Nuclear

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December 17, 1982
4410-82-L-0072

TMI Program Office
Attn: Mr. L. H. Barrett, Deputy Program Director
US Nuclear Regulatory Commission
c/o Three Mile Island Nuclear Station
Middletown, PA 17057-0191

Dear Sir:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Shipment of Spent SDS Liners Which Require Special Passification Systems

The purpose of this letter is to inform your office of GPUNC's intent to commence shipping SDS spent liners which require special passification systems.

In accordance with your letter, NRC/TMI-82-032, dated May 19, 1982, the following information is being provided in order to demonstrate compliance with the Certificate of Compliance (C.O.C. No. 9152/B) for the CNS 1-13C II shipping container.

As stated in GPU letter 4410-82-L-0041 dated November 11, 1982, the water remaining in the SDS liner in the form of zeolite hydration water and free water (non-hydration water) will not exceed 120 lbs. during shipment. To verify that this criterion is met, two independent methods of verification must be satisfied.

Method 1 - Measured

Following SDS liner removal from the SDS processing train and prior to interim storage in the spent fuel pool, the spent SDS liner is bulk dewatered in accordance with TMI-2 procedures. Following this evolution, it is estimated that the SDS liner then contains 220 lbs. of total water. (This has been demonstrated by testing performed by Rockwell Hanford Operations and verified by cold functional testing performed at TMI-2.) After moving from interim storage and prior to attaching the liner to the SDS Vacuum Offgassing System, the liner is weighed, dewatered, and weighed again. The liner is

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then attached to the SDS Vacuum Offgassing System and water is continued to be removed by vacuum drying. This step is continued until sufficient water is removed from the liner or a significant drop in internal liner pressure occurs. After initial liner pressure drawdown by the SDS Vacuum Offgassing System, if the pressure drops off significantly (i.e. greater than 4mm of mercury), this indicates that very little free water remains in the liner and the total water content of the liner is well below the 120 lb. criteria. If inleakage did occur during storage, it will be identified by Method 2.

Method 2 - Calculated

This method uses the same liner weights as in Method 1, however, the final weight of water is determined by adding the empty liner weight to the weight of bone dry zeolite contained in the liner and the buoyancy effects are subtracted. This calculated weight is subtracted from the measured liner weight under water. This value is the total water remaining in the liner. Empty liners have varied in weight from 717 lbs. to 735 lbs. The lower weight will be used in the calculation since this would make the calculation conservative for heavier liners.

In order to ensure that combustible mixtures of gas are not present in the liner during shipment, a H_2O_2 recombiner catalyst will be added to the vent screen of the liner via a 1 1/2 inch Hansen connection on the vent nozzle. This arrangement has been demonstrated to be effective at recombining H_2O_2 gases by Rockwell Hanford Operations testing under various liner orientations and internal pressures ranging from the vapor pressure of water to 1 atmosphere. As discussed in GPU letter 4410-82-L-0022 dated October 13, 1982, the rate of H_2O_2 gas addition during testing was 3 liters/hour which is more than a factor of 2 times the measured rate of 1.25 liters/hour which was generated by the highest curie loaded SDS liner (D10012). In all tests, the liner internal pressure stabilized and no detectable H_2 was found when internal liner gases were sampled. Once the catalyst is added to the liner, the liner is pumped down to approximately the vapor pressure of water and then isolated on a pressure/vacuum gauge to verify proper catalyst operation. The gas generation for SDS Liner D10012 will be monitored for 14 days prior to shipment. Subsequent liners will be monitored for a sufficient period to ensure proper catalyst operation. The liner pressure, when loaded into the shipping cask, will be approximately the vapor pressure of water. Any liners that are determined to leak will be handled on a case-by-case basis for shipping. Pressures during the isolation period will be monitored and the pressure increase rate will be calculated to determine the shipping window. In order to detect any water leakage into the liner, it will be weighed periodically during the isolation period.

At the completion of the isolation period or upon reaching an upper limit of 10 psia on the liner pressure rise, the liner gas inventory will be sampled to determine concentrations of combustible gases. This modifies the 5 psia limit contained in GPU letter 4410-82-L-0022 and is based on experience gained during the testing performed on D10012. These results, along with the calculated pressure increase rate data, will be included in the shipping package for each liner. In order to comply with C.O.C. No. 9152/B, hydrogen gas concentrations will be shown to be limited to a molar quantity that would be no more than 5% by volume of the liner gas void if present at standard temperature and pressure (i.e. no more than 0.063g-moles/ft^3 at 14.7 psia and 70°F). If this cannot be

demonstrated, due to nonstoichiometric production of hydrogen and oxygen, the liner will be monitored prior to shipment to assure that oxygen shall be limited to 5% by volume at standard temperature and pressure during shipment.

Lastly, the 1-13C II shipping cask void space will be inerted with nitrogen prior to each shipment to below 5% O_2 volume at standard temperature and pressure to ensure that oxygen does not enter the liner in the unlikely event a leak should develop between the liner and shipping cask cavity during shipment.

This information should be sufficient for your approval to ship all spent SDS ion-exchange filled liners requiring the recombiner catalyst for safe shipment. As stated previously, any liner that develops a leak will be identified during the isolation period and will be handled on a case basis.

Sincerely,

B. K. Kanga

B. K. Kanga
Director, TMI-2

BKK/JJB/jep

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