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Opinion



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Waste can be transported safely

Friday, July 5, 2002

By GAIL H. MARCUS
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I often wonder about all the public concern that surrounds the shipment of spent nuclear fuel to Yucca Mountain. President Franklin Roosevelt was right when he said that all we have to fear is fear itself.

During the past four decades, about 3,000 shipments of spent nuclear fuel have navigated more than 1.7 million miles of U.S. roads and railways. In this whole time, only 90 spent fuel casks have been involved in accidents. None resulted in any release of radioactive material.

Most fatalities and injuries associated with hazardous material transportation accidents result from gasoline tank trucks. I have to question why the public doesn't share the same concerns over the transport of gasoline and other hazardous materials on public roads as it does the movement of nuclear waste.

Safety measures employed for the transportation of high-level wastes have resulted in one of the most enviable safety records of industrial public transportation. This is made possible, in large part, by the strength of the casks used in the transport of HLW material. These casks are designed to protect the public against potential radiation exposure during any accident. The casks are about 15 times thicker than a gasoline tank truck shell and they include three inches of stainless steel with thick radiation shields. To be certified by federal authorities, cask designs must withstand three tests -- crashes, fire and puncture -- in specified accident conditions. They must also withstand eight hours under water.

It should be noted that the impact tests required by federal regulation exert forces on the casks that are greater than the impact forces in the worst recorded accidents. Temperatures produced in the casks by the regulatory fire tests are higher than those in any recorded fire accidents.

The nuclear industry tests the casks to conditions even beyond those requirements. For example, Sandia National Laboratories conducted three types of tests to measure the punishment casks can withstand:

- A 20-ton truck cask struck by a 120-ton diesel locomotive traveling at

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81 miles per hour;

- A 22-ton cask on a flatbed crashed into a 690-ton concrete block at 84 mph;
- A propane tank car exploding next to a cask in a pool, throwing the cask 33 feet.

The casks emerged with only minor damage, and in no test did the casks fail to hold their contents.

Recently, concerns have been raised about the potential impacts of terrorist attacks during the transport of high-level waste. We can say that the same features that render casks highly resistant to highway and rail accidents tend to make them difficult targets for terrorist attacks.

The casks are just one of the many elements that help ensure public safety. U.S. Department of Transportation regulations require carriers to use the safest routes available.

Risk assessments of the transportation of radioactive materials evaluate factors such as accident rates, transit time, population density, other vehicles sharing the route and time of day. The DOT identifies "preferred routes," which consist primarily of interstate highways and bypass routes around cities (where such routes exist) or an alternative route selected by a state routing authority.

If the routing authority selects an alternate route, a routing analysis is conducted to determine that the alternate route does not increase overall risk. Alternate route selections must be preceded by consultations between DOT and affected state and local authorities.


Most materials being transported are monitored by global satellites and are tracked at all times during the transportation process. Specialized trucking companies handle spent nuclear fuel shipments. These experienced, specially licensed companies haul all kinds of hazardous materials more than 50 million miles annually.

Vehicles are state-of-the-art, equipped with computers that provide an instantaneous update on the truck's location and convey messages between driver and dispatcher through a satellite communications network. Drivers receive extensive training and must be certified by the federal government.


The regulatory requirements on casks and transportation security and the industry's high level of performance have produced a safety record that would be difficult to match. This should reassure all Americans that the transport of spent nuclear fuel to Yucca Mountain can and will be conducted without harm to the public.

Gail H. Marcus is immediate past president of the American Nuclear Society, a professional society devoted to advancing nuclear science and technology. Dr. Marcus has S.B. and S.M. degrees in physics and an Sc.D. degree in nuclear engineering from the Massachusetts Institute of Technology.

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ANS Position Affirms Safety of Transporting Nuclear Waste

La GRANGE PARK, Ill. July 12, 2002 -- With the Senate approving Yucca Mountain as the nation's first geological repository on Tuesday, attention now focuses on the security of moving spent nuclear fuel to the Nevada site. The American Nuclear Society has adopted a position statement that addresses the safety of transporting radioactive materials.

ANS applauds the Senate's vote approving Yucca Mountain.

"The transportation of radioactive materials in the United States has enjoyed, and can continue to enjoy, an excellent safety record," said Herb Fontecilla, chair of ANS' Public Policy Committee. "In view of this safety record, the small number of shipments compared to the volume of other hazardous materials, the inherent robustness and stringent requirements imposed on the shipping casks, we believe that the projected shipments of used nuclear fuel to Yucca Mountain can be accomplished safely and without impacting the health and safety of the population along the shipping routes."

Operation of Yucca Mountain for used nuclear fuel would result in additional shipments from reactor sites, where the fuel is currently stored. Current estimates are for about 2,200 truck shipments and 500 rail shipments per year over a 24-year period. This would constitute an increase of less than 0.1 percent over the current number of radioactive shipments, and less than 0.0007 percent of the 400 million shipments of all kinds of hazardous materials taking place per year in the United States.

The nuclear energy industry has transported more than 3,000 shipments of used nuclear fuel over 1.7 million miles of U.S. highways and railroads since 1964. No nuclear fuel container has ever cracked or released any radioactive material to the environment. Also, the Department of Energy has transported to the Waste Isolation Pilot Project in New Mexico about 700 shipments of transuranic waste over 1.5 million miles since 1999 without incident.

"All shipments of radioactive materials take place according to regulations issued by the Department of Transportation and the Nuclear Regulatory Commission," said Fontecilla. "Federal regulations address packaging, labeling, loading and unloading, storage, transportation routes and vehicle requirements, as well as limits on external radiation.

"There also are requirements to protect against the diversion of these materials. All shippers and carriers are licensed, as are the storage and shipping containers."

Packages, or casks, used for the transportation of materials with the highest levels of radioactivity -- including used nuclear fuel -- are required to survive such simulated accident conditions as a crash at high speed into a concrete barrier, water immersion, a 30-foot drop onto an unyielding surface, severe impact and

extreme heat.

Studies of the risk posed by the transportation of used fuel confirm that the current regulations provide adequate protection of the public health and safety, according to the ANS position statement. In addition, used fuel shipments take place only along specified routes, and governors of states through which the material will pass are notified in advance.

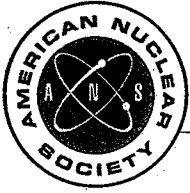
"More than 45 million shipments of radioactive materials have taken place in the United States over the last three decades, with a current rate of about three million per year," said Fontecilla. "The majority of these radioactive shipments consist of radiopharmaceuticals, luminous dials and indicators, smoke detectors, contaminated clothing and equipment, and research and industrial sources. Fewer than 3,500, or 0.01 percent, have been involved in any sort of accident, incident or anything other than routine transportation. Fewer than 200 were damaged or failed in any form.

"None of the damaged packages contained used fuel or high-level radioactive materials."

ANS, established in 1954, is a professional organization of scientists and engineers devoted to the applications of nuclear science and technology. Its 11,000 members come from diverse technical disciplines ranging from physics and nuclear safety to operations and power, and from across the full spectrum of the national and international nuclear enterprise, including government, academia, research laboratories and private industry.

For more information regarding this and other position statements of the American Nuclear Society, please go to its web site at <http://www.ans.org/pi/ps/>.

Questions or comments about the web site? Contact the [ANS Webmaster](#).



The Safety of Transporting Nuclear Material

Talking Points

- Over the past 40 years, about 3,000 shipments of spent nuclear fuel have navigated more than 1.7 million miles of U.S. roads and railways. Of all this travel, no radioactive materials have been released to contaminate the environment as a result from an accident. The nuclear industry's commitment to safe packaging and security has produced a safety record that would be difficult to match. The basic safety measures undertaken in the transportation of nuclear material ensures that the industry's safety track record will remain undiminished.
- Each year, 100 million shipments of hazardous supplies navigate America's roadways, railways, airspace and shipping routes. Of these hazardous shipments, only 2 to 5 million involve radioactive material. At the most, only 5 percent of hazardous shipments in the United States involve radioactive materials. And most of these shipments are radioisotopes for medical and industrial use.
- The well-designed packages and casks, used to carry nuclear materials, along with implementing stringent regulations and tested safety measures, are the reasons for this stellar safety record.
- Casks used for shipping spent nuclear fuel are designed to minimize potential radiation exposure for the public. They are rigorously designed according to requirements established by the Nuclear Regulatory Commission and the Department of Transportation in volumes 10 and 49 of the Code of Federal Regulations. The casks are about 15 times thicker than a gasoline tank truck shell, and they include three inches of stainless steel and thick radiation shields. Typically, for every ton of fuel, there are more than three tons of protective packaging and shielding.
- Casks are designed and tested to withstand crashes, fire, water immersion and puncture. To be certified, a cask design must withstand a sequence of four tests that measure its performance in specified crash and fire accident conditions.

(over)

- Public routes used for the transport of nuclear materials must meet strict safety requirements before nuclear fuel is permitted access. Department of Transportation regulations require carriers of materials with high levels of radioactivity, such as spent fuel, to use the safest routes available. Risk assessments of radioactive materials transportation evaluate factors such as accident rate, transit time, population density, other vehicles sharing the route and time of day.
- The DOT identifies "preferred routes," which consist of interstate highways and bypass routes around cities, where possible, or an alternative route selected by a state routing authority. If the routing authority selects an alternate route, it must demonstrate by a routing analysis that using the alternate route does not increase overall risk. Alternate route selections must be preceded by consultations between DOT and affected state and local authorities before such designations can go into effect.
- Specialized trucking companies handle used nuclear fuel shipments in the United States. These experienced, specially licensed companies haul all kinds of hazardous materials more than 50 million miles annually. Vehicles are state of the art, equipped with computers that provide an instantaneous update on the truck's location and convey messages between driver and dispatcher through a satellite communications network. Drivers receive extensive training and must be certified.
- Radioactive materials are transported to medical, industrial, research and manufacturing facilities; nuclear power plants; and storage and disposal sites. They are used in a variety of applications, such as the diagnosis and treatment of disease, agricultural research, manufacture of commercial goods and nuclear electricity production.
- The United States has a half-century of experience in transporting radioactive materials.
- It is less hazardous to ship solid spent nuclear fuel than to ship many other materials, including gasoline, that are routinely transported all over the country. Fresh nuclear fuel is even less hazardous to ship, and is not highly radioactive.

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