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March 8, 2021
E-58415

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Subject: Replacement Pages for NUH-003, Updated Final Safety Analysis Report (UFSAR) for the Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel, Revision 19

Reference: 1. Letter from Prakash Narayanan to NRC Document Control Desk, "NUH-003, Updated Final Safety Analysis Report (UFSAR) for the Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel, Revision 19," January 22, 2021 (E-57435)

2. Letter from Jayant Bondre to NRC Document Control Desk, "NUH-003, Updated Final Safety Analysis Report (UFSAR) for the Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel, Revision 16," July 27, 2017 (E-46684)

TN Americas LLC (TN) has discovered two CoC 1004 UFSAR pages that require replacement. Specifically, page T.5-19 was modified incorrectly during preparation of Reference 1 and is being provided for replacement. In addition, page T.4-22 was inadvertently omitted from Reference 2 and is also being provided herein. Neither of the replacement pages for the UFSAR contains proprietary information. Accordingly, the corrected public replacement pages are provided in the Enclosure.

This situation has been entered into TN's corrective action program and actions are in progress to prevent recurrence.

Should you have any questions regarding this submittal, please do not hesitate to contact Mr. Douglas Yates at 434-832-3101, or by email at Douglas.Yates@orano.group.

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Don Shaw
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cc: Christian Jacobs (NRC DFM)

Enclosure:

Replacement Pages for NUH-003, Standardized NUHOMS® UFSAR, Revision 19 (Public Version)

Enclosure to E-58415

Replacement Pages for NUH-003, Standardized NUHOMS® UFSAR, Revision 19 (Public Version)

The temperature profiles of the TCs and the 61BTH DSC shell and top and bottom cover plates and shield plugs obtained from the results of the OS197FC-B TC analysis with 19.4 kW, 22.0 kW, 27.4 kW, and 31.2 kW heat loads are used in thermal stress calculations.

T.4.5.3 OS197FC-B TC Thermal Model Results

The maximum temperature results for the 61BTH DSC shell assemblies and TC components during transfer are presented in Table T.4-7 through Table T.4-9. These results are for 31.2 kW and 22.0 kW heat loads. The DSC shell temperatures are then used as boundary conditions in the 61BTH DSC basket analysis presented in Section T.4.6.

This section presents the thermal evaluation of transfer operations for 61BTH DSC with HLZCs 1 through 8. Thermal evaluation of 61BTH DSC for HLZCs 9 and 10 is presented in Section T.4.6.10.

T.4.5.3.1 Normal and Off-Normal Conditions Results

Table T.4-7 presents the maximum steady state component temperatures for the configuration of the TC with a 61BTH Type 1 DSC with 22.0 kW and 19.4 kW of decay heat. All component temperatures are well below their associated maximum allowable limits. Figure T.4-14 illustrates the temperature distribution within the TC at steady-state conditions during vertical transfer operations with no insolation and 120 °F ambient.

Transient analyses are performed to determine the time limit for DSC transfer operations for 61BTH Type 2 DSC with a decay heat load higher than 22.0 kW up to 31.2 kW. The analyses assume that the transient analysis begins with water in the TC/DSC annulus and that with the TC in a vertical orientation (i.e., no credit is taken for heat transferred through the canister rails). At time = 0, the annulus water is assumed to be drained and the bolting of the TC top cover is initiated. This causes the system to heat up. Figure T.4-17 illustrates the predicted thermal response of the DSC and TC for this transient, assuming a decay heat load of 31.2 kW in a 61BTH Type 2 DSC. Figure T.4-17 also shows the steady state results of the same case. Based on targeted DSC shell temperatures of approximately 405 °F (for HLZC 7) and 445 °F (for HLZCs 5, 6 and 8) to avoid excessive fuel cladding temperatures, the transient analysis indicates that approximately 15 and 28 hours, respectively, are available to transfer the DSC into the HSM-H or take some other corrective actions. The anticipated corrective actions are:

- Complete the transfer of the DSC from the TC to the HSM-H, or
- Unbolt the TC top cover plate and flood the TC/DSC annulus with water if the TC is vertical, or
- Use of an external fan to circulate the air in the TC/DSC annulus if the TC is horizontal, or
- Return the TC to the TC handling area, unbolt the TC top cover plate and reflood the TC/DSC annulus with clean water.

T.5.4.6 Assumptions

The following general assumptions are used in the analyses. Shielding analysis models using radiological sources described earlier and based on the assumptions described next result in bounding dose rates for the arrangements of the fuel assemblies in the DSCs as prescribed by HLZCs depicted on Figures T.2-1 through Figure T.2-8, Figure T.2-10, and Figure T.2-11 of Chapter T.2.

T.5.4.6.1 Source Term Assumptions

- The primary neutron source in LWR spent fuel is the spontaneous fission of ^{244}Cm. For the ranges of exposures, enrichments, and cooling times in the fuel qualification tables, ^{244}Cm represents more than 90% of the total neutron source. The neutron spectrum is, therefore, relatively constant for the fuel parameters addressed herein and is assumed to follow the ^{244}Cm fission spectrum provided in Section T.5.2.2.
- The BWR heavy metal weight is assumed to be 0.198 MTU per fuel assembly. Radiological sources from such an assembly result in bounding dose rates for the NUHOMS® 61BTH system loaded with its authorized content if used in the shielding analysis models described next.

T.5.4.6.2 HSM-H Dose Rate Analysis Assumptions

- The 61BTH DSC and fuel assemblies are positioned as close to the HSM-H front door as possible to maximize the HSM-H front wall dose rates.
- Planes of reflection are used to simulate adjacent HSM-Hs.
- Embedment and rebar in the HSM-H concrete are conservatively neglected.
- Penetrations on the exterior of the HSM-H modules for instrumentation and ease of installation are not modeled since they do not result in any significant change in the dose rate distribution and are covered by other modeling conservatisms.
- The borated neutron absorber sheets in the 61BTH DSC are modeled as aluminum.
- An axial source distribution is discussed in Section T.5.2.3 is utilized.
- Fuel is homogenized within the fuel compartment, although the 61BTH DSC basket is modeled explicitly.

T.5.4.6.3 HSM Model 102 Dose Rate Analysis Assumptions

The dose rates for HSM Model 102 were also calculated using MCNP. Those dose rates are due to bounding 61BTH DSC Type 1 loading configuration sources. This configuration includes 0.393 kWt/FA assemblies in the central 25 fuel compartments. The next layer of 24 fuel compartments holds *0.48* kWt/FA assemblies, the outer compartments admit assemblies generating 0.54 kWt/FA. Note that this is also a fictitious loading configuration because more than 22.0 kWt/DSC heat load is not allowed for 61BTH DSC Type 1 and HSM Model 102 configuration. This “fictitious” configuration is depicted in Figure T.5-1. The same set of assumptions listed in Section T.5.4.6.2 applies to MCNP model of HSM Model 102.