

October 30, 2001

The Honorable David Price
United States House of Representatives
Washington, DC 20515-2107

Dear Congressman Price:

I am responding to your letter of September 17, 2001, about the concerns raised by one of your constituents, Ms. Judy Hogan, regarding the storage of high-level nuclear waste. The U.S. Nuclear Regulatory Commission's (NRC's) responses to Ms. Hogan's questions can be found in Enclosure 1 to this letter. I have also included a copy of NRC's NUREG/BR-0111, "Transporting Spent Fuel--Protection Provided Against Severe Highway and Railroad Accidents" (Enclosure 2), which may be of interest to Ms. Hogan.

Immediately after the terrorist attacks on the World Trade Center and the Pentagon, NRC advised nuclear power plant licensees to go to the highest level of security, and all promptly did so. These same NRC licensees are also responsible for the safe storage of spent nuclear fuel at their facilities. Today, with continued uncertainty about the possibility of additional terrorist activities, the Nation's nuclear power plants remain at a heightened level of security and NRC continues to monitor the situation. For the longer term, I have directed the NRC staff to thoroughly reevaluate NRC's safeguards and physical security programs. This reevaluation will be a top-to-bottom analysis involving all aspects of the Agency's safeguards and physical security programs, including an assessment of the effectiveness of the storage of spent nuclear fuel.

Given the sophistication of the attacks on September 11, the identification of any necessary adjustments to the safeguards and/or physical security measures for storage of spent nuclear fuel must involve other U.S. national security organizations. NRC is currently interacting with the Federal Bureau of Investigation, other intelligence and law enforcement agencies, and the military, to ensure that all changes to NRC's programs will consider pertinent information from all relevant U.S. agencies.

D. Price

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Because NRC's reevaluation is still ongoing, the enclosed answers to Ms. Hogan's questions are founded on information available at this time. If you have further comments or questions, please contact me.

Sincerely,

/RA by Carl J. Paperiello Acting For/

William D. Travers
Executive Director for Operations

Enclosures:

1. "Responses to Questions"
2. NUREG/BR-0111, "Transporting Spent Fuel--Protection Provided Against Severe Highway and Railroad Accidents"

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RESPONSES TO QUESTIONS

Ms. Judy Hogan's questions, along with the U.S. Nuclear Regulatory Commission's (NRC's) responses, are listed in the order that they were presented in Congressman Price's letter to Dr. Richard Meserve, dated September 17, 2001.

Question: Does the accident risk identified in the report for decommissioning plants also apply to currently operating plants? If not, is the risk for operating plants higher or lower?

Answer:

The accident risk identified in the report for decommissioning plants does not apply directly to currently operating plants. Although the risk of accidents in spent fuel pools at operating reactors has not been evaluated in the same level of detail as "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," NUREG-1738, February 2001, NRC expects the risk of spent fuel pool accidents at operating reactors is not significantly different from that at a recently shutdown, decommissioning reactor. For a decommissioning reactor which has been shutdown for a long period of time, the risk would be expected to be significantly less than for an operating reactor spent fuel pool.

Question: Has the NRC estimated the risk of a spent fuel pool accident at a single site or at all sites over a long period of time, such as thirty years? If not, can an extrapolation be made from the estimate for a single year contained in the report?

Answer:

Risk includes both the frequency of an event and the likely consequences of that event. NRC believes that the annual risk for a single site is the appropriate measure for spent fuel pool accidents, as for other accidents that may occur. NRC broadly defined an acceptable level of total risk for nuclear power plants in its "Policy Statement on Safety Goals for the Operation of Nuclear Power Plants," which was issued in 1986. From these safety goals, NRC derived quantitative health objectives for the annual risk to the life and health of an individual living near a reactor site. These quantitative health objectives were established low enough such that the risk from reactor operations would pose no significant additional risk (when compared to all other risks) to those living near the reactors. The staff believes that the risk from spent fuel pool accidents at both decommissioning and operating reactors is well within the acceptable level of risk defined by these objectives.

Conceptually, one could estimate the cumulative risk for all spent fuel pools over an extended period of time using the estimate for a single year contained in the report. This could be done by first multiplying the single-plant, single-year estimate in the report by the number of years that a specific pool contained fuel. Then one could add the result for each spent fuel pool to obtain the cumulative risk for all spent fuel pools. Note that, however, this would be a very rough estimate. For an accurate calculation one would also need to know the quantity and age of the fuel in each pool each year, a number that continuously changes. Thus, an accurate

calculation would be very difficult to perform and, the staff believes, would offer little insight into the risk associated with spent fuel pools nor change the staff's conclusion that the risk posed by spent fuel pools is well within the quantitative health objectives.

Question: Does the NRC require plants to prepare a plan for evacuation in the event of a nuclear accident? If so, how does the NRC determine the size of the required evacuation area, and does this planning take into account the possibility of a spent fuel pool accident?

Answer:

NRC requires each plant to prepare a plan for evacuation in case of a nuclear accident. An integral part of the licensing process for a nuclear power plant is the requirement that an emergency response plan be developed and demonstrated. Before issuing a license, NRC, in consultation with the Federal Emergency Management Agency, makes a determination that there is reasonable assurance that adequate protective measures can and will be taken in case of a radiological emergency.

The size of the emergency planning zone (EPZ) for which evacuation plans are prepared consists of an area of about 16 kilometers (10 miles) in radius. The size of the EPZ is based on recommendations made by a joint NRC and U.S. Environmental Protection Agency (EPA) task force on emergency planning, and documented in a report entitled "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," NUREG-0396, EPA 520/1-78-016, dated December 1978. The NRC/EPA task force considered a spectrum of accidents in making its recommendations. A spent fuel pool accident is within the bounds of the accidents considered.

Decommissioning plants are not required to maintain and test evacuation plans. They have been exempted from this requirement based on the reduced hazard as compared to an operating reactor. The status of decommissioning plant exemptions is being reviewed in consideration of the September 11, 2001 event.

Question: Has the NRC evaluated the relative susceptibility of spent nuclear fuel stored in dry casks and in pools to terrorist threats?

Answer:

NRC has not compared the susceptibility to terrorist threats of spent nuclear fuel stored in dry casks to that stored in spent fuel pools. However, NRC has reviewed spent fuel pools and dry casks for specific sabotage threats. Given the events of September 11, 2001, the NRC will reevaluate its safeguards and physical security programs. This reevaluation will be a top-to-bottom analysis involving all aspects of the Agency's safeguards and physical security programs, including an assessment of the effectiveness of the storage of spent nuclear fuel.

Question: Do containers used to transport spent fuel emit harmful amounts of radiation? If so, how dangerous is the radiation emitted to a bystander?

Answer:

Containers used to transport spent fuel do not emit harmful amounts of radiation. A small amount of radiation emanates through the walls of transport casks during normal transportation operations. Radioactive material does not escape. Independent design reviews by the NRC staff and measurements taken by the shipper before each shipment ensure that cask radiation levels will be below established, safe regulatory limits. Regulatory limits are not specific to spent fuel; they apply to many types of radioactive materials transport packages and many annual shipments.

A person sharing the route, or along the route, as a spent fuel cask goes by, could receive a small radiation dose from the cask. Even with multiple shipments, this dose would be a small fraction of the radiation that everyone receives annually from natural sources. The Commission has previously determined that transportation regulations in 10 CFR Part 71 provide a reasonable degree of safety, based in part on the "Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes," NUREG-0170, published December 1977. It concludes that public health and safety and environmental impacts from the transportation of all radioactive material (including spent fuel) are small.

Question: What degree of damage are the containers designed to withstand in the event of a transportation accident or a terrorist attack?

Answer:

The NRC regulations in Part 71 specify standards for certification of spent fuel cask designs. These standards provide that a package shall prevent the loss or dispersion of radioactive contents, provide adequate shielding and heat dissipation, and prevent nuclear criticality under both normal and accident conditions of transportation. Spent fuel cask designs must pass a sequence of four engineering examinations to be certified by NRC. These include: (1) a 9-meter (m) (30-foot)(ft) drop test onto an unyielding surface; (2) a puncture test involving a 1-m (40- inch) drop onto a steel bar; (3) immersion in a 800-°Celcius (1475-°Fahrenheit) fire for 30 minutes; and immersion under 0.9-m (3-ft) of water. Accident scenarios that could exceed the thermal and impact forces represented by these design standards are rare. For additional information, we have included a brochure entitled, "Transporting Spent Fuel--Protection Provided Against Severe Highway and Railroad Accidents." Among other things, this brochure explains that the kinds of impacts and thermal forces represented by the NRC certification tests in Part 71 cover 994 of every 1000 accidents.

NRC's regulations in 10 CFR Part 73 address the requirements for the physical protection of spent fuel shipments. Although not specifically designed against any particular terrorist threat or device, a cask's design for accident safety also provides an inherent level of protection against terrorist activities. Past studies sponsored by NRC and the U.S. Department of Energy (DOE) have evaluated the consequences of terrorism, and we are considering the need for additional work. NRC approves physical protection and security considerations for each route.

Question: Have routes been proposed for transporting spent fuel to the proposed Yucca Mountain site, and do any proposed routes include interstate highways?

Answer:

No routes have been proposed for transporting spent fuel to the proposed Yucca Mountain site (the site is only under investigation as a candidate repository; it is several years from potential operation). However, reasonable predictions can be made using the locations of nuclear reactors and current routing practices. Routes for spent fuel shipments are selected by the carrier (i.e., trucking or railroad company) in consultation with the shipper (the nuclear utility or the DOE) consistent with U.S. Department of Transportation (DOT) and/or carrier-specific requirements. For transportation by public highway, carriers are required to select routes that reduce the time in transit. To facilitate this, DOT regulations specify the use of "preferred routes," meaning the U.S. interstate highway system and related city bypasses, where available. However, each State may designate alternate preferred routes to supplement the DOT-prescribed interstate highway system or to provide suitable alternatives to the interstate highway system. States use DOT guidance to evaluate and establish alternatives.

Question: Would there be any technical difficulties involved in permanently storing spent nuclear fuel on-site in dry casks at individual nuclear power plants?

Answer:

Yes. Dry casks have not been evaluated for permanent storage of spent nuclear fuel. Existing regulations limit the use of dry cask storage to 20 years, with options to renew. Although such casks are robust and should last far longer than 20 years, such a characteristic has not been evaluated for a time period spanning thousands of years (in contrast to what is being considered for a permanent repository). It is unlikely that the concrete and stainless steel casks would maintain their integrity in an open environment for thousands of years without replacement or repair.