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Writer's Direct Dial Number

May 5, 1981
LL2-81-0118

TMI Program Office
Attn: Mr. Lake Barrett, Deputy Director
U. S. Nuclear Regulatory Commission
c/o Three Mile Island Nuclear Station
Middletown, PA 17057

Dear Sir:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Submerged Demineralizer System

During discussions with members of your staff you requested that we provide an analysis to determine the consequences of possible water in-leakage into a dry, spent SDS ion exchange vessel. This letter provides our response to your request.

In the unlikely event that water leaked into a dry, spent SDS vessel while in storage and the maximum centerline temperature had been reached, the water would flash to steam. As a result of the generation of steam three primary consequences could result. They are:

1. Steam would enter the storage vent header.
2. Pressure in the vessel would increase if the vent header were plugged.
3. Increased tritium levels in the offgas.

Steam entering the vent header is prohibited from depositing on the offgas HEPA filters by virtue of its passage through the offgas separator where condensation of the vapor occurs.

Water inleakage to a dried, spent SDS vessel would not present a dangerous situation due to the venting provided in the vessel design. However, the vessel will remain intact even if the vent were plugged. Worst case inleakage would occur if water is introduced to the hot centerline resins. Calculations show that a maximum centerline temperature for the zeolite could be as high as 435°F for 60,000 (Cs-137) curie loading of the SDS liners. Water contacting these resins would be vaporized.

The SDS liners are designed to withstand an internal pressure of 350 psig and will be hydrostatically tested to a pressure of 525 psig. Saturated steam at the projected centerline temperature of 435°F has an

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absolute pressure of 360 psi. Steam produced by this mechanism would not rupture the vessel, ignoring 1) the venting and 2) the cooling provided by the heat sink of pool water and 3) significant external pressure. Any heat of hydration released upon inleakage to a dried bed would be dissipated to the heat sink provided by the fuel pool, and the vessel would remain intact. Furthermore, such a dried bed is not expected to exist; the SDS zeolite liners will be stored submerged under "wet" conditions and will not self-dry to any appreciable extent. Calculations show that the minimum dehydrating time for a 60,000 curie-loaded bed is approximately fourteen years.

Although it is possible, under water inleakage conditions, to increase the amount of tritium released in the SDS offgas, this additional amount of tritium is insignificant. Our calculations indicate that the additional tritium released will be 1.2×10^{-3} µCi/sec. This compares to a normal tritium source term of 8.14 µCi/sec.

Should you have any questions or wish to discuss this matter, please contact Mr. L. J. Lehman, Jr. of my staff.

Sincerely,

G. K. Hovey
Vice-President and
Director, TMI-2

GKH:LJL:djb

cc: Dr. B. J. Snyder, Director - TMI Program Office