Department of Energy

Washington, DC 20585

May 24, 2011

MEMORANDUM FOR TIMOTHY A. FRAZIER
DESIGNATED FEDERAL OFFICER
BLUE RIBBON COMMISSION ON AMERICA'S
NUCLEAR FUTURE

FROM: GLENN S. PODONSKY
CHIEF HEALTH, SAFETY AND SECURITY
OFFICER
OFFICE OF HEALTH, SAFETY AND SECURITY

SUBJECT: Blue Ribbon Commission on America's Nuclear Future

This memorandum is a response to requests for additional information from members of the Blue Ribbon Commission at its May 13, 2011, public hearing. Commissioner MacFarlane requested information on the fuel storage configurations in the fuel pools for the Department's two Category 1 nuclear reactors. Commissioner Moniz requested information on the rationale for categorization of the high-level waste tanks at the Department's Hanford and Savannah River sites as Category 2 nuclear facilities. He also requested the Department's position on separating disposal solutions for defense and civilian high-level radioactive wastes.

Please transmit the attachment to the Blue Ribbon Commission as the Department's response to the information requested and express to the Commissioners the Department's appreciation for the opportunity to present information on our nuclear safety program. They may contact me at (202) 287-6071 if they have any further questions.

Attachment

Attachment

Responses to Questions to the Department of Energy from the May 13, 2011 Blue Ribbon Commission Public Meeting

Question: What is the fuel storage configuration for the two Category 1 nuclear reactor fuel pools? Specifically, is the fuel storage in a densely packed configuration like observed at commercial nuclear reactors?

Response: The Department's two Category 1 nuclear reactors are the Advanced Test Reactor (ATR) at the Idaho National Laboratory and the High Flux Isotope Reactor (HFIR) at the Oak Ridge National Laboratory.

The ATR pool serves multiple functions in support of ATR operations in addition to fuel storage. The fuel storage occupies roughly only 25% of the pool footprint. In that area, the fuel could be considered densely packed, but not as much so as a commercial spent fuel pool. Because of the large pool size relative to the fuel stored, forced cooling of the pool water is not required, although the capability exists. Short bulkheads ensure that a draining accident in another area of the pool would not uncover the fuel in the fuel storage area. ATR does not store all spent fuel in its pool, but has historically shipped spent fuel to the INTEC 666 facility once it has cooled enough to allow air storage. All fuel in the INTEC 666 pool is decayed sufficiently to no longer require water cooling; water is only needed for shielding. Although ATR uses poisoned storage racks, the large pool capacity and shipping to INTEC 666 has averted any need to increase storage capacity.

The HFIR spent fuel pool is not packed densely like a commercial nuclear spent fuel pool. There are a total of 102 locations for the storage of HFIR cores in the spent fuel pool. These storage locations occupy less than half of the footprint of the pool containing spent fuel. There are currently 41 HFIR cores stored in the spent fuel pool, equating to less than ½ metric ton of uranium fuel. US commercial nuclear power spent fuel pools often contain greater than 1000 metric tons of uranium fuel. The HFIR spent fuel does not require active forced cooling. Cooling of all HFIR spent fuel (even immediately after discharge from the reactor) is by natural convection to the water in the pool. The HFIR spent fuel pool has sufficient thermal capacity to accommodate a loss of all ac power without boil off of the pool. Spent fuel that has decayed for 270 days can be cooled via natural convection to air.

Question: How did the Department determine the categorization of Hazard Category 2 for the Department's high-level waste tanks (at Hanford and SRS) given the potential hazards that they present?

Response: 10 CFR 830.202(b), "Safety Basis" states that:

> "In establishing the safety basis for a hazard category 1, 2, or 3 DOE nuclear facility, the contractor responsible for the facility must…categorize the facility consistent with DOE–STD–1027–92..."

DOE–STD–1027–92 sets forth the methodology for categorizing a DOE nuclear facility, and provides the following:

> "... contractors shall be required to perform a Hazard Analysis of their nuclear activities and ... classify the consequences of unmitigated releases of hazardous radioactive and chemical material in the following categories:
>
> Category 1 Hazard: The Hazard Analysis shows the potential for significant off-site consequences.
> Category 2 Hazard: The Hazard Analysis shows the potential for significant on-site consequences.
> Category 3 Hazard: The Hazard Analysis shows the potential for only significant localized consequences."

DOE–STD–1027–92 also includes interpretations and discussion of these definitions as follows: Category A reactors (reactors that have a steady-state thermal power level greater than 20 MW) and facilities designated by a Program Secretarial Officer are classified as HC 1. Under the DOE-STD-1027-92 methodology, Hazard Category (HC) 1 facilities have the potential for significant offsite consequences based on total curie content and potential for radiological dose, potential material forms, and maximum energy for dispersion available under the postulated hazards analysis.

Under DOE-STD-1027, facilities with the potential for nuclear criticality events or with sufficient quantities of hazardous material and energy which would require on-site emergency planning activities in an accident scenario are classified as HC 2. The threshold values for fissile material are the minimum theoretical mass necessary for a nuclear criticality to occur with moderation and reflection. The approach for designating HC 2 facilities on the basis of hazardous material inventory was constructed from the NRC's regulations for byproduct material licensees which define minimum thresholds for many radionuclides on the basis of consequences from these hazards in the vicinity of a facility.

The tank farms at Hanford and Savannah River are currently both classified as HC 2 facilities based on comparing their radionuclide inventories to the threshold quantities given in DOE-STD-1027-92. The tank farms differ from reactors in that the decay heat energy in the waste is only a small fraction of that of a commercial nuclear reactor, are not operated at the high pressures and temperatures associated with reactors, and the Hanford and Savannah River tank farm site boundary distances used for calculating postulated public exposures are much larger than typical reactor sites.

Question: Does it make sense for the United States to re-evaluate its policy for managing high-level radioactive waste ("HLW") by separating the disposal solutions for defense and civilian waste?

Response: Given that it has been over twenty-five years since the Presidential determination that a defense only repository was not required, it makes sense to re-evaluate that determination in light of current conditions. Among other things, the Department has successfully disposed of other types of defense waste over the past two decades and this experience may provide additional insights on the disposition of defense HLW. Accordingly, the Department will give

serious consideration to a Commission Recommendation concerning separate disposal solutions for defense and civilian waste. The Department will evaluate such a recommendation within the relevant legal context, including Section 8 of the Nuclear Waste Policy Act, and take into consideration factors relating to cost efficiency, health and safety, regulation, transportation, public acceptability, and national security.