclear chain reaction) under both normal and accident conditions of transportation.

The normal conditions of transportation which must be considered are specified in the regulations in terms of hot and cold environments, pressure differential, vibration, water spray,

impact, puncture, and compression tests. The accident conditions that must be considered are specified in terms of impact, puncture, fire, and water immersion test conditions.

Adequacy of Safety Standards

In 1981, the NRC reevaluated its regulations concerning transportation of radioactive materials, and concluded no immediate changes were needed to improve safety [Ref. report NUREG-0170]. This conclusion was based on:

- An assessment of the probability and severity of transportation accidents;
- The extent of potential consequences that could result if a radioactive material shipment were involved in a transportation accident; and
- The excellent safety record developed over more than 30 years during which millions of radioactive material shipments have been made without identifiable injury or death attributable to radiological causes.

The NRC believes that shipments of spent nuclear fuel in the U.S. are safe. This belief is based on the NRC's confidence in the shipping containers that it certifies and its ongoing research in transportation safety. The NRC ensures that shipping containers are robust by:

- Regulating the design and construction of the shipping containers;
- Reviewing designs and independently checking a container's ability to meet accident conditions; and
- Ensuring that containers are built, maintained, and used properly.

The NRC also follows an aggressive program to investigate and assess the risks involved in spent fuel shipments by :

- Analyzing spent fuel transportation records to understand safety issues better;
- Evaluating new transportation issues, such as denser populations along some transportation routes, and other factors; and
- Using new technology to estimate current and future levels of potential risk to the public.

Although there will always be a slight chance that an accident will cause a release of nuclear material, the NRC has found that the likelihood of such an event and the associated risk to the public are extremely low. Even so, NRC will continue to be vigilant about public safety as an essential part of its mission.

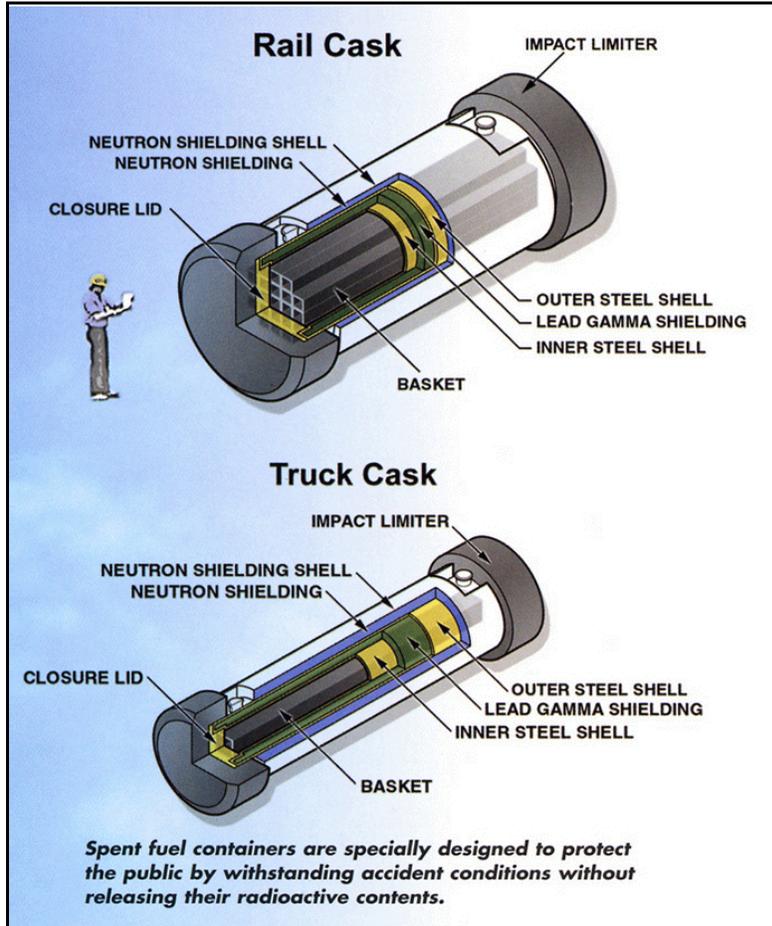
The shipment of spent nuclear fuel in NRC-certified packages has an excellent safety record. However, NRC recognizes that the characteristics of the spent fuel and their container systems

being reviewed by NRC have changed since the 1987 “modal study” was completed. This study examined shipping container responses to severe highway and railway accident conditions (NUREG/CR-4829). It also recognizes that more sophisticated analytical techniques are now available than were used in the modal study. Moreover, there is a possibility for near-term increases in the number of spent fuel shipments. This has focused public attention on spent fuel shipment safety, and despite the previous studies and very good safety record, some people may have questions.

NRC Review of Spent Nuclear Fuel Transport Safety

The NRC is revisiting the modal study to assure that its conclusions remain valid. In February 2000, NRC published a report (NUREG/CR-6672) which reexamined spent fuel shipment risk estimates and found the risks from accidents in shipping spent nuclear fuel to be very small. In addition, the NRC has initiated a research program to address the public’s concern about transportation of spent nuclear fuel, including the robustness of transportation containers, the need for full-scale physical testing of the containers, and to further validate the computer models used, in NUREG/CR-6672, to evaluate transportation container design safety. This study, referred to as the “Package Performance Study,” is being undertaken to update the NRC’s evaluation of the level of protection provided by certified spent nuclear fuel transportation package designs under accident conditions for railway and highway transport. Numerous public meetings have been held by the agency to help the NRC identify safety transport concerns and to shape further study.

In February 2003, the NRC published for public comment, the “Package Performance Study Test Protocols Report (NUREG-1786) which included preliminary plans for examining the response of full-scale rail and truck containers to extreme accident conditions, including subjecting casks to high-speed impact and fire tests. The NRC staff is reviewing public comments and will develop options for Commission consideration for conducting the Package Performance Study. [More information on the study can be found on our web at <http://www.nrc.gov/waste/spent-fuel-transp.html> under Regulatory Issues Topic].



Transportation Security

The NRC's current physical protection regulations for spent fuel transportation includes:

- Pre-shipment coordination with law enforcement agencies;
- Pre-shipment notice of States and NRC;
- In-transit shipment call-in to communications center;
- Shipment monitoring;
- Armed escorts (in populated areas); and
- Immobilization devices.

Since September 11, 2001, the NRC has taken additional steps to protect the public. These steps involve a heightening of the security posture, including new measures taken to protect nuclear facilities and regulated activities, such as spent fuel transportation, and orders that NRC has issued to various licensees.

Both the NRC and the Department of Energy continue joint operation of a national database and information support system to track movement of domestic and foreign nuclear materials under safeguards control.

Accident Response Assistance

If an accident occurs, state and local governments are primarily responsible for overseeing the response of the carrier, shipper and others and for taking any actions deemed necessary to protect the public health and safety.

To assist state and local governments, the federal government has established an Interagency Radiological Assistance Plan under the coordination of the Department of Energy, which charges eight regional coordinating offices with the responsibility and authority for convening radiological assistance teams. Upon request, immediate action will be taken to respond to the emergency, including providing assistance at the scene.

As described in the Federal Radiological Emergency Response Plan, NRC is the Lead Federal Agency (LFA) for events involving radioactive materials either licensed by NRC or under NRC's Agreement States Program. As LFA, NRC coordinates the Federal Government's response to an event. Other Federal agencies that respond to an event include the Federal Emergency Management Agency, the Department of Energy, the Environmental Protection Agency, the Department of Agriculture, the Department of Health and Human Services, the National Oceanographic and Atmospheric Administration, and the Department of State.

If event conditions warrant, NRC would immediately dispatch a team of experts from its nearest regional office to the site. An executive team would be assembled in the agency's headquarters Operations Center to lead the response until the team is on site. The site team would manage event-related activities based on a firsthand assessment of the situation and face-to-face communications with all participants. The Operations Center would continue to provide round-the-clock logistical and technical support throughout the response.

Additional information on the safety of spent fuel transportation can be found in NUREG/BR-0292 which is available on our web at:

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0292> .