orano

Columbia Office
7135 Minstrel Way
Columbia, MD 21045
Tel: (410) 910-6900
@Orano_USA

July 25, 2018
E-52083

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

Subject: Submittal of Biennial Report of 10 CFR 72.48 Evaluations Performed for the Standardized NUHOMS® System, CoC 1004, for the Period 07/26/16 to 07/25/18, Docket 72-1004

Pursuant to the requirements of 10 CFR 72.48(d)(2), TN Americas LLC hereby submits the subject 10 CFR 72.48 summary report. Enclosure 1 provides a brief description of changes, tests, and experiments, including a summary of the 10 CFR 72.48 evaluation of each change implemented from 7/26/2016 to 7/25/2018, including indication as to whether the evaluations had associated Updated Final Safety Analysis Report (UFSAR) changes that will be incorporated into the UFSAR for the CoC 1004 Standardized NUHOMS® System.

Should you or your staff have any questions regarding this submittal, please contact Mr. Dennis Williford by telephone at (704) 805-2223, or by e-mail at Dennis.Williford@orano.group.

Sincerely,

Jayant Bondre
Chief Technical Officer

cc: Christian J. Jacobs (NRC SFM), provided in a separate mailing

Enclosure:

1. Biennial Report of 10 CFR 72.48 Evaluations Performed for the Standardized NUHOMS® System For the Period 07/26/16 to 07/25/18

IE47
NMSS26
NMSS

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

Enclosure 1 Part 1 - DESIGN CHANGES

Licensing Review (LR) 721004-1432, Revision 2 – (incorporated into UFSAR Revision 16)

Change Description

A summary of Revision 0 of this LR was provided in the previous biennial summary report (E-44173 dated July 25, 2016, ML16209A246). The purpose of Revision 2 to this LR is to remove this LR as TN Americas LLC's (TN's) 10 CFR 72.48 assessment for the design basis and licensing basis changes for the 32PTH1 Type 2-W. A new and separate LR (721004-1586 Revision 0, which is also summarized in this submittal) has been generated to support this new design, using a different method of evaluation.

Evaluation Summary

The proposed changes in Revision 0 of this LR involve the introduction of new 32PTH1 Type 2-W basket. The 32PTH1 Type 2-W design is based on the existing basket designs provided on drawing NUH32PTH1-400X Series. The proposed new design option consists of a reduction in poison plate thickness and reduction in the thickness of the center section basket plates, intended to accommodate the fabrication of a larger fuel compartment size with a corresponding larger fuel gauge size. The evaluation summary and conclusions in Revision 2 of this LR have been changed to indicate that this proposed change results in a departure from a method of evaluation described in the UFSAR used in establishing the design bases or in the safety analyses. Therefore, this change, if evaluated using the methodology employed in this specific LR, may not be implemented without an amendment.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

LR 721004-1507 Revision 0 – (incorporated into UFSAR Revision 16)

Change Description

This change implements changes to the 32PTH1 Type 2-W system to accommodate the new contents authorized by Amendment 14. Table 1 below lists these changes to the 32PTH1 Type 2-W system.

Table 1

ITEM No.	DESCRIPTION OF CHANGES
1	Increase the maximum uranium loading from 490 kgU per assembly to 492 kgU per assembly for fuel to be stored in the 32PTH1 Type 2-W dry shielded canisters (DSCs).
2	Expand the fuel qualification tables for fuel to be stored in the 32PTH1 Type 2-W DSCs for burnup and enrichment combinations not previously allowed, specifically analyzing fuel assemblies with 3.2 and 3.3 wt.% U-235 initial enrichment values with a burnup range of 57 to 60 GWd/MTU.
3	Allow for the storage of up to four failed fuel cans (FFCs) in the 32PTH1 Type 2-W DSC in a new heat load zoning configuration (HLZC) No. 4. The FFCs shall be located in the four corners of the 16 innermost fuel cells within the DSC. In addition, see Change No. 8 for an alternate arrangement for storage of damaged assemblies in HLZC No. 4.
4	Create a new 32PTH1 Type 2-W HLZC No. 4 which is capable of up to 16 damaged SFAs, up to 4 FFCs and balance intact SFAs. The total heat load for the DSC for this new HLZC is limited to 31.2 kW.
5	Evaluate the shielding impacts of 32PTH1 Type 2-W DSC stored in the HSM-H with a concrete density reduced from 145 pcf to 140 pcf, and uniform gaps at 1.5 inches between the HSM-H modules.
6	Update the existing Fuel Qualification Table (FQT) for the 32PTH1 Type 2-W DSC with a heat load of 1.2 kW/FA as the current FQT is a conservative approximation.
7	Allow up to sixteen FFCs to be stored in the 32PTH1 Type 2-W DSC when stored in HLZC No. 3.
8	Allow for an alternative loading configuration in HLZC No. 4 of up to 16 damaged fuel assemblies in the peripheral cells of the 32PTH1 Type 2-W DSC.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

Evaluation Summary

The design criteria for the NUHOMS® 32PTH1 Type 2-W DSC are identical to those defined in Chapter U.2 of the UFSAR for the NUHOMS® 32PTH1 DSC. The fuel to be loaded in the 32PTH1 Type 2-W DSC is identical to the content authorized by Amendment 14 to Certificate of Compliance (CoC) No. 1004. The 32PTH1 Type 2 basket analyses with intact fuel bound those when the basket is loaded with failed fuel.

The structural evaluation provided in UFSAR Section U.3.6.4 for the 32PTH1 FFC DSC remains bounding for the 32PTH1 Type 2-W DSC since the difference in external dimensions of the two alternate FFCs is minimal.

The maximum fuel cladding temperatures as a result of these changes are bounded by the design basis temperatures determined for the 32PTH1 Type 2 DSC. Since these changes lead to a reduction in the maximum fuel cladding temperatures, a similar behavior will be observed in the 32PTH1 Type 2-W DSC. Therefore, the maximum fuel cladding temperatures for the 32PTH1 Type 2-W DSC remain bounding. A review of the maximum DSC components temperatures indicate that they remain bounded by the design basis values determined for the 32PTH1 Type 2 DSC. For the addition of HLZC No. 4 including damaged and failed fuel assemblies, the thermal evaluation shows that the maximum basket component temperatures increase during accident conditions. However, there are no structural load combinations dependent on these component temperatures for accident conditions. Therefore, there is no structural impact due to these changes.

For the reduction in the HSM-H concrete density from 145 lbm/ft^3 to 140 lbm/ft^3, an increase of 10 °F is observed in the maximum temperature of the HSM-H concrete. However, the evaluation was based on a maximum heat load of 40.8 kW for the 32PTH1 Type 1 DSC. Since the 32PTH1 Type 2-W DSC is limited to 31.2 kW, this small increase will not impact the thermal performance of the HSM-H concrete.

For the shielding evaluation, an increase in maximum uranium loading from 490 kgU/FA to 492 kgU/FA results in less than a 1% increase in the bounding total dose rate for the NUHOMS® 32PTH1 system, which is within the uncertainty of the shielding analysis method. This conclusion is also applicable to the 32PTH1 Type 2-W system.

Change No. 2 in Table 1 increases burnup enrichment combinations in the FQTs for the 32PTH1 Type 2-W DSC but decay heat limits on Heat Load Zone Configurations (HLZCs) are not changed. A heat load of 1.2 kW/FA FQT is added for FA in the new HLZC No. 4 in Change No. 6. However, the maximum decay heat per DSC remains unchanged at 31.2 kW per DSC for the NUHOMS® 32PTH1 Type 2-W DSC. Even though HLZC No. 4 can load FAs with a decay heat load of 1.2 kW/FA and 1.5 kW/FA, the assumed 32 kW per DSC source terms in Chapter U.5 of the UFSAR still bound the 32PTH1 Type 2-W DSC. Given that the maximum dose rates around the OS200 TC loaded with the NUHOMS® 32PTH1 Type 2 DSC presented in UFSAR Table U.5-3 bound the maximum dose rates presented in UFSAR Table U.5-19 when loaded with the 32PTH1 Type 2-W DSC, it is concluded that changes No. 2 and 6 do not adversely affect the shielding analysis presented in the UFSAR.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

Changes No. 3, 4, and 7 introduce FFCs in the 32PTH1 Type 2-W DSC. Amendment 14 allows FFCs to be loaded in HLZCs No. 3 and No. 4 with the maximum allowable heat load per FFC limited to 0.8 kW. When FFCs are loaded in HLZC No. 3, the maximum heat load is reduced from 24.0 kW per DSC to 12.8 kW per DSC. The assumed 32 kW per DSC source terms in Chapter U.5 of the UFSAR still bound the 32PTH1 Type 2-W DSC with changes No. 3, 4, and 7. Given that the maximum dose rates around the OS200 TC loaded with the NUHOMS® 32PTH1 Type 2 DSC presented in UFSAR Table U.5-3 bound the maximum dose rates presented in UFSAR Table U.5-19 when loaded with the 32PTH1 Type 2-W DSC, it is concluded that changes No. 3, 4, and 7 do not adversely affect the shielding analysis presented in the UFSAR.

Change No. 5 in Table 1 is related to the HSM-H shielding analysis. The maximum dose rates around the OS200 TC loaded with the 32PTH1 Type 2 - W DSC in UFSAR Chapter U.5 demonstrate that the difference introduced by the Type 2-W DSC is bounded by the difference between the design basis source for the OS200 TC shielding and the bounding source terms for the 32PTH1 Type 2 DSC. The maximum decay heat of the design basis source is 46 kW per DSC while the maximum decay heat of the 32PTH1 Type 2 DSCs is 31.2 kW. Even though the design basis sources are different for the OS200 TC shielding and for the HSM-H shielding analysis, it is still reasonable to expect a similar relative difference between the HSM-H loaded with bounding sources for the 32PTH1 Type 2 - W DSC and the HSM-H loaded with design basis sources. Therefore, it is concluded that there are no adverse effects on dose rates on and around the HSM-H and site doses due to the design changes introduced with Change No. 5.

Change No. 8 allows 16 damaged fuel assemblies to be placed peripherally in the 32PTH1 Type 2-W basket in HLZC No. 4. This modification does not change the design basis sources or the maximum decay heat load of 31.2 kW for HLZC No. 4. For the shielding analysis, damaged fuel is identical to the intact fuel under normal conditions. Damaged fuel is modeled as rubble under accident conditions. Given the significant margins in terms of maximum dose rates around the OS200 TC loaded with the NUHOMS® 32PTH1 Type 2-W DSC, it is reasonable to expect a similar difference for the NUHOMS® 32PTH1 Type 2-W DSC under accident conditions. Therefore, it is concluded that there are no adverse effects of dose rates on and around the OS200 transfer cask due to Change No. 8.

A comparison of the 32PTH1 DSC MRC k_{eff} and the 32PTH1 Type 2 – W DSC MRC k_{eff} shows that the 32PTH1 MRC bounds the 32PTH1 Type 2 – W MRC with a margin of almost 6 σ. Therefore, the 32PTH1 Type 2 DSC maximum enrichment requirements for all fuel classes in intact, damaged and failed conditions as specified in the UFSAR are also applicable to the 32PTH1 Type 2 – W DSC.

The primary safety functions of the NUHOMS® 32PTH1 Type 2-W system to provide confinement, structural integrity, criticality control, heat removal, and limit occupational exposure to as low as reasonably achievable (ALARA) are not adversely affected by the proposed changes listed in Table 1.

All eight 72.48 evaluation criteria were met.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

LR 721004-1586 Revision 0 – (incorporated into UFSAR Revision 16)

Change Description

This change involves the introduction of the new 32PTH1 Type 2-W basket. The proposed new design option consists of a reduction in thickness of the paired aluminum and poison plates and reduction in the thickness of the center section basket plates, intended to accommodate the fabrication of a larger fuel compartment size with a corresponding larger fuel gauge size. This LR replaces LR 721004-1432 as TN's 10 CFR 72.48 assessment for the design and licensing basis changes for the 32PTH1 Type 2-W basket.

Evaluation Summary

Regarding structural and confinement boundary design, the structural analyses demonstrate that the DSC shell and other confinement boundary features satisfy ASME Code allowable values for all loading conditions of storage and transfer, as well as the side and end drop accident conditions, and the basket component stresses remain well within the ASME Code design basis limits and satisfy basket buckling criteria.

The subject design changes have no adverse effect on the credited confinement boundary design function for normal, off-normal and accident conditions of the system.

There is no adverse impact on criticality safety since the results of UFSAR Section U.6.4.2.B indicate that there is no reactivity effect due to a change in the poison/aluminum thickness. Similarly, there is no adverse impact on criticality safety due to the fuel compartment width dimension increase because, as discussed in UFSAR Section U.6.4.2.B, the MRC is characterized by the minimum fuel compartment tube size. The most limiting K_{eff} for the 32PTH1 Type 2-W DSC is 0.9321, which is bounded by the most limiting K_{eff} of 0.9360 for the 32PTH1 Type 1 DSC as currently reported in the UFSAR.

Regarding shielding, the dose rates reported in UFSAR Section U.5 also remain unchanged as a result of the introduction of the 32PTH1 Type 2-W basket.

Thermal performance of the 32PTH1 Type 2-W basket was evaluated using the same methodology and thermal model developed for the 32PTH1 Type 1 and Type 2 DSCs. The most limiting load cases for normal and off-normal conditions of storage are analyzed with the revised parameters for the 32PTH1 Type 2-W basket. For the bounding storage load cases, the results for the maximum fuel cladding temperature indicate an increase of +11 °F (728 °F) for the load case with only intact fuel assemblies and +16 °F (749 °F) with both intact and damaged fuel assemblies. Similarly for the bounding transfer load cases, the results for the maximum fuel cladding temperature indicate an increase of +10 °F (737 °F) with only intact fuel assemblies and +16 °F (747 °F) with both intact and damaged fuel assemblies. Based on these evaluations, the maximum fuel cladding temperature remains below the allowable temperature limits of 752 °F for normal, short term transfer operations and 1058 °F for off-normal, accident conditions. The 32PTH1 Type 2-W basket components are within temperature limits for their respective materials of the structures, system, and components, and they perform their intended safety function within the operating range for intact fuel assemblies or intact and damaged FAs during storage and transfer conditions.

Regarding pressure control, the thermal evaluation demonstrates that the internal DSC cavity pressures for the system are bounded by 32PTH1 Types 1 and 2 designs and remain within the specified design pressures of 15 psig for normal, 20 psig for off-normal and 140 psig for accident conditions.

All eight 72.48 evaluation criteria were met.

LR 721004-1595 Revision 0 – (no associated UFSAR change)

Change Description

At a general licensee (GL) site, when preparing for a loading campaign several years after the initial independent spent fuel storage installation (ISFSI) loading at that GL site, a new soil-structure interaction (SSI) analysis was obtained and the results for the site were higher than from the initial analysis. TN prepared a calculation that documents the continued design adequacy of the associated horizontal storage modules (HSMs) – Model HSM 80, and DSCs – 24P for increased accelerations, when subjected to the GL new SSI seismic loading. Calculations were also performed to check for the potential for overturning and sliding.

Evaluation Summary

The controlling factors of safety for HSM overturning and sliding were calculated to be 1.24 and 1.34, respectively for the original evaluation. The evaluation of the increased seismic loads decreased the factors of safety to 1.112 and 1.181, respectively, for overturning and sliding. The factors of safety are greater than the required value of 1.1 and are, therefore, acceptable. All demand/capacity ratios and stress ratios for all HSM components were found to be less than 1.0 and are therefore acceptable. The controlling component of the DSC shell and basket assemblies was determined to be the DSC shell. With the addition of pressure stress, the controlling stress ratio is less than 1.0 and is, therefore, acceptable.

Overall, demands on the HSM concrete components remain below the associated capacities, stresses in steel components and connections remain below the associated allowables, and acceptable factors of safety are maintained against HSM overturning, HSM sliding, and DSC overturning. As a result, it can be concluded that the HSM and DSC remain structurally unaffected by the increased seismic loads and, therefore, the thermal, shielding, criticality, and confinement design functions of the HSM and DSC are maintained and are unaffected.

All eight 72.48 evaluation criteria were met.

LR 721004-1596 Revision 0 – (no associated UFSAR change)

Change Description

At a general licensee (GL) site, when preparing for a loading campaign several years after the initial ISFSI loading at that GL site, a new soil structure interaction (SSI) analysis was obtained and the results for the site were higher than from the initial analysis. TN prepared a calculation which documents the design adequacy of the new proposed loading

configuration of horizontal storage modules (HSMs) – Model HSM-H, and dry shielded canisters (DSCs) – Model 32PTH1 for increased accelerations, when subjected to the GL new SSI seismic loading. Calculations were also performed to check for the potential for overturning and sliding.

Evaluation Summary

The controlling factors of safety for HSM overturning and sliding were calculated to be 1.03 and 1.33, respectively. The factors of safety are greater than the required value of 1.0 and are, therefore, acceptable. All demand/capacity ratios and stress ratios for all HSM components were found to be less than 1.0 and are, therefore, acceptable. Stresses in the controlling components of the 32PTH1 DSC shell assembly and basket assembly were scaled conservatively in consideration of the increased GL axial acceleration. All stress ratios are less than 1.0 and are therefore acceptable.

Overall, demands on the HSM concrete components remain below the associated capacities, stresses in steel components and connections remain below the associated allowables, and acceptable factors of safety are maintained against HSM overturning, HSM sliding, and DSC overturning. As a result, it can be concluded that the new HSM and new DSCs are structurally adequate considering the increased seismic loads, and therefore the thermal, shielding, criticality, and confinement design functions of the HSM and DSC are adequate also.

All eight 72.48 evaluation criteria were met.

LR 721004-1654 Revision 0 – (no associated UFSAR change)

Change Description

This change involves an analysis to accept a basket-to-shell gap of 0.420" diametrical that exceeds the 0.25" to 0.40" requirement provided in one of the UFSAR drawings for the NUHOMS® 61BTH Type 2 DSC.

Evaluation Summary

The larger gap results in a reduction of heat transfer from the basket to the shell, which, in turn, results in a 3°F rise in fuel cladding temperature and an increase in temperature values for the basket. The increased temperature in the basket assembly remains below the code allowable for normal, off-normal and accident conditions. The maximum temperature of the outside shell remains the same. The larger basket-to-shell gap results in nonconformances that are either negligible or already bounded by the current UFSAR evaluation.

The mechanical functionality, shielding capability, criticality control, and heat transfer capability during the fuel loading/unloading and DSC transfer operations remain unchanged.

All eight 72.48 evaluation criteria were met.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

LR 721004-1667 Revision 0 – (no associated UFSAR change)

Change Description

This activity involves an evaluation of foreign materials found within fuel assemblies during an inspection at a GL's spent fuel pool for acceptability for loading and storage in a NUHOMS® 61BTH Type 1 DSC at a GL's ISFSI. Three types of debris are present within the FAs, which require evaluation: (1) stainless steel or carbon steel metal debris in various geometries, (2) five small size (no larger than diameter of a fuel pin) paint chips/fuel bundle, and (3) PVC particles. The worst case values for each type of foreign material are obtained by conservatively considering that the quantity of debris is loaded into a single DSC with General Electric (GE)14 fuel type. The total weight of foreign material/debris is less than 0.15 lb.

Evaluation Summary

The potential addition of the very small amount of foreign material debris addressed by this evaluation does not have an adverse impact on the structural, thermal, criticality, confinement and shielding response of the DSC. The DSC remains in compliance with the allowable criteria identified in the UFSAR for the normal, off-normal, and accident conditions. For this condition, the relevant accident is the postulated DSC pressurization due to cladding failure. The added volume due to full vaporization of the paint chips and PVC material into hydrogen was conservatively evaluated, resulting in an added 4.6 ft^3 of hydrogen. The pressure increase due to the foreign material (conservatively calculated) of 2.2% will not cause the DSC design pressure to be exceeded.

Although the debris in the DSC (paint chips, PVC, carbon steel and stainless steel) could potentially cause some corrosion in an air/water environment, the lack of an oxidizing agent in the DSC and the inert helium gas fill of 99.75% of the free volume of the DSC will preclude any corrosion of the pressure boundary, basket (or other DSC components), or fuel assemblies. Therefore, corrosion from a very small amount of foreign material in a dry helium (inert gas) atmosphere is not a concern for the pressure boundary or the fuel cladding. In addition, the extremely small paint chip concentration will have no impact on the re-flooding operation. The quantity of foreign material (paint chip and PVC) in an inert 61BTH Type 1 DSC will have no impact on the performance of the DSC or fuel cladding.

The foreign material is of a small enough volume that no problems are anticipated in successfully vacuum drying or during any re-flooding operations. The change addressed by this evaluation does not affect system loading and unloading operations, nor does it alter any canister handling operations.

The volume of the foreign material is not sufficient to alter the DSC internal atmosphere and thus alter gaseous heat transfer. In addition, there is no impact on the confinement capabilities of the DSCs as there are no new leak paths introduced.

All eight 72.48 evaluation criteria were met.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

LR 721004-1692 Revision 0 – (no associated UFSAR change)

Change Description

This change involves an evaluation of foreign materials found within FAs during an inspection at a general licensee(GL)'s spent fuel pool for acceptability for loading and storage in a NUHOMS® 32PT DSC at a GL's ISFSI. Three types of debris are present within the FAs, which require evaluation: (1) steel metal chips debris in various geometries, (2) paint chips, and (3) plastic and fiber debris. The worst case values for each type of foreign material are obtained by conservatively considering that the quantity of debris is loaded into a single DSC with Westinghouse (WE)14X14 fuel. The total weight of foreign material/debris is less than 0.21 lb.

Evaluation Summary

The potential addition of the very small amount of foreign material debris addressed by this evaluation does not have an adverse impact on the structural, thermal, criticality, confinement and shielding response of the DSC. The DSC remains in compliance with the allowable criteria identified in the UFSAR for the normal, off-normal, and accident conditions. For this condition, the relevant accident is the postulated DSC pressurization due to cladding failure. The added volume due to full vaporization of the paint chips and plastic-fiber debris material into hydrogen was conservatively evaluated, resulting in an added 6.2 $ft.^3$ of hydrogen. The pressure increase due to the foreign material (conservatively calculated) of 4.55% will not cause the DSC design pressure to be exceeded.

Although the debris in the DSC (paint chips, plastic, fiber, carbon steel, and stainless steel) could potentially cause some corrosion in an air/water environment, the lack of an oxidizing agent in the DSC and the inert helium gas fill of 99.75% of the free volume of the DSC, will preclude any corrosion of the pressure boundary, basket (or other DSC components), or FAs. Therefore, corrosion from a very small amount of foreign material in a dry helium (inert gas) atmosphere is not a concern for the pressure boundary or the fuel cladding. In addition, the extremely small paint chip concentration will have no impact on the re-flooding operation. The quantity of foreign material (paint chip and plastic fiber) in an inert 32PT DSC will have no impact on the performance of the DSC or fuel cladding.

The foreign material is of a small enough volume that no problems are anticipated in successfully vacuum drying or during any re-flooding operations. The change addressed by this evaluation does not affect system loading and unloading operations, nor does it alter any canister handling operations.

The volume of the foreign material is not sufficient to alter the DSC internal atmosphere and thus alter gaseous heat transfer. In addition, there is no impact on the confinement capabilities of the DSCs as there are no new leak paths introduced.

All eight 72.48 evaluation criteria were met.

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

Enclosure 1 Part 2 – NONCONFORMANCES

LR 721004-1590 Revision 0 – (no associated UFSAR change)

Change Description

This change addresses the "Repair" disposition for a nonconforming fusion spot weld and spliced basket bar for a NUHOMS® 32PTH1 Type 2-W DSC. The proposed activity evaluates an increase in stress due to the spliced basket strap and two plug welds in lieu of autogeneous fusion spot welds.

The stainless steel tubes that make up the fuel compartment structure are welded to each other along the axial length of the basket at elevations corresponding to the stainless steel insert (strap) plates by autogeneous fusion welds applied through intermittently placed steel insert plates.

Evaluation Summary

The fusion spot welds and basket plate support bars do not perform any criticality or shielding functions and are not part of the DSC confinement boundary. In addition, the repair is far from the hottest center section of the DSC, so the impact to thermal functions is negligible. However, the change was evaluated for an adverse effect on the structural design function of the DSC basket. The associated calculation results show a minor increase in the stress ratio on the fuel compartment and basket straps. The supplier nonconformance evaluation and associated calculation demonstrate the structural adequacy of the welds and basket bar in the repaired condition. Component stresses still remain below the allowable stress intensity limits specified in the UFSAR.

All eight 72.48 evaluation criteria were met.

LR 721004-1662 Revision 2 – (no associated UFSAR change)

Change Description

This activity addresses a nonconformance at a general licensee (GL) site where there was a gap of 2 inches between the bottoms of the bases of two HSMs – Model 152s, due to a concrete basemat that did not meet Class A flatness criteria. The disposition of the nonconformance allows the use of stainless steel shims under the HSMs to aid in leveling of the HSMs for proper installation and fitup on the ISFSI basemat. The LR evaluates the impact of the shims and potential gaps between modules on the design basis functions of the HSMs.

Evaluation Summary

The structural evaluation of the HSM analyzes sliding of the module due to earthquake, flood, tornado-generated wind, and tornado-generated missile impact loads. The coefficient of friction between the stainless steel shims and concrete is less than that between concrete and concrete. Therefore, the frictional force will differ and sliding of the HSM module may be affected. The analysis performed for the stability of the HSM was redone with a reduced

REPORT OF 10 CFR 72.48 EVALUATIONS PERFORMED FOR THE STANDARDIZED NUHOMS® SYSTEM FOR THE PERIOD 07/26/16 to 07/25/18

coefficient of friction between the concrete and steel of 0.3 versus the original calculated concrete-on-concrete coefficient of friction of 0.6. The minimum factor of safety (FOS) is 1.21 and corresponds to the FOS against sliding due to the flood load (for a single array of loaded HSMs). Based on the above, the HSM satisfies the stability criteria.

The addition of two steel shim plates on any side of the HSM base in order to minimize any potential gaps with its adjacent HSM does not adversely affect the sliding resistance requirements. Note that a maximum of two shims are allowed per HSM and multiple shim plates cannot be stacked in order to minimize any gaps between the modules. A potential gap between two HSMs does not adversely affect the overturning stability requirements. The existence of a 2-inch maximum gap between adjacent modules does not affect the evaluation against local damage (i.e., perforation and scabbing) due to tornado-generated missile impacts. The 2-inch gap limit is smaller than 8 inches, which is the smallest diameter of the tornado-generated missiles. In conclusion, the use of shims or the existence of a maximum of a 2-inch gap between the HSM modules does not adversely affect the structural integrity of the design.

All eight 72.48 evaluation criteria were met.