TRANSNUCLEAR
AN AREVA COMPANY

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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 01/10/07 to 01/09/09, Docket 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 01/10/07 to 01/09/09, 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 1, submitted on October 3, 2007.

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

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 01/10/07 TO 01/09/09

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

This report is divided into two parts. Part 1 includes the 72.48 evaluations performed for design changes and Part 2 includes the 72.48 evaluations performed for nonconformances.

Enclosure 1 Part 1 - DESIGN CHANGES

***Licensing Review (LR) 721030-012, Rev. 1* – (incorporated into UFSAR Revision 1)**

Change Description

This LR evaluated design changes to the horizontal storage module, Model HSM-H support structure, roof, heat shields, main assembly and fastener drawings.

The following changes were evaluated:

1. Option to eliminate the 2" x 1/2" slots on the Extension Plate of the dry shielded canister (DSC) support structure.
2. Replace flat aluminum side heat shields with flat stainless steel side heat shields.
3. Replace the louvered aluminum roof heat shield with a flat stainless steel heat shield.

Evaluation

The HSM-H is a freestanding reinforced concrete structure designed to provide environmental protection and radiological shielding for the 32PTH DSC. The HSM-H also provides heat rejection from the spent fuel decay heat by a combination of radiation, conduction and convection.

The 32PTH-DSC is supported inside the base unit on two rails. The rail assembly spans between the front and the rear wall of the base unit and acts as a sliding surface during 32PTH DSC insertion and retrieval. This assembly is the DSC support structure. For thermal protection of the HSM-H concrete, heat shields are installed on the sidewalls of the base. Heat shields are also installed under the roof.

Analyses have been performed where necessary to demonstrate that the changed design meets the acceptance criteria specified in the NUHOMS® HD UFSAR, as follows.

Structural:

The changes have been evaluated in a structural calculation and have been shown to meet the structural design criteria for the HSM-H as described in the UFSAR.

Thermal:

The primary purpose of the slots is to provide additional air flow around the DSC. The effects of eliminating the slots have been evaluated in calculations. The stainless heat shields were evaluated with no slots on the DSC support structure extension plate and have been shown to meet the thermal design criteria for the HSM-H as described in the UFSAR.

Shielding:

The DSC support structure is not relied upon for shielding. The shielding analysis of the HSM-H as documented in a calculation includes the side heat shield modeled as flat plate. The change from aluminum to stainless has no adverse bearing on the shielding performance.

Criticality and Confinement:

The changes do not affect the DSC and, therefore are not relevant to the criticality analysis. There is no effect on confinement.

Mechanical:

The changes do not affect the design function of the HSM-H which is to store the DSC and provide environmental protection, shielding and heat decay capability to the DSC during storage. The change does not affect DSC insertion, DSC storage and DSC retrieval operations.

These results demonstrated that these design changes do not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-016 Rev. 1* – *(incorporated into UFSAR Revision 1)

Change Description

This LR evaluated design changes to the horizontal storage module, Model HSM-H, made to incorporate fabricator's input, operations experience, past practices, past fabrication, etc. The following changes were evaluated:

1. The end shield wall design is changed from a horizontal lap joint with horizontal primary reinforcement to a vertical lap joint with vertical primary reinforcement.
2. The 12'-8" wide Type A rear wall (for single row arrays) is deleted and replaced with a 3' square corner piece to cover the back of the end shield wall only.
3. The 1" diameter with 1" thick washer plate through-bolt connections that connect the shield walls to the module are changed to 1 1/2" diameter with 1 1/2" thick washer plates. The material specification for the bolt and nut is changed from ASTM A325 to ASTM A193 GR B7 and ASTM A563 to ASTM A194, respectively. Correspondingly, the size and material of the embedments are changed from 1" to 1 ½" and from ASTM A325 (based on rear wall embedment) to ASTM A193 GR B7 or A325 or A490, respectively. The location of the connections between the shield walls and the module are also changed and connections to the roof are added, and for the end shield walls, two through-bolts through the outlet vent opening at the roof are included.
4. Through-holes in the walls are changed from 3" to 3 1/2" diameter (nominal) to accommodate the increased through-bolt size.

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5. The outlet vent cover clear span length of 12'-4" and total length of 14'-4" have been changed to 12'-10" and 14'-10", respectively.
6. Two through-bolts are used to attach the vent cover to the roof instead of four bolts.
7. The rebar cover has been changed from 1 1/2" to 1".
8. The ASTM A572, GR 50 material specifications for the DSC Stop Plate Assembly are changed to ASTM A36.
9. Stiffeners at the temporary gusset locations are removed from the UFSAR drawings.
10. The thickness of the rail extension base plate is changed from 1 1/4" to 1" thick.
11. The front wall bolted connections, which consists of four 1" diameter ASTM A490 bolts (with washers) for each rail bolted to an embedment assembly, are changed to two 1 1/2" diameter ASTM A325 bolts (without washers) for each rail, bolted to individual threaded embedments.
12. The rear wall bolted connections, which consist of two side plates with oversized slotted holes and a tapped hole for a leveling stud (jacking screw) that is welded to the lower flanges and studs with double nuts and washer plates that connect through the slots to the base embedment, were redesigned. Equivalent rear wall bolted connections are used, which consist of four 1" x 1" side plates welded to the lower flanges. Studs with double nuts and plates will bridge the side plates and connect to the base embedment to clamp down the structure. A nut is welded to the edge of the flange for a leveling stud (jacking screw).
13. The 1/4" fillet welds used to attach the leveling nuts and rear connection plates to the lower flanges are replaced with 1/8" fillet welds to attach the leveling nuts, and 5/16" fillet welds to attach the rear connection plates to the lower flanges.
14. 1" nominal grout thickness is changed to ¾" nominal grout layer thickness.
15. The following changes are made to the louvered heat shield:

    a. The dimensions of the louvered panels are changed and the number of panels is changed from 7 to 6 for ease of fabrication. The width dimension of the individual panel is changed from 2'-2" to 2'- 6 1/8" (since the mounting bar is 1" wide, the length dimension of each individual louvered plate is changed from 24" to 28.125"). The total width of the assembly is changed from 15'-2" to 15'-1 3/8" to accommodate a 1/8" separation between panels for thermal expansion.
    b. The mounting bar material is changed from A240, Type 304 stainless steel to aluminum Type 1100.
    c. The cross section dimension of each louver plate (2" x 1/8") and the 1" distance separating each louver plate are added to UFSAR drawings. A 1" long 1/8" fillet weld is used to connect the louver plate to the mounting bar at each end of the mounting bar.
    d. The connection detail of the heat shields to the roof is changed from a stainless steel bracket type connection to a ¾" diameter schedule 40 aluminum pipe welded to the mounting bar. The length dimension of each panel is changed from 6'-6" to 6'- 2" due to the revised connection detail (from bracket type to pipe section). Since the number of panels is changed from 7 to 6, the number of attachment connections to the roof (4 per panel) is changed from 28 to 24.

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16. This change implemented a side heat shield design without fins.
17. The "min" designation shown in UFSAR drawing for the door opening and the inside diameter of the cask docking flange is deleted. In the procurement drawing the door opening is given a tolerance of +1/4", -1/8" and the inside diameter of the cask docking flange is +1/4", -0".
18. The door reinforcement detailed as #4 @ 6" E.W. (each way) is changed to "E.W.E.F." (each way, each face).
19. The stitch fillet weld joining the door's outer plate with the inner plate is changed from 1/4" 2-10 to 5/16" 2-6.
20. The door's square outer plate size of 8'-1 1/2" is changed to 7'-7 1/4" to match the diameter of the round door. Corner chamfers are removed.

Evaluation

The HSM-H is a freestanding reinforced concrete structure designed to provide environmental protection and radiological shielding for the 32PTH-DSC. The HSM-H also provides heat rejection from the spent fuel decay heat by a combination of radiation, conduction and convection.

Three-foot thick shield walls are installed behind each HSM-H (single row array only) and at the ends of each row to provide additional shielding and protection against missile impact.

The 32PTH DSC is supported inside the base unit on two rails. The rail assembly spans between the front and the rear wall of the base unit and acts as a sliding surface during 32PTH DSC insertion and retrieval.

For thermal protection of the HSM-H concrete, heat shields are installed on the sidewalls of the base. Heat shields also installed under the roof.

Analyses were performed, as necessary, and documented in calculations, to demonstrate that the design as revised with the proposed changes meets the acceptance criteria specified in the UFSAR for the structural, thermal, shielding, and criticality design functions. None of the changes affected the confinement design function.

The analysis results demonstrate that the proposed changes do not adversely affect the system design as described in UFSAR and all eight 72.48 evaluation criteria are met.

***LR 721030-056 Rev. 0* – (incorporated into UFSAR Revision 1)**

Change Description

Transfer cask (TC) calculations were revised to more accurately reflect trunnion loads, as discussed below.

The OS-187H TC is designed to contain a dry shielded canister (DSC) during loading and transfer operations. Four trunnions are welded to the structural shell of the TC. The trunnions support the TC and DSC during lifting and transfer operations.

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TC input loads have been changed to more accurately reflect the loads applied to the trunnions when the TC is supported horizontally on the skid. The applicable structural calculations previously assumed equal loads applied to upper and lower trunnions when restraining the transfer cask during acceleration. However, because the upper skid towers incorporate a "sliding" support to permit free axial thermal expansion, the upper trunnions do not see any significant loads in the axial direction. Hence, the entire axial load must be carried by the bottom trunnions for the calculation to be conservative. The calculations were revised to demonstrate the ability of the TC to perform its design function.

Evaluation

The maximum stress in the bottom trunnion increased from 5.7 ksi to 9.1 ksi and is less than the design limit of 20.0 ksi. The maximum local membrane stress (P_l) at the bottom trunnion/shell juncture increased from 3.81 ksi to 6.46 ksi and is less than the allowable of 30 ksi. The local membrane plus bending (P_l + Q) is increased from 15.69 ksi to 18.91 ksi and is still well within the design limit of 60 ksi.

The analysis results demonstrate that the revised analytical results do not adversely affect the system design as described in UFSAR and all eight 72.48 evaluation criteria are met.

***LR 721030-057 Rev. 0* – (incorporated into UFSAR Revision 1)**

Change Description

DSC basket calculations were revised to reflect refined basket models, as discussed below.

The 32PTH DSC internal basket assembly provides criticality control, heat transfer, and shielding capability. The basket locates and restrains 32 spent fuel assemblies contained in the DSC. The basket also provides heat conduction paths to carry heat produced by the spent fuel assemblies to the DSC shell.

Applicable calculations were revised to calculate the stresses based on refined basket models. A study was performed to demonstrate that this refined model has sufficient elements (i.e., by increasing more elements, the result will remain the same or not change significantly). During the basket fabrication, due to fabrication tolerance the fusion weld spacing can be as small as 5.00". A separate study was performed on the fusion weld spacing and found that the fusion weld distance has no significant effect on the analysis results. The results indicate that the smaller distance (5.00") yields slightly higher stress (28.3 ksi vs. 27.4 ksi, with an allowable of 44.38 ksi). Therefore, in the refined mesh models, the fusion weld spacing of 5.00" is modeled.

Evaluation

The results from these revised calculations and their effects on design functions are as follows:

Stresses Results: A comparison of the calculated stresses from the refined models with the stresses from the original models indicates that the stress changes are not significant (some slightly increased and some slightly decreased). The results indicate that even though some basket component stresses were increased by using the refined model, the stress values are still within the design allowables with large margins of safety. The fusion weld test load is based on the calculated force including a factor of safety of 2 and a correction for material strength for room temperature testing. Based on the refined model the required minimum fusion weld test load is 17.1 kips.

Buckling Analysis Results: The results indicate that in all three drop orientations (0°, 30°, 45°) the buckling loads went down by using the refined mesh model. The lowest margin is the 30° drop orientation case; the margin of safety for this drop orientation is approximately 1.12.

The analysis results demonstrate that the revised analytical results do not adversely affect the system design as described in UFSAR and all eight 72.48 evaluation criteria are met.

LR 721030-058 Rev. 2 – *(incorporated into UFSAR Revision 1)*

Change Description

DSC basket components calculation was revised to demonstrate the acceptability of using Type 6061 aluminum in addition to Type 1100, as discussed below.

A 32PTH DSC basket design drawing specifies ASTM B209 aluminum for rail inserts and back plates. These components are part of the periphery of the basket and form part of the heat conduction path from the fuel assemblies to the DSC shell. The thermal analysis done as part of the licensing application used conductivity values based on ASTM B209 Type 1100 aluminum. However, due to material availability, basket fabricators would like to have the option to use ASTM B209 Type 6061 for these components. Although both of these aluminum types meet the drawing material requirements, the thermal conductivity values are slightly different. Because of this, an additional thermal calculation was performed that demonstrates the acceptability of using Type 6061 aluminum in addition to Type 1100 qualified by the original analysis.

Evaluation

The change of the material decreases the heat transfer capability of the rails. This increases the cladding temperature, and the temperature of the basket material at which structural properties were taken for the bounding structural analysis. The resulting temperatures of the fuel cladding and basket components are slightly higher than the temperatures calculated using Type 1100 aluminum. The maximum cladding temperature increases by 4° F from 723° F to 727° F. The allowable cladding temperature is 752° F; therefore the calculated new temperature of 727° F is still within the cladding temperature limits.

The maximum basket components temperature increases by 3° F from 697° F to 700° F. The basket stresses due to the accident transfer load were analyzed. The stress analysis uses a uniform temperature of 700° F for the entire basket. Since the maximum stress in the basket does not occur in the high temperature region (the maximum stress occurs at the periphery of the basket where the basket temperature is less than 600° F), this increase does not affect the results of the basket stress analysis.

The basket buckling was analyzed. The basket fuel compartment plates are divided into three material regions on the basis of their average temperatures and the structural properties based on these temperatures were used for the buckling analysis. The averages of these three regions are:

- Center hot region: 688° F (700° F used for analysis),
- Intermediate region: 645° F (650° F used for analysis),
- Outer region: 582° F (600° F used for analysis).

An increase of 3° F at each of these three regions results in an average temperature that is still less than the temperature in that region used for the buckling analysis. Therefore this temperature increase does not affect the results of the basket buckling analysis.

The DSC internal pressure is increased proportionally to the increase of absolute temperature. The pressure increase is bounded by 0.3% due to a 4° F temperature increase. This small increase of DSC internal pressure is bounded by the design pressures used in the structural analysis.

The safety function of the components analyzed does not change nor does that of the basket that includes these components. All design bases continue to be met because no temperature limits or resultant stress limits are exceeded. The temperatures used in the basket structural analyses bound the increased temperatures.

The analysis results demonstrate that the revised analytical results do not adversely affect the system design as described in UFSAR and all eight 72.48 evaluation criteria are met.

***LR 721030-059 Rev. 1* – (no associated UFSAR change)**

Change Description

This LR proposes to revise the PT examination requirements for the 32PTH basket rail welds from progressive PT to surface only PT, per NG-5233 versus NG-5231. This change to examination routine is linked to weld quality factors assigned in the associated calculations. Per ASME Section III Subsection NG Table NG-3352-1, the weld quality factor assigned for full penetration groove welds with the application of progressive PT is 0.90 and for surface only PT is 0.65. A calculation was performed to demonstrate that the maximum stresses at the weld locations remain within the allowable value with the application of a weld quality factor of 0.65 (i.e., 35% design penalty for performing a surface only PT vs. 10% penalty for progressive PT).

Evaluation

The basket rails are designed to ASME Section III Subsection NG and function as structural dunnage to fill the voids between the cylindrical DSC shell and fuel compartments (assembly of 32 square tubes) to achieve a circular basket configuration. The rails are attached to studs welded to the basket plate support bars which are fusion spot welded to the fuel compartments. The rails are modeled in the structural analysis and limit deformation of the fuel compartments during storage, transfer, and off-normal and accident loading conditions. The rails are classified as important to safety, Quality Category A since they are credited to provide structural support to the fuel compartments and are an integral part of the basket assembly.

The ASME Code design rules continue to be satisfied and the structural function of the rails is unaffected by the proposed change. The rails are not credited as a confinement boundary, but do provide structural support to the basket and are credited to ensure the confinement boundary stresses remain within allowable values for the imposed design loads (i.e., interaction between DSC shell and basket under design basis loading). Therefore, since the structural function of the rails is unaffected, the confinement boundary is also not adversely affected.

There is no impact on the thermal, shielding and criticality analyses.

These results demonstrated that the revised PT examination routine does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-082 Rev. 0* – *(incorporated into UFSAR Revision 1)

Change Description

Certificate of Compliance 1030, Amendment 0, issued in January 2007, authorizes storage of PWR fuel assemblies within the NUHOMS® 32PTH DSC stored inside the HSM-H module. TN subsequently revised the 32PTH DSC, called the 32PTH Type 1 DSC, to incorporate selected design changes and to allow for additional fuels (longer length) to be stored within the DSC (the authorized fuel types are not changed). The intent of this 72.48 review is to identify and document differences between the "current" 1030 license configuration 32PTH DSC and the 32PTH Type 1 DSC. the following changes were evaluated by this 72.48:

1. The top end closure detail has been revised to add an alternate three part closure detail (top shield plug (non-pressure boundary), inner top cover (pressure boundary), and outer top cover (redundant pressure boundary)), the same as the Standardized NUHOMS® CoC 1004 design.
2. In order to accommodate longer fuel lengths, the interior cavity length of the DSC is increased by approximately 7½" or 3-4 %. The thicknesses of the top and bottom shield assemblies are unchanged, and therefore the overall length also increases. The diameter is unchanged. The length of the fuel basket is also increased to maintain similar thermal expansion gaps and thermal aluminum and neutron poison are added to the lengthened top layer.
3. The basket configuration has an additional set of cross bars to connect the fuel compartment tubes at the top and form a full assembly (no empty space between tubes). The set of top bars and fill plates ties the top of the tubes together to increase structural margins, contain the thermal aluminum and neutron poison, and eliminate potential for cantilevered cell compartments.

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4. The 32PTH Type 1 DSC procurement drawing details the requirements for the fusion welds that make up the basket by connecting the fuel compartment tubes to the cross bars. The requirement is 45 kips per face of the tube. The UFSAR drawing requirement is 16.5 kips for each of the two welds. This change increases the required capacity of the fusion welds and therefore increases structural margins for the basket.
5. The 32PTH Type 1 DSC uses a key welded to the shell ID and a keyway cut into the transition rail to restrain the basket during fabrication and shipping. The purpose of the basket key is non-safety. It is intended to prevent rotation of the basket during shipping (empty) of the canister to the utility site. This basket rotation could damage the siphon tube, which could create operational problems during canister closure operations. The UFSAR drawing does not contain this level of detail, as once the canister is sealed the siphon tube has no safety function.
6. The 32PTH Type1 DSC utilizes lifting lugs, located at the top of the DSC, to lift an empty DSC.
7. The thickness of the grapple ring is increased to 1.20" min., which is greater than the UFSAR drawing of 1.00". The increase in the grapple ring thickness increases the structural margins of the grapple ring for canister extraction loads. The height of the grapple assembly above the outer bottom cover plate is shown as 3.75", +.25", -.12" for the 32PTH Type 1 DSC. The UFSAR states 3.75" ± .12" for the 32PTH DSC. The increased tolerance on the grapple ring height is necessary to allow for fabrication flexibility.
8. Top cover plate rigging points are increased from 3 (triangle) to 4 (rectangle). This applies to the top shield plug, the inner top cover plate, and the outer top cover plate. This adds capacity and makes the lifting configuration similar to that of CoC 1004 components.
9. The 32PTH Type 1 DSC Outer Top Cover Plate contains a Test Port Plug not shown on the UFSAR drawing. The Test Port Plug can be used to leak test the Inner Top Cover Plate (ITCP). The configuration is the same as that used in CoC 1004.
10. The configuration of the bottom of the siphon tube and the inner bottom cover plate recess of the 32PTH Type 1 DSC is also revised. The depth of the recess is increased to 0.75" and the slots in the siphon tube are deleted. The increase in the recess depth allows for greater flow during pumpdown/blowdown. The slots are not needed as a result of the increased recess. In addition there is an allowance for the reduction in the size of the Inner Bottom Cover Plate to shell cover fillet weld, in the region of the siphon tube recess.
11. The 32PTH Type 1 DSC procurement drawing allows for notching of the support ring to allow for clearance above the fuel cells. It provides limits on the notching. This change acknowledges that the support ring may extend over the fuel cell opening and that notching may be necessary to avoid fuel assembly interference.
12. The 32PTH Type 1 DSC basket has four cutouts in the bottom of the fuel compartments to allow for lifting of the assembled basket. These are below the level of the neutron poison. The UFSAR does not show these cutouts. The purpose of these cutouts is to provide a means to lift the assembled basket and lower it into the shell.

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Evaluation

The Dry Shielded Canister (DSC) described in the UFSAR has confinement, shielding, criticality control, and thermal safety functions. The primary function of the DSC is to provide confinement for the spent nuclear fuel. This is achieved by the stainless steel shell and cover plates (top and bottom ends), which are welded to the shell assembly. There is a redundant top outer cover plate to assure confinement integrity. The DSC provides gamma shielding at its ends by the use of shielded end plugs. These provide ALARA dose rates at the top of the canister (for DSC drying and sealing operations) and at the bottom (for minimizing dose rates at the HSM-H doorway). Shielding in the radial direction is not a safety function of the DSC, although it does provide a small amount due to the shell thickness.

The DSC's internal basket assembly provides criticality control. Fuel compartment tubes separated by thermal aluminum and neutron poison plates maintain the fuel assemblies in known positions under all normal and accident conditions. The thickness and location of the stainless steel fuel tubes plus the relative locations of the fuel assemblies achieve the criticality control function. In addition the thermal aluminum plates perform a heat transfer function and maintain basket and fuel cladding temperatures below integrity limits.

Calculations were performed to evaluate the 32PTH Type 1 DSC and the results are reflected in UFSAR Revision 1. For Changes 1, 2, 6, 8, 11, and 12 the structural analyses show that all stresses are below ASME Code allowables. For Change 5 the structural analysis shows that assuming a basket short loaded (31 FA's), with the missing FA at the periphery, results (conservatively assuming no basket-shell friction) in less than 1 kips of force applied to the keys and weld stresses of less than 1 ksi. For changes 3, 4, 7, 9, and 10 there are no adverse effects on the structural design function.

There are no adverse effects on the thermal, shielding, or criticality design functions from any of the changes. For the confinement design function, Changes 2, 4, 5, 6, 8, 9, 10, 11, and 12 have no adverse affect and Changes 1, 3, and 7 have no affect.

These results demonstrated that these design changes do not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-090 Rev. 0 – *(incorporated into UFSAR Revision 1)*

Change Description

Certificate of Compliance 1030, Amendment 0, authorizes storage of specific PWR fuel assemblies within the NUHOMS® 32PTH DSC stored inside the HSM-H module. Onsite transfer operations utilize the OS187H Transfer Cask (TC). Subsequently TN revised the 32PTH DSC, called the 32PTH Type 1 DSC, to allow for additional fuels (longer length) to be stored within the DSC. The authorized fuel types are not changed. The corresponding TC for the onsite transfer of the 32PTH Type 1 DSC is the OS187H Type 1 TC addressed in this LR.

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The intent of this LR is to identify and document differences between the "current" 1030 licensed configuration of OS187H TC and the OS187H Type 1 TC. The OS187H Type 1 TC is utilized in the same basic operational steps as the OS187H TC. The longer TC will not alter the operations described in the UFSAR.

The following changes were evaluated by this LR:

1. Increase in TC length and Revised Trunnion Spacing and Use of a Cask Spacer

   The global change is that the TC cavity is increased in length (inside diameter is unchanged) to accommodate longer canisters, such as the 32PTH Type 1. As a result of the increase in cavity length (approximately 13") the overall cask length is increased and the trunnion spacing is adjusted to maintain CG locations and to allow for upending and downending clearances.

2. Configuration of Upper Shell Course of Structural Shell and Upper Trunnion Pad Plate

   The UFSAR for the OS187H TC includes a load combination that is a 6g loading on the upper trunnions. The OS187H TC utilizes a thickened upper shell course and an additional pad plate between the trunnion OD and the upper shell course. In the case of the OS187H Type 1 TC the thickness of the upper shell course is increased and the pad plate diameter and thickness is increased to increase stress margins.

3. Inner Liner Thickness Increase and Cask Diameter Changes

   The OS187H Type 1 TC has an inner liner of increased thickness (5/8" vs. ½") to provide additional structural margin against lead slump and side drop accidents. As a result of the liner thickness increase the diameters of the OS187H Type 1 TC components are slightly revised. The minimum lead thickness is unchanged and the neutron shield cavity thickness is not significantly changed.

4. Upper and Lower Trunnion Configuration Changes and Deletion of Trunnion Shielding Pockets

   The OS187H Type 1 TC upper and lower trunnions have dimensions that are slightly different from those of the OS187H TC. In addition, the machined cavities in the OS187H TC trunnions that were filled with shielding material are deleted and the trunnions are monolithic and solid. The reason for these changes is to increase structural margins and to increase clearances for interface with other transfer equipment, such as the yoke and transfer skid.

5. Replacement of Cast Shielding Material (Resin) with (NS-3) Cementatious material, Cask Top and Bottom

   The OS187H Type 1 TC uses a cementatious cast shielding material (NS-3) for the bottom and top shielding cavities similar to the OS197 TC from CoC 1004, in place of the resin used on the OS187H. The reason for the change was the ease of fabrication by using NS-3 instead of the resin. Also, the NS-3 has lower offgassing, due to elevated temperatures, than the resin and provides similar shielding properties.

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6. Addition of Wedges to TC Bottom End (Interior)

   The OS187H Type 1 TC is evaluated in this 72.48 for use within CoC 1030 only.

   The wedges at the cask bottom end (interior) create ten 1" high, approximately 9" wide, passages from the center of the cask to the ID. The wedges are fabricated either as separate solid pieces that are welded to the cask bottom plate, or at the fabricator's option the bottom plate and the wedges can be machined from a single piece. The thicknesses of the bottom plates is not reduced (the wedges add to the total thickness) and the wedges are loaded only in compression and are not relied upon to carry any bending loading.

7. Deletion of Removable Trunnion Shielding and Setback of Neutron Shield at Upper Trunnion

   The OS187H TC contains removable shielding assemblies consisting of stainless steel encased resin that are bolted around the upper trunnions. These assemblies are approximately 3" wide and "fill-in" the opening between the neutron shield and the trunnion wall. The neutron shield is setback from the trunnion a similar distance. The removable assemblies have no licensing or operational function. In the case of the OS187H Type 1 TC, these assemblies are deleted and the neutron shield is extended up to, and welded to, the trunnion body.

8. Transfer Cask Exterior Surface Coating

   The OS187H TC exterior side surfaces are coated with white epoxy coating. This coating is relied upon for, and is an input to, the thermal analysis. The OS187H Type 1 TC is also coated, but additional acceptance criteria are specified for uncoated/damaged areas. The purpose is to allow for continued usage of the TC with small areas of coating damage that may occur during loading and handling operations, without the need to recoat the TC.

   The allowances for uncoated areas are:

   - The limit of localized missing coating damage such as peeled-off coating is 260 in^2,
   - The limit of scattered coating damage such as scratches is 1000 in^2.

   Specifically the change under review in the 72.48 is the added allowance for missing/damaged coating.

9. TC Top Cover Plate Utilizes Two Hoist Rings

   The TC top cover plate is lifted in two orientations during canister loading operations. It is lifted horizontally using the four hoist rings to place the cover onto the TC, when the cask is vertical. At the independent spent fuel storage installation (ISFSI) the TC is backed to within a few feet of the HSM and the top cover plate is then removed by lifting it vertically (cask is horizontal). In this lift, connection is made to the top edge of

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the TC top cover plate and the plate lifted.

The OS187H TC uses one 1" hoist ring located at the TDC of the plate for the vertical lift. The OS187H Type 1 TC uses two ¾" hoist rings, each of which is located 12° off TDC. The smaller hoist rings are used to increase edge distance and thus increase structural margins.

10. Fully Welded Nitronic Rails on Cask ID Surface

In the NUHOMS® HD system the DSC is pushed out of, or pulled into, the TC. During this horizontal transfer the DSC rests on four hardened stainless steel rails to prevent galling of the exterior DSC surface or the TC inner liner, and thus reduce insertion/extraction forces. These rails are welded to the TC inner liner.

The OS187H TC rails are welded using an intermittent weld and the unwelded intervals are sealed with RTV sealant. Experience has shown that the RTV sealing is less than complete and the sealant is susceptible to damage from the DSC. If the sealing function is degraded, annulus water can get behind the rails and make drying of the cask ID more difficult.

In order to eliminate this concern, the rails of the OS187H Type 1 TC are fully welded on all edges. The only loadings imposed on the rails are compression from the canister and a lateral traction force due to friction between the canister and the rail. Increased weld length will add margin for the traction loading.

11. Neutron Shield Height and Support Ring Spacing

As a result of the changes in diameters of cask components (See Change No. 3 above), the height of the neutron shield cavity is changed. In addition the axial spacing of the support rings, and the number of rings, is altered to accommodate the longer length of the OS187H Type 1 TC.

12. Neutron Shield Panel Attachments to Structural Shell and Cask Ends

The neutron shield panels which form the outside surface of the neutron shield cavity are supported from rings/ribs that are, in turn, welded to the structural shell of the TC. In the case of the OS187H TC, the rings are 3/16" thick and plug welds of 1/8" x 1" are used to connect the panel to the rings. The OS187H Type 1 TC uses a different ring and welded configuration. A Tee section is added to the rings and the plug weld openings are increased in size. The purpose is to make welding easier by providing a wider platform for the weld, and thus reduce the need to place the rings exactly under the plug slots. The total size of the weldments is not decreased. Additionally, given the larger size of the welding platform, an alternative for use of drilled holes for the plug welds is added.

13. Increased Diameter of Bottom Ram Access Cover Opening

The cover plate at the ram access opening at the bottom of the TC is removed during operations at the ISFSI to allow connection of the ram grapple with the canister grapple ring. The OS187H TC has a ram access opening of 20" ID. The OS187H Type 1 TC has an increased opening size of 22" ID. The increased opening allows for less constraint of grapple hoses, and allows for better observation of grapple functions from the TC bottom end.

Evaluation

The design function of the TC is to provide a means for safely moving the DSC. This includes movement into the fuel pool and from the fuel pool to the decontamination area for vacuum drying and welding, and later from the decontamination area to the ISFSI for loading into the HSM. The TC provides structural protection for the DSC from the impact of an accidental drop or tornado missiles. The TC also provides shielding to maintain operational dose rates ALARA during transfer operations. The TC provides gamma shielding at its ends by the use of thick plates and cast-in-place shielding material. The TC, through the sides of the cask rejects heat from the DSC. The heat transfer is through conduction, radiation, and convection.

Calculations were performed to evaluate the OS187H Type 1 TC and the results are reflected in UFSAR Revision 1. For Changes 1, 2, 3, 11, 12, and 13 the structural analyses show that all stresses are below ASME Code allowables. For Change 4 the structural analyses show that all stresses are below ASME Code and ANSI N14.6 allowables. For changes 6, 8, 9, and 10 there are no adverse effects on the structural design function. Changes 5 and 7 have no affect on the structural design function.

The TC is not part of a confinement boundary, so none of the changes affect the confinement design function.

There are no adverse effects on the thermal or shielding design functions from any of the changes. For the criticality design function, Changes 1, 2, 3, 4, 6, 7, 8, 9, 10, and 12 have no adverse affect and Changes 5 and 11 have no affect.

These results demonstrated that these design changes do not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-092 Rev. 0* – *(no associated UFSAR change)

Change Description

This LR evaluated the DSC and TC temperatures during normal transfer conditions with a small percentage of the white paint removed from the TC.

Evaluation

The 32PTH DSC establishes the confinement boundary for the spent fuel assemblies. The OS187H TC provides shielding and heat removal during transfer activities. The white paint provides factors of solar absorptivity of 0.3 and emissivity of 0.9.

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A calculation modeled two scenarios of white paint missing from the transfer cask: a large area (260 in^2) and many small areas (total of 1000 in^2) of missing paint. The temperature increases from both scenarios are combined, and compared against the values provided in the UFSAR.

The results of the calculation show that the increase in the DSC temperatures is insignificant in comparison to the values previously reported in the UFSAR. The heat rejection capabilities of the DSC and transfer cask are unchanged for all practical purposes. The UFSAR structural evaluations envelope the increased component temperatures of the DSC and TC. The missing white paint has no effect on shielding, confinement and criticality design functions of the 32PTH DSC.

These results demonstrated that the allowance for these scenarios does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-099 Rev. 0 – (no associated UFSAR change)

Change Description

This LR evaluated reanalysis of the OS187H TC trunnion stresses due to modification of a client's universal cask lifting yoke assembly to remove a small amount of material from the inside surface of the lift arms. The modification to the universal cask lifting yoke assembly reduces the thickness of the lift arms. This modification changes the lifting point and the load bearing surface for the trunnions which affect the trunnion stress analysis previously performed. In order for the universal cask lifting yoke assembly to interface properly with the OS187H TC lifting trunnions, approximately ¼ inch of material has been removed from the yoke lift arms.

Evaluation

The primary design function of the two top (lifting) trunnions is to facilitate lifting/handling the TC using a lifting yoke. First, into the spent fuel pool for loading of the spent fuel when the TC contains a canister and an empty basket. After fuel loading, the TC is lifted to a decontamination area. After draining and drying, welding of the canister cover, and bolting of the TC lid, the TC is placed in a trailer for transfer to onsite HSM. The TC is vertically lifted into the trailer and rests its bottom trunnions on a support frame in the trailer. The TC is allowed to pivot into a horizontal position until the top trunnions rest on their supports in the trailer. Throughout the operation the maximum total load is applied to the TC top trunnions. After the TC has been placed on the trailer, it is supported by all four (top & bottom) trunnions and is subject to a set of specified handling loads.

A calculation determined that the trunnion stresses remain within the allowable design limits. There is no physical change to the trunnions; therefore, there cannot be any effect on shielding, criticality, thermal and containment functions.

These results demonstrated that the reanalysis of the OS187H TC trunnion stresses due to modification of a client's universal cask lifting yoke assembly does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

Enclosure 1 Part 2 – NONCONFORMANCES

LR 721030-002 Rev. 2 – *(no associated UFSAR change)*

Nonconformance Description

This LR addresses a fabrication non-conformance for the OS187H TC. The TC cylindrical shell is joined at the bottom to the bottom support flange, which is joined to the bottom end plate, which is joined at its center to the ram access penetration ring. The weld area joining the bottom support flange and the bottom plate was machined such that a taper approximately 0.07 inches deep by 4 inches wide has occurred. The nominal thickness of the area is 2 inches.

Evaluation

The TC is designed to contain a DSC during loading and transfer operations. The DSC is supported by the bottom support flange and bottom end plate. The bounding condition for the bottom support flange/bottom plate area is the end drop condition. Using the same method described in the UFSAR, a calculation was performed to evaluate that bounding condition. While the maximum calculated stresses in the TC bottom plate and the ram access area increased relative to the results in the UFSAR, the stresses remain below the allowables, and calculated stresses in the DSC bottom were significantly below the allowable limits. The nonconformance has no effect on any shielding, criticality, or thermal design functions and no effect on operations.

These results demonstrated that the nonconformance does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-096 Rev. 0 – *(no associated UFSAR change)*

Nonconformance Description

This LR evaluated a condition where while handling the basket during fabrication, damage was incurred on the edges of several poison plates and aluminum basket plates. The nonconformance that was evaluated was for the damaged poison plate and aluminum basket material.

Evaluation

The 32PTH DSC basket is designed for a maximum heat load of 34.8 kW. The internal basket assembly contains a storage position for each fuel assembly. Criticality safety is maintained through fixed poison (poison plates), soluble boron during loading operations and the favorable geometry of the basket. Heat transfer is provided mainly through the aluminum basket plates, and to a lesser extent through the stainless steel fuel tubes and straps and through the poison plate material. Structural support for the PWR fuel is provided by the stainless steel fuel tubes and support strips. The support strips are located periodically over the full length of the basket with allowance provided for thermal growth. The stainless steel transition rails are provided at the basket periphery for support and heat transfer.

The damage is limited to the edges of the plates and is evaluated for impact on the structural, thermal, shielding, criticality, confinement and operations evaluations.

Regarding the aluminum basket plates:

There is no effect on the structural evaluation of the DSC because no structural credit is taken for the aluminum basket plates in the structural analysis

There is no effect on the thermal evaluations of the DSC because the edges of the aluminum basket plates are not credited for heat transfer in the thermal models (i.e., only the faces of the aluminum basket plates are credited in the model because little or no heat transfer occurs through the edges of the aluminum plates). The minor damage to the edges of the aluminum basket plates has an insignificant effect on the surface area of the face of the basket plates. Furthermore, the depth of the damage to the aluminum plates is less than 1/8", which is within the dimensional tolerances for fabrication of the basket plates. Therefore, there is no change in the as-modeled thermal performance of the basket due to the nonconforming condition.

There is no effect on the shielding evaluations of the DSC because the amount of material that is missing from the damaged areas is insignificant as compared to the total aluminum content of the basket.

There is no negative effect on the criticality evaluations of the DSC because replacing aluminum with borated moderator reduces the reactivity of the system.

As the basket is not a confinement boundary itself and, as demonstrated in the thermal evaluation above, there is no change in the as-modeled thermal performance of the basket.

Any potential impact of these nonconforming areas of the basket is addressed by the normal gage testing of the fuel compartments required after final installation of the basket in the canister shell. No other impact on the operations of the system could occur.

Regarding the poison plates:

There is no effect on the structural evaluation of the DSC because no structural credit is taken for the poison plates in the structural analysis.

There is no effect on the thermal evaluations of the DSC because the poison plates are not credited for heat transfer in the thermal models.

There is no effect on the shielding evaluations of the DSC because the amount of material that is missing from the damaged areas is insignificant as compared to the total poison plate content of the basket.

A calculation was performed to determine the effect of the missing poison plate material. The damaged poison plate is modeled by assuming that two 3 cm by 3 cm square areas of poison plate material are replaced with aluminum in each "cake layer" of the basket. The 3 cm x 3 cm areas of missing poison are modeled in the sides of the poison plates in an area that would have a much larger impact on the reactivity of the basket. The missing poison material is assumed to occur in every "cake layer" of the basket. These very conservative assumptions bound the actual nonconforming condition. Based on the calculation, the evaluation concluded that no statistically significant change in the bounding k_{eff} occurred even when the very conservative geometric assumptions are used. The minimum boron density requirement of 25 mg/cm^2 specified in the Technical Specifications is still satisfied.

As the basket is not a confinement boundary itself and, as demonstrated in the thermal evaluation above, there is no change in the as modeled thermal performance of the basket.

Any potential impact of these nonconforming areas of the basket is addressed by the normal gage testing of the fuel compartments required after final installation of the basket in the canister shell. No other impact on the operations of the system could occur.

These results demonstrated that the nonconformances do not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-151 Rev. 0 – *(no associated UFSAR change)*

Nonconformance Description

This LR evaluated nonconforming fusion welds, located on the basket perimeters of 32PTH DSCs.

Evaluation

The components affected include:

Basket Fusion Welds - The fusion welds join the fuel compartments with the basket plates.

Fuel Compartments - The fuel compartments provide the structural integrity of the 32PTH basket, provide heat transfer, and also maintain geometry used in criticality calculations.

A calculation was performed to support a use-as-is disposition for the nonconformance.

Regarding the effect on the fusion welds, assuming that 50% of the perimeter welds are missing very conservatively bounds the nonconforming condition. With this assumption, the maximum shear force at the fusion nugget increases 10.5% from 7733 to 8547 lb. These loads are not compared to stress allowable. Rather they are used to establish a minimum test load to qualify welds with a safety of factor of 2 with respect to weld failure and with correction for material strength at design basis temperature. This test value is 17.1 kip per Section 3.6.1.1 of the UFSAR.

Regarding the effect on the fuel compartment, the factor of safety against buckling decreased for the 30 and 45 degree orientation, as shown below.

Drop Orientation	Last Converged Load (g) UFSAR	Last Converged Load (g) in Calculation	Design Basis Acceleration (g)
30°	83.9	81.4	75
45°	85.6	84.2	75

The loads do not exceed the design basis limits, so the geometry of the basket components is not affected. Therefore the thermal, shielding, and criticality design functions are not adversely affected.

The nonconformance does not affect the confinement boundary so there is no effect on the confinement design function.

These results demonstrated that the nonconformance does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

<u>LR 721030-173 Rev. 0</u> – (no associated UFSAR change)

<u>Nonconformance Description</u>

This LR evaluated a condition where weld filler material for two welds did not meet the 0.21 percent copper content specified in site-specific configuration drawings for certain DSC support structures. The welds attach the rail extension plate and DSC stop plate to the top flange of the DSC support rail.

<u>Evaluation</u>

The components affected include:

Rail Extension Base Plate - The functions are to restrain the rails from rearward movement during loading, front-to-rear movement in an earthquake, and forward motion during unloading.

DSC Stop Plate - The function of the stop plate is to define the end of the DSC travel during loading, and to restrain the front-to-rear motion of the DSC during an earthquake. Only the latter function is affected by corrosion of the weld.

These welds are not in a load path for support of the DSC. For both the rail extension plate and the DSC stop plate, the only affected design function is the restraint of front-to-rear motion of the rails and the DSC during an earthquake.

A calculation was performed to evaluate this nonconformance, using accelerated corrosion in a salt water marine environment. The calculation shows that with consideration of marine environment corrosion for 60 years (the system is licensed for 20 years, but could potentially be extended) the weld thickness could be reduced by 0.2 inches. A comparison to the minimum required weld sizes below shows that after considering this marine environment corrosion for 60 years, the welds stresses still remain below the original design allowables.

Description	Original Minimum Requirement	Actual Weld As- Built	Minimum Requirement for Weld with 60 Years of Accelerated Corrosion
Weld between support rail and DSC Stop Plate	0.49 in. thickness	0.90 in. Thickness	0.70 in. thickness
Weld between support rail and Rail Extension Base Plate	4.36 in. length	12 in. length	6.36 in. length (increased length with corrosion)

No other design functions are affected by this nonconformance.

These results demonstrated that the nonconformance does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

LR 721030-185 Rev. 0* – *(no associated UFSAR change)

Nonconformance Description

This LR evaluated a situation where a visual inspection of all the fuel assemblies (FAs) which had been selected for loading in an upcoming loading campaign had identified specific FAs which contained foreign material or debris within these FAs.

TN was requested to evaluate the storage of these assemblies with the debris within a NUHOMS® 32PTH DSC. This LR does not add these foreign materials as a change to the general license.

There were two types of debris present within the FAs; (1) stainless steel or carbon steel metal debris in various geometries, and (2) small size (1.32" x 0.44") paint chips.

The worst case values for each type of foreign material were obtained by conservatively assuming that the values of the listed debris are loaded into a single DSC, as follows:

- Metal Debris (Stainless Steel, Carbon Steel, or a combination): various sizes with a cumulative weight of all listed metal debris for the 12 assemblies < 0.10 lbs. (Note: assuming carbon steel composition for the metal debris is conservative as compared to stainless steel)

- Paint Chips (Ameron or Carboline type paint): maximum size of 1.32" x 0.44", maximum film thickness of .008" with a cumulative paint area of 1.65 in^2 and a bounding mass of 0.0007 lbs.

Evaluation

The NUHOMS® 32PTH DSC has structural, confinement, shielding, criticality, and thermal safety functions. The primary function of the DSC is to provide confinement for the spent nuclear fuel. This is achieved by the stainless steel shell and inner and outer cover plates (top and bottom ends) which are integral to the shell assembly. The DSC provides gamma shielding at its ends by the use of thick end plugs. These provide ALARA dose rates at the top of the canister (for DSC drying and sealing operations) and at the bottom (for minimizing dose rates at the HSM-H doorway). Shielding in the radial direction is not a safety function of the DSC, although DSC shell provides a small amount of shielding due to the shell thickness. Criticality control is provided by the DSC's internal basket assembly and soluble boron credit. Heat transfer is provided by the helium atmosphere within the DSC and the aluminum/stainless steel in the basket and rails. The primary pressure boundary, which is 304 stainless steel, maintains an inert (helium) dry atmosphere inside the DSC to minimize pressure boundary and fuel degradation.

The effect of the potential introduction of foreign material into the 32PTH DSC was evaluated.

- 0.10 lbs of either stainless steel or carbon steel, or a mix, per DSC.
- 0.0007 lbs of paint chips per DSC.

One concern is that the material could volatize which would result in an increase in gas volume within the DSC. Both the stainless steel and carbon steel are stable and will not volatize, so no contribution from this material is calculated. To calculate the added volume due to vaporization of the paint chips, it is conservatively assumed that the helium atmosphere inside the DSC is @ 14.7 psia (0 psig), in order to maximize the impact of any contribution from the plastic material. Assuming that the paint chips fully convert into hydrogen (the gas with the lowest density, and thus the greatest volume increase), results in an added hydrogen gaseous volume of (0.0007 lbs.)/0.0056 lbs./ft^3 = 0.125 ft^3 of hydrogen. This is a very conservative assumption since much of the paint chip material is of heavier elements that would result in lower volumes of gas.

Effect on the Structural Function:

There are two concerns:

Impact of Foreign Material on DSC Pressure Boundary and FA's

Although the debris in the DSC (paint chips, 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.

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Impact of Foreign Material on DSC Internal Pressure

The DSC free cavity volume is 178.3 ft^3. As determined above, the conservative estimate for additional gas volume is 0.125 ft^3. This then results in a pressure increase of (0.125)/178.3 = 0.07%. The design pressure used for DSC analysis is 15 psig for normal, 20 psig for off-normal and 70 psig for accident cases. The actual pressure values calculated are 4.8 psig for normal, 8.6 psig for off-normal and 11.3 psig for accident conditions. In all cases, the pressure increase due to the foreign material (conservatively calculated) of 0.07% is significantly less than the "available" margin between the calculated and design pressure. Therefore the 0.07% increase in calculated pressure will not exceed the previously specified DSC design pressure and there is no adverse impact on canister internal design pressure.

Effect on the Confinement Function:

There is no impact on the confinement capabilities of the DSCs as there are no new leak paths introduced. As stated previously, the foreign material will not adversely impact the stainless steel DSC pressure boundary.

Effect on the Shielding Function:

There is no adverse impact. The introduction of foreign material into the DSC does not change the source term limits of the Fuel Qualification table. The shielding analysis does not explicitly rely on the DSC internal gas environment. The volume of the foreign material is very small, contains no significant material susceptible to activation, and thus will not significantly alter the long term source term.

Effect on the Criticality Function:

There is no adverse impact. The DSC will be drained, successfully vacuum dried, and sealed. The very small amount of foreign material will not create a concern during future reflooding. As shown previously, the concentration of dissolved materials (conservatively assuming that it all goes into solution following reflood) is very low and thus will not adversely change keff. The fuel cladding will not be breached by this small amount of material, within a dry helium atmosphere. There will be no dispersal or reconfiguration of pellet material. The fuel assembly will not become "damaged". Thus there is no adverse impact on criticality of including the small amount of foreign material.

Effect on the Thermal Function:

There is no adverse impact. The limiting decay heat source term is unchanged. There are no changes to the acceptance criteria for these fuel types. The volume of the foreign material is not sufficient to alter the DSC internal atmosphere and thus alter any heat transfer capability. The small fraction of gas generated from breakdown of the foreign material will insignificantly alter the internal atmosphere (e.g., the assumed helium for conduction heat transfer is not reduced).

Mechanical Considerations:

There is no adverse impact. The material is of a small enough volume (less than 0.2 lb per canister), that no problems are anticipated in successfully vacuum drying. Prior to leaving the fuel building for storage, the vacuum drying and sealing operations will have been performed successfully. It can be inferred that any reflooding operations would be similarly unaffected. Assuming that the debris is still intact, it would either be retained as it was before or it would have become dislodged during horizontal transfer and is now "loose" in the DSC. In either case this debris is not large enough to block reflooding through the siphon tube, nor would it interfere with subsequent gas venting. During fuel unloading there are no required changes to the procedures for opening the DSC, testing the atmosphere within the DSC, and removing the closure plates. The change addressed by this evaluation does not affect system loading and unloading operations, nor does it alter any canister handling operations.

Weight Considerations:

There is no adverse impact. The weight of the foreign material is less than 0.2 lb. This will not change the DSC Center of Gravity location or exceed any weight limits.

These results demonstrated that the potential for this foreign material in the 32PTH DSC does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.

***LR 721030-218 Rev. 0* – (no associated UFSAR change)**

Nonconformance Description

This LR evaluated a nonconformance involving lack of fusion in basket spot welds for multiple DSCs. Specifically, a lack of fusion condition for the spot welds between the fuel compartments and basket plate support bars.

Evaluation

The components affected include basket subcomponents consisting of fuel compartments, basket plate support bars and fusion spot weld connections between them.

The 32PTH internal basket assembly provides criticality control and heat transfer capability. The fuel compartments locate and restrain 32 spent fuel assemblies contained in the DSC. The basket plate support bars locate the paired poison/aluminum plates internally within the basket. The basket internals provide heat conduction paths to transfer heat produced by the spent fuel assemblies to the DSC shell. The fusion spot welds between the fuel compartments and basket plate support bars hold the basket internals together.

In order to address the nonconforming condition, a calculation was performed which determined that the structural integrity of the basket is maintained for the bounding case assuming a conservative quantity of fusion welds removed in the structural analysis for the transfer cask side drop event. The calculation utilized the existing structural model and revised the input to remove 50% of the fusion spot welds on exterior face fuel compartments and 10% of the fusion spot welds on interior face fuel compartments. The removed exterior face welds were evenly distributed around the periphery of the basket and the removed interior welds were conservatively concentrated at the bottom of the basket in the area of highest load for the governing load case.

The calculation results indicate that even though some component stresses increased for the revised input model, the stress values are still within the ASME Code design allowable values with large margins of safety.

Although the maximum load for the fusion spot welds increased resulting in a factor of safety reduction from 2.0 to 1.74, the minimum factor of safety of 1.43 as derived from the ASME Code is satisfied.

The buckling results indicate that for all three drop orientations evaluated (0°, 30°, 45°) the buckling loads exceed the 75g minimum acceptance criterion. The governing factor of safety is 1.05 for the 30° drop orientation case.

The safety function of the components analyzed remains unchanged and all design bases continue to be satisfied

These results demonstrated that the nonconformance does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.