TRANSNUCLEAR
AN AREVA COMPANY

January 7, 2011
E-30238

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 72.48 Evaluations Performed for the NUHOMS® HD System, CoC 1030, for the Period 01/10/09 to 01/07/11, Docket No. 72-1030

Pursuant to the requirements of 10 CFR 72.48(d)(2), Transnuclear, Inc. herewith submits the subject 72.48 summary report. Enclosure 1 provides a brief description of changes, tests, and experiments, including a summary of the 72.48 evaluation of each change implemented from 01/10/09 to 01/07/11, including indication as to whether the evaluations had associated Updated Final Safety Analysis Report (UFSAR) changes that were incorporated into the UFSAR for the NUHOMS® HD System, Revision 2, submitted on October 2, 2009.

Should you or your staff require additional information, please do not hesitate to contact me at 410-910-6878 or Dr. Jayant Bondre at 410-910-6881.

Sincerely,

Donis Shaw
Licensing Manager

cc: B. Jennifer Davis (NRC SFST), provided in a separate mailing

Enclosures:

1. REPORT OF 72.48 EVALUATIONS PERFORMED FOR THE NUHOMS® HD SYSTEM FOR THE PERIOD 01/10/09 to 01/07/11

NMSS01

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REPORT OF 72.48 EVALUATIONS PERFORMED FOR THE NUHOMS® HD SYSTEM FOR THE PERIOD 01/10/09 to 01/07/11

Enclosure 1 Part 1 - DESIGN CHANGES

***Licensing Review (LR) 721030-203, Rev. 0* – (not yet incorporated into the UFSAR)**

Change Description

The proposed activity involved the addition of an optional door design for the NUHOMS® HD horizontal storage module Model HSM-H. The optional door has a thinner steel section than the standard door, but is two inches thicker overall. The optional door has 3 inches of steel and 29.375 inches of concrete (overall 32.375 inches), whereas the standard door has 7.875 inches of steel and 22.5 inches of concrete (overall 30.375 inches).

Evaluation

The design functions of the HSM-H door are to provide physical protection for the dry shielded canister (DSC), and shielding from radiation emanating from the DSC at the access opening in the front wall of the HSM-H.

The structural evaluation of the optional HSM-H door was assessed. The required thickness for the limiting missile (12 inch diameter steel pipe) is 1.45 inches, which is less than the 3 inch door thickness. The maximum ductility ratio for the limiting missile (less than 2) also remains acceptable (allowable ductility is 20).

The door connection was evaluated as follows:

> The pull-out load on the door is controlled by the tornado wind load. The maximum calculated tensile force per bolt is 4.5 kips, which is less that the allowable load per bolt of 44.3 kips.
>
> The concrete pull-out strength is calculated to be 24 kips. Half of the concrete pull-out strength (12 kips) is greater than the tension load (4.5 kips) per bolt, thus satisfying the ductility requirements of the ACI code.

In conclusion, the optional door design for the HSM-H is adequate to prevent any local damage due to missile impact and qualified for the overall structural response due to missile impact load.

The shielding effectiveness of the optional HSM-H door was also assessed. The results show that this has no impact on the shielding effectiveness of the HSM-H because the door dose rates are mostly due to neutrons and an increase in the neutron shielding offsets the reduction in the gamma shielding.

The eight 72.48 evaluation criteria were met.

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LR 721030-219 Rev. 0 – (incorporated into UFSAR Revision 2)

Change Description

The proposed activity involved a design change which added notches (.5 inches maximum on each side and 1.0 inches maximum high) at the bottom of the eight corner-fuel compartments of the 32PTH DSC. A calculation was performed to determine the effect on the compressive stress in the fuel compartments during vertical loadings.

Evaluation Summary

The table below reports the original maximum stress, new maximum stress, and the maximum allowed by the ASME Code, during 1g loading and the 75g vertical end drop.

Loading	Original P_m (ksi)	New P_m (ksi)	ASME Allowable (ksi)	Original P_m+Pb (ksi)	New P_m+Pb (ksi)	ASME Allowable (ksi)
1g	0.16	0.17	16.0	0.16	0.17	24.0
75g	11.9	12.8	44.38	--	--	--

As shown, the fuel compartments continue to perform their design function for the normal and accident load cases previously evaluated in the UFSAR.

The eight 72.48 evaluation criteria were met.

LR 721030-227 Rev. 0 – (incorporated into UFSAR Revision 2)

Change Description

The proposed activity involved assessing the impact on HSM Model HSM-H surface dose rates when low density grout is used to repair concrete surface defects or cosmetic rework on the surface of the HSM-H.

Evaluation Summary

A calculation was performed which assumes that 5% of the surface area concrete, 16 cm deep, at the location of greatest dose rate (excluding the HSM vents) is replaced with grout at 70% of the concrete density, and that rebar is not exposed.

The results show a dose rate increase of approximately 6%. This increase is no more than the calculation uncertainty of 10% and is considered statistically insignificant. The slight increase in the surface average dose rates results in an insignificant increase in the site boundary dose rates.

The eight 72.48 evaluation criteria were met.

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LR 721030-231 Rev. 0 – (incorporated into UFSAR Revision 2)

Change Description

The proposed activity involved changing the methodology for calculating the dynamic load factors (DLF) described in NUHOMS® HD System UFSAR Appendix 3.9.11 from a method based on the ratio of the acceleration to a method based on the ratio of displacements.

Evaluation Summary

The 32PTH DSC and basket provide confinement, an inert environment, structural support, and criticality control for 32 PWR fuel assemblies. The 32PTH DSC shell is a welded stainless steel pressure vessel that includes thick shield plugs at either end to maintain occupational exposures ALARA. The 32PTH DSC basket consists of stainless steel square tubes and support strips for structural support, and geometry control, and aluminum/borated aluminum for heat transfer and criticality control.

The change of the methodology to calculate the DLF results in g loads that remain bounded by the g loads considered for the structural evaluation of the DSC shell and basket as reported in UFSAR Appendix 3.9.11, Section 3.9.11.6.

Because the proposed activity only involved the eighth 72.48 evaluation criterion (departure from a method of evaluation), only that criterion was assessed. The criterion was met, as follows.

The proposed change involved a methodology which calculates the DLF based on the ratio of displacements. This methodology differs from the methodology currently described in the CoC 1030 UFSAR. However, this methodology was approved by the NRC in CoC 9255 SAR, Revision 17, Section 2.10.10 for the NUHOMS® MP187 Multi-Purpose Cask. The intended use of the approved methodology in the MP187 SAR was to determine the DLF for the drop equivalent static structural analysis, which is the same intended use as that utilized in the proposed activity.

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Enclosure 1 Part 2 - NONCONFORMANCES

LR 721030-211 Rev. 0 – (no associated UFSAR change)

Change Description

The proposed activity involved a dry shielded canister (DSC) with an oversized chamfer on the bottom circumference of the DSC shell. The maximum allowed length of the chamfer is 0.38 inches. The nonconforming chamfer had a maximum length of .875 inches. A calculation was performed, which demonstrated that there is an increase in the maximum stress in the bottom of the DSC. The calculation involved a change to a method of evaluation.

Evaluation Summary

To measure the adverse effect on the structural design function, a bounding load case of a cask drop was evaluated. The maximum stress during the 75g horizontal drop increased from 24.1 ksi to 25.6 ksi. The maximum stress allowed by the ASME Code is 44.4 ksi. Therefore, the DSC shell continues to perform its intended structural design function. No other design functions were affected.

Regarding the methodology, UFSAR Revision 2, Section A.3.9.1.3.2, Page A.3.9.1-4 (1st paragraph) states that the ANSYS Multilinear Kinematic Harding material option is used in all of the DSC accident size drop analyses. The calculation associated with this proposed activity used a bilinear stress-strain curve with tangent modulus amounting to 5% of the elastic modulus. This option is listed in the UFSAR, but for the structural evaluations of the transfer cask (last paragraph of page A.3.9.1-3). This change to the element of the method of evaluation is not adverse because this modeling option is within the limits and constraints associated with this modeling method, already included in UFSAR evaluations reviewed by the NRC, and the CoC 1030 Amendment 0 NRC Final Safety Evaluation Report does not identify features of the modeling methods used at this level of detail. Furthermore, the use of a 5% slope for the plastic modulus provides higher estimates of stress compared to the multilinear curve used in the analysis of record. The change to the method of evaluation moves the results closer to the design limit and is considered to be conservative, consistent with Section B4.3.8 of NEI 96-07, Appendix B.

The eight 72.48 evaluation criteria were met.

LR 721030-232 Rev. 0 – (no associated UFSAR change)

Change Description

The proposed activity involved a reduced thickness of basket rails due to scoring which occurred in multiple locations on the rail face during basket retrieval activities from a shell for a DSC. Rail scoring depths of 0.315 inches or less were demonstrated by calculation to be acceptable as-is.

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Evaluation

The DSC basket assembly provides criticality control and heat transfer capability. The basket locates and restrains 32 spent fuel assemblies contained in the DSC for design basis loading. The basket also provides heat conduction paths to carry heat produced by the spent fuel assemblies to the DSC shell.

The results from the supporting calculation and the effects on design functions of the reduced rail face thickness are as follows.

Stresses Results: The supporting calculation performed a ratio method evaluation based on the reduced rail face thickness to increase the calculated stresses by the ratio of the thickness squared. This conservative method demonstrated that ASME Code design allowable values continue to be satisfied with the nonconforming rail face thicknesses.

The eight 72.48 evaluation criteria were met.

LR 721030-233 Rev. 0 – (no associated UFSAR change)

Change Description

The proposed activity involved a reduced thickness of a DSC shell wall due to scoring which occurred in multiple locations on the shell ID during basket retrieval activities. Shell scoring depths resulting in a remaining wall thickness of 0.440 inches or greater were demonstrated by calculation to be acceptable as-is.

Evaluation

The DSC shell component provides the confinement boundary for the spent fuel, structural support for the basket and heat transfer capability.

The results from the supporting calculation and the effects on design functions of the reduced shell wall thickness are as follows.

Stress Results: The supporting calculation performed a ratio method evaluation based on the reduced shell wall thickness to increase the calculated stresses by the ratio of the thickness squared. This conservative method demonstrates that ASME Code design allowable values continue to be satisfied with the nonconforming shell wall thickness.

The eight 72.48 evaluation criteria were met.

LR 721030-247 Rev. 0 – (no associated UFSAR change)

Change Description

The proposed activity involved a nonconforming condition where the as-built dimension between the end of the rail flange and the rail stiffener on several horizontal storage module

DSC support structures exceeded the permitted design tolerance.

Evaluation

The function of the DSC support structure is to provide support for the DSC during storage and to act as a sliding surface during DSC insertion and retrieval. The stiffener plate resists torsional moments acting on the support rails.

The associated structural calculation evaluates the bending stresses on the stiffener plate in five different load combinations using the original method of analysis. Incorporation of a decrease in the cross section of the stiffener plate by 5/32 inches, along with the negative tolerance allowed by the design drawing, yielded values well within the capacity limits of the plate.

The eight 72.48 evaluation criteria were met.

***LR 721030-254 Rev. 0* – (no associated UFSAR change)**

Change Description

The proposed activity involved allowing the installation facility to utilize stainless steel shims under horizontal storage modules, Model HSM-H, to aid leveling of the HSM-Hs for proper installation on the independent spent fuel storage installation (ISFSI) basemat. The use of shims was limited to placement under only the back wall of the HSM-H in a double array, with no shims stacked, a maximum shims thickness of 0.25 inches, and the area of each shim is no less than 144 square inches.

Evaluation

The structural evaluation of the HSM-H analyzes sliding of the module due to seismic, flood, tornado generated wind, and tornado generated missile impact loads. The coefficient of friction and frictional force are independent of the contact area the module makes with the basemat. However, the coefficient of friction between stainless steel shims and concrete is less than that between concrete and concrete.

The proposed activity affects the sliding resistance of the HSM-H as evaluated in the UFSAR. The following sliding conditions that are analyzed in the UFSAR were re-evaluated, incorporating stainless steel shims under the back wall of the HSM-H.

The coefficient of friction between concrete and stainless steel used is 0.3 (PCI Design Handbook, Fifth Edition, Section 6.6). This is a conservative value that is reduced from 0.4 by 25% for wet conditions.

Sliding due to seismic, flood, tornado generated wind load, and tornado generated missile impact load was evaluated. The results demonstrated that the decrease in the sliding resistance of the modules did not result in an unacceptable condition for the modules. Sliding of modules remains resisted under all accident loads as evaluated in the UFSAR.

The eight 72.48 evaluation criteria were met.