January 9, 2012

MEMORANDUM TO: D. Blair Spitzberg, Ph.D., Chief
Repository and Spent Fuel Safety Branch
Division of Nuclear Material and Safety
Region IV

FROM: Michael D. Waters, Chief **/RA/**
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

SUBJECT: TECHNICAL ASSISTANCE REQUEST RESPONSE – DEGRADATION OF CONCRETE HORIZONTAL STORAGE MODULES AT DEPARTMENT OF ENERGY'S THREE MILE ISLAND UNIT-2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (TAC NO. L24547)

PROJECT:

The Division of Spent Fuel Storage and Transportation (SFST), Office of Nuclear Material Safety and Safeguards (NMSS), has completed its work associated with the May 31, 2011, Technical Assistance Request (TAR) (ML11270A246) from the Region IV Repository and Spent Fuel Safety Branch regarding the concrete degradation of the Horizontal Storage Modules (HSMs) at the Three Mile Island Unit 2 (TMI-2) Independent Spent Fuel Storage Installation (ISFSI). The responsibility for responding to the TAR, which was addressed to Eric Benner, was subsequently assigned to the Licensing Branch of SFST.

REQUESTED ACTIONS:

(1) Review the proposed actions identified by Department of Energy (DOE) in their May 3, 2011, letter to correct the concrete problem with the HSMs and the actions completed as described in Section 1.2 (i) of the inspection report and make a determination of the adequacy of DOE's actions to correct the problem. This would include reviewing the technical basis for their proposed actions (i.e. the results of the independent consultant report).

(2) Make an independent determination of the adequacy of the independent consultant's evaluation as to whether there is reasonable assurance that the independent evaluation was sufficiently comprehensive to fully identify the extent of the problem and to come to the conclusion that the design basis function of the HSMs is still being met in their current condition.

(3) Determine if a follow-up inspection of the TMI-2 ISFSI should be performed upon completion of the planned actions by DOE to independently assess their effectiveness. If a follow-up inspection is advisable, Region IV requests support from individuals knowledgeable in structural concrete capable of independently assessing the adequacy of the corrective actions taken by DOE and the current physical condition of the HSMs.

(4) Determine if a generic evaluation may be appropriate relative to the use of this design of HSM at other sites and the potential for this same problem to occur at other ISFSIs.

RESPONSES TO REQUESTED ACTION:

SFST reviewed the following documents in conducting its evaluation of the concrete problem at the TMI-2 ISFSI: NRC Inspection Report 72-20\2011-01 (ML11097A028), the DOE response to NRC Inspection Report 72-20\2011-01 (ML11130A126), the technical report upon which the DOE responses were based (ML111920258) and Engineering Design Files submitted by DOE to SFST (ML112200329). In addition, SFST held two phone calls (ML111990038 and ML112510384) with DOE personnel to discuss the technical content of these documents as well as one phone call with the licensee of the HSMs utilized at the TMI-2 ISFSI (ML112030412). Based upon its review of these documents and these discussions, SFST staff developed the following responses to your requests:

1. The mitigative actions taken by the DOE have been adequate to correct the problem thus far. Additional corrective action plans proposed by DOE appear to be adequate.

2. The technical report upon which the DOE based their responses to ML11097A028 is sufficiently comprehensive and fully identifies the extent of the problem. Also, staff agrees that there is reasonable assurance that the HSMs meet their design bases in their current condition.

3. A follow up inspection is warranted. SFST believes repairs can be readily verified either by visual inspection (e.g., installation of caps, silicone sealant, etc.) or review of records (e.g., resin injection, waterproof sealant application, etc.). SFST can support inspections if necessary.

4. Design documents for this particular horizontal storage system indicated that thru hole penetrations, the primary entry mode for the water which subsequently caused cracking in the HSMs during freeze/thaw cycles at the TMI-2 ISFSI, are not common to this design. Discussions with the licensee were held to identify if this design, and the associated thru hole penetrations, was employed at other ISFSI sites (ML112030412). The Millstone ISFSI site was identified by the licensee as being the only other site which both employed this design and utilized thru hole penetrations. Although cracks were reported at the Millstone ISFSI, the problem was not as extensive as that identified at the TMI-2 ISFSI. The primary difference between the two ISFSI sites was better implementation of water exclusion materials (gaskets, silicone sealants, etc.) around the thru hole penetrations at the Millstone ISFSI versus the TMI-2 ISFSI. In addition, heat generated by the waste at the TMI-2 ISFSI is low while the heat currently generated by the spent fuel stored at the Millstone ISFSI site is higher. The higher heat generation would reduce the number of freeze/thaw cycles. Therefore, staff reached the conclusion there are no significant issues with the use of this design at other sites.

In addition to the TMI-2 ISFSI and the Millstone ISFSI mentioned above, staff learned that an HSM design employed at the Rancho Seco ISFSI also utilized thru hole penetrations. Therefore, staff will request Transnuclear identify in writing all ISFSI sites employing HSM designs with thru hole penetrations. This information will subsequently be forwarded to the Region offices. Staff believes inspection and maintenance activities by licensees should focus on early identification and mitigation of potential degradation in penetrations and appropriate aging management maintenance actions should be incorporated into the license renewal. SFST recommends that routine NRC inspections focus on licensee inspection and maintenance

activities of HSM designs that may be susceptible to this phenomenon. It is recommended that future 72.48 changes to HSM designs be reviewed for possible incorporation of thru hole penetrations or other changes that may result in accelerated weathering. SFST staff will also verify the licensee includes appropriate aging management plans when the license is submitted for renewal.

With submittal of this response, SFST considers this TAR closed.

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(301) 492-3148

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