Enclosure 3 to TN E-26868

Replacement Pages for ANUH-01.0150, the Standardized Advanced NUHOMS® UFSAR, Revision 3 (Public Version)

ANUH-01.0150
Revision *3*

UPDATED FINAL SAFETY ANALYSIS REPORT

FOR THE

STANDARDIZED ADVANCED NUHOMS®

HORIZONTAL MODULAR STORAGE SYSTEM

FOR IRRADIATED NUCLEAR FUEL

NON-PROPRIETARY REPORT

By

Transnuclear, Inc.
Columbia, MD

August 2008

REVISION LOG SHEET

FSAR Revision	Date	Record of Changes/FCNs	Changed Pages
0	3/19/03	None	All
1	3/21/05	FCNs 721029-39, 40, 62, 65, 81, 89, 92, 124, 126, 165, 169 & 175	See List of Effective Pages
2	8/17/06	FCNs 721029-182, 185, 103 R-1, 162 R-1, 166, 173 R-1, 176 R-1,177 and 204	See List of Effective Pages
3	*8/15/08*	*FCNs 721029-202, 205, 206, 208, 215, 220, 222 R1, 232, 239, 246, 257, 272*	*See List of Effective Pages*

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Revision 2 of this UFSAR incorporates changes implemented due to the approval of CoC 1029 Amendment 1, effective May 16, 2005. It also incorporates modifications implemented per 10 CFR 72.48 from March 21, 2005 through August 15, 2006.

Revision 3 of this UFSAR incorporates modifications implemented per 10 CFR 72.48 from August 16, 2006 through August 15, 2008. This revision also includes a full list of effective pages.

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[1] Because SAR drawings were revised throughout the licensing period, their revision level may be higher than the overall UFSAR revision level.

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1.4 Generic Cask Arrays

The 24PT1-DSC containing the SFAs is transferred to, and stored in, an AHSM in the horizontal position. Multiple AHSMs are grouped together to form arrays whose size is determined to meet plant-specific needs. Arrays of AHSMs are arranged within the ISFSI site on a concrete basemat(s) with the entire area enclosed by a security fence. Individual AHSMs are arranged adjacent to each other. The decay heat for each AHSM is primarily removed by internal natural circulation flow and conduction through the AHSM walls. Figures 1.4-1, 1.4-2, and 1.4-3 show typical layouts for Advanced NUHOMS® ISFSIs which are capable of modular expansion to any capacity. These are typical layouts only and do not represent limitations in number of modules, number of rows, and orientation of modules in rows. An empty module is required at the end of an array to allow for future expansion *when the array is terminated with an end shield wall. Alternatively, two empty AHSM modules may be used at the end of the array (without end shield wall) to facilitate future expansion activities.* Back to back module configurations require expansion in pairs. Expansion can be accomplished as necessary by the licensee provided the criteria of 10CFR 72.104, 10CFR 72.106 and Chapter 12 are met. The parameters of interest in planning the installation layout are the configuration of the AHSM array and an area in front of each AHSM to provide adequate space for backing and aligning the transfer trailer. The minimum required array size to meet the high seismic design criteria is three AHSMs in a single row array (no maximum array size is specified, however, licensee evaluation of site requirements may impose a maximum array size). The licensee will install the basemat for the AHSMs. The basemat will provide sufficient space to allow for AHSM sliding during a seismic event.

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REVISION	DESCRIPTION	DATE
5	REVISED PER FCN 721029-232 AND FCN 721029-257	8/6/08

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M

INTERPRETATION OF WELD SYMBOLS PER ANSI / AWS 2.4

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
GENERAL LICENSE NUHOMS®
ADVANCED HORIZOTAL STORAGE MODULE
MAIN ASSEMBLY

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welded to the 24PT1-DSC shell to form the inner pressure boundary at the top end of the 24PT1-DSC, as shown in Figure 3.1-2. The secondary, outer, pressure boundary is provided by the outer top cover plate. All closure welds are multiple-layer welds. This effectively eliminates any pinhole leaks which may occur in a single-pass weld, since the chance of pinholes being in alignment on successive weld passes is negligibly small. Also, both welds are examined by multi-level liquid penetrant to effectively eliminate through wall leaks.

The top end assembly of the 24PT1-DSC design incorporates a vent siphon block, with two small-diameter tubing penetrations into the 24PT1-DSC cavity for draining and filling operations. One penetration, the vent port, is terminated at the bottom of the shield plug assembly. The other port is attached to a siphon tube, which continues to the bottom of the 24PT1-DSC cavity. Both ports include dog-leg type, offsets to prevent radiation streaming. The vent and siphon ports terminate in normally closed quick-connect fittings. Both ports are used to remove water from the 24PT1-DSC during the drying and sealing operations.

The stringent design and fabrication requirements described above ensure that the pressure retaining confinement function is maintained for the design life of the 24PT1-DSC. Pressure monitoring instrumentation is not used since penetration of the pressure boundary would be required. The penetration itself would then become a potential leakage path and, by its presence, compromise the leaktightness of the 24PT1-DSC design.

During draining, backfilling, and leak testing, a "Strongback Device" may be installed to minimize deformation of the inner top cover plate during blowdown. The strongback is bolted to the top flange of the transfer cask and provides support to the inner cover plate during those operations that may involve significant pressurization of the 24PT1-DSC cavity.

Transfer of the 24PT1-DSC from the transfer cask into the AHSM is performed using a hydraulic ram that applies a load to the outer bottom cover plate, at the center of the DSC. During insertion of the 24PT1-DSC into the AHSM, the load is shared by the outer bottom cover plate, the bottom shield plug, and the inner bottom cover plate.

Frictional loads during 24PT1-DSC transfer are reduced by application of a dry film lubricant to the nitronic surface *of* the support rails of the AHSM and the transfer cask. The lubricant chosen for this application is a tightly adhering inorganic lubricant with an inorganic binder. The dry film lubricant provides a thin, clean, dry, layer of lubricating solids that is intended to reduce wear, and prevent galling in metals. It is applied as a thin sprayed coating, similar to paint, using a carefully controlled process. The lubricant is not affected by water and is designed to be highly resistant to aggressive chemicals. This product is designed for radiation service and has a low coefficient of sliding friction for stainless steel.

Table 3.6-21
Computed Forces and Capacities of Ties and Keys

#	Tie/Key	Force (kips)	Capacity (kips)	Ratio
1	Tie Beam at Top (3 Beams) (8 #8 Rebars at each Beam)	892.2	1017	0.88
1A	Tie Beam at Top (3 Beams) (*6* #9 Rebars at each Beam)	*892.2*	*972*	*0.92*
2	Bottom Tie Rod (4 Rods)	249.2	394.4	0.63
3	Key between Top Shield Block and Base Unit (Transverse)	491.3	955	0.51
4	Key between Top Shield Block and Base Unit (Longitudinal)	393.1	1,910	0.21
5	Vertical Tie Rods between Top Shield Block and Base Unit (8 Rods)	424	536.8	0.79
6	Vertical Shear Key between Modules	1,368	1605	0.85
7	Horizontal Shear Key between Modules	456.7	462	0.99

CAUTION: Verify that the requirements of Chapter 12 lifting controls are met prior to the next step.

2. Move the scaffolding away from the cask as necessary. Engage the lifting yoke and lift the cask over the cask support skid onto the transfer trailer.

3. The transfer trailer should be positioned so that the cask support skid is accessible to the crane with the trailer supported on the vertical jacks.

4. Position the cask lower trunnions onto the transfer trailer support skid pillow blocks.

5. Move the crane while simultaneously lowering the cask until the cask upper trunnions are just above the support skid upper trunnion pillow blocks.

6. Inspect the positioning of the cask to insure that the cask and trunnion pillow blocks are properly aligned.

7. Lower the cask onto the skid until the weight of the cask is distributed to the trunnion pillow blocks.

8. Inspect the trunnions to insure that they are properly seated onto the skid and install the trunnion tower closure plates.

8.1.1.6 24PT1-DSC Transfer to the AHSM

CAUTION: Verify that the requirements of Chapter 12 lifting controls are met prior to the next step. The maximum lifting height and ambient temperature requirements must be met during transfer from the fuel building to the AHSM.

1. Using a suitable heavy haul tractor, transfer the loaded cask from the plant's fuel building to the ISFSI along the designated transfer route.

2. Prior to aligning the cask, remove the AHSM door using a portable crane, inspect the cavity of the AHSM, remove any debris and prepare the AHSM to receive a 24PT1-DSC. The doors on adjacent AHSMs should remain in place.

Caution: *The insides of empty modules have the potential for high dose rates due to adjacent loaded modules. Proper ALARA practices should be followed for operations inside these modules and in the areas outside these modules whenever the door from the empty AHSM has been removed.*

3. Inspect the AHSM air inlet and outlet to ensure that they are clear of debris. Inspect the screens on the air inlet and outlet for damage.

4. Position the transfer trailer to within a few feet of the AHSM.

5. Check the position of the trailer to ensure the centerline of the AHSM and cask approximately coincide. If the trailer is not properly oriented, reposition the trailer, as necessary.

6. Using a portable crane, unbolt and remove the cask top cover plate.

7. Back the trailer to within a few inches of the AHSM, set the trailer brakes and disengage the tractor. Drive the tractor clear of the trailer and extend the transfer trailer vertical jacks.

8. Connect the skid positioning system hydraulic power unit to the positioning system via the hose connector panel on the trailer. Remove the skid tie-down bracket fasteners and use the skid positioning system to bring the cask into approximate vertical and horizontal alignment with the AHSM. Using optical survey equipment and the alignment marks on the cask and the AHSM, adjust the position of the cask until it is properly aligned with the AHSM.

9. Using the skid positioning system, fully insert the cask into the AHSM access opening docking collar.

10. Secure the cask to the front wall embedments of the AHSM using the cask restraints.

11. After the cask is docked with the AHSM, verify the alignment of the transfer cask using the optical survey equipment.

12. Position the hydraulic ram behind the cask in horizontal alignment with the cask and level the ram. Remove the bottom ram access cover plate. Power up the ram hydraulic power supply and extend the ram through the bottom cask opening into the 24PT1-DSC grapple ring.

13. Activate the hydraulic cylinder on the ram grapple and engage the grapple arms with the grapple ring.

14. Recheck all alignment marks and ready all systems for transferring the 24PT1-DSC into the AHSM.

15. Activate the hydraulic ram to initiate insertion of the 24PT1-DSC into the AHSM. Stop the ram when the 24PT1-DSC reaches the support rail stops at the back of the module.

16. Disengage the ram grapple mechanism so that the grapple is retracted away from the grapple ring.

17. Retract and disengage the hydraulic ram system from the cask and move it clear of the cask. Remove the cask restraints from the AHSM. Replace the bottom ram access cover plate.

18. Using the skid positioning system, disengage the cask from the AHSM access opening.

19. Install the 24PT1-DSC seismic restraint.

9.2 Pre-Operational Testing and Maintenance Program

The Advanced NUHOMS® System is designed to be totally passive with minimal maintenance requirements. The 24PT1-DSC does not require any maintenance once it is loaded into the AHSM.

The transfer cask is designed to require minimal maintenance. OS197 Transfer cask maintenance is limited to periodic inspection of critical components and replacement of damaged or nonfunctioning components. A discussion of these requirements is provided in the associated cask SAR (C of C 72-1004 [9.9]).

9.2.1 Subsystems Maintenance

9.2.1.1 Inspection (Transfer Cask Only)

The following sections discuss typical subsystem maintenance requirements that are applicable to the OS197 and MP187 cask systems. Detailed requirements for these systems can be found in their associated SARs.

9.2.1.1.1 Routine Inspection

The following inspections should be performed prior to each use of the transfer cask and lifting hardware:

A. Visual inspection of the transfer cask exterior for cracks, dents, gouges, tears, or damaged bearing surfaces. Particular attention should be paid to the transfer cask trunnions and lifting yoke.

B. Visually inspect all threaded parts and bolts for burrs, chafing, distortion or other damage.

C. Check all quick-connect fittings to ensure their proper operation.

D. Visually inspect the interior surface of the cask for any indications of excessive wear.

E. Visually inspect the neutron shield jacket for indications of damage.

F. Visually inspect the Transfer Cask/24PT1-DSC annulus seal for indications of damage.

G. Visually inspect the seal (o-ring) for indications of damage.

9.2.1.1.2 Annual Inspection

The following inspections and tests shall be performed on an annual basis *or prior to use following a prolonged period out of use greater than 14 months*:

A. Test the transfer cask cavity quick-connect fittings and ram penetration seal for leaktightness.

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4	REVISED PER FCN 721029-205 AND FCN 721029-272	8/5/08
REVISION	DESCRIPTION	DATE

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M

INTERPRETATION OF WELD SYMBOLS PER ANSI / AWS 2.4

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
GENERAL LICENSE
NUHOMS® 24PT4-DSC
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET	REVISION
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All pressure boundary components are constructed of Type 316 stainless steel. Non-pressure boundary components welded to the pressure boundary components are also constructed of Type 316 stainless steel. The lead shield plugs are made of ASTM B29 lead.

The 24PT4-DSC cylindrical shell and bottom end assembly including the bottom shield plug assembly, outer bottom cover plate, and the grapple ring assembly, and the internal basket assembly, are shop-fabricated components. The top shield plug assembly and the outer top cover plate are shop-fabricated and tested for fit-up but installed at the plant after the spent fuel assemblies have been loaded into the 24PT4-DSC internal basket.

The 24PT4-DSC shell assembly is designed, fabricated, examined and tested in accordance with the requirements of Subsection NB of the ASME Code including Code Case N-595-1 [A3.2] for closure welds. The circumferential and longitudinal shell plate weld seams are full penetration butt welds. The butt weld joints are fully radiographed and inspected according to the requirements of NB-5000 of the ASME Boiler and Pressure Vessel Code.

The 24PT4-DSC top closure is compliant with Code Case N-595-1 and NRC's ISG-15 [A3.3]. The inner top cover plate of the top shield plug assembly is welded to the 24PT4-DSC shell to complete the pressure boundary as shown in Figure A.3.1-2. The outer top cover plate is sealed by a separate, redundant closure weld. All closure welds are multiple-layer welds and are examined by multi-level liquid penetrant methods to effectively eliminate leaks through welds.

A NITS Strongback may be placed over the outer top cover plate of the 24PT4-DSC and attached to the onsite transfer cask during tack welding of the outer top cover plate to the DSC shell. The Strongback is used to flatten the outer top cover plate.

The top end assembly of the 24PT4-DSC design incorporates a vent/siphon block, with two small-diameter penetrations into the 24PT4-DSC cavity for draining and filling operations. The vent port is terminated at the bottom of the shield plug assembly. The other port is attached to a siphon tube, which continues to the bottom of the 24PT4-DSC cavity. The ports include dog-leg type offsets to minimize radiation streaming. The vent and siphon ports terminate in normally closed quick-connect fittings.

During fabrication, leak tests of the 24PT4-DSC shell assembly are performed in accordance with ANSI N14.5-1997 [A3.4] to demonstrate that the shell assembly, including the bottom closure, is leak tight.

The stringent design and fabrication requirements described above ensure that the pressure retaining confinement function is maintained for the design life of the 24PT4-DSC. Pressure monitoring instrumentation is not used since penetration of the pressure boundary would be required. The penetration itself would then become a potential leakage path and, by its presence, compromise the leaktightness of the 24PT4-DSC design.

Transfer of the 24PT4-DSC from the TC into the AHSM is performed using a hydraulic ram that applies a load to the outer bottom cover plate, at the center of the 24PT4-DSC. During insertion of the 24PT4-DSC into the AHSM, the load is shared by the outer bottom cover plate and the inner bottom cover plate.

Frictional loads during 24PT4-DSC transfer are reduced by application of a dry film lubricant to the nitronic surface of the AHSM support rails and the TC. The lubricant chosen for this

application is a tightly adhering inorganic lubricant with an inorganic binder. The dry film lubricant provides a thin, clean, dry, layer of lubricating solids that is intended to reduce wear, and prevent galling in metals. It is applied as a thin sprayed coating, similar to paint, using a carefully controlled process. The lubricant is not affected by water and is designed to be highly resistant to aggressive chemicals. This product is designed for radiation service and has a low coefficient of sliding friction for stainless steel.

The internal basket assembly, shown in Figure A.3.1-3, provides structural support for and geometric separation of the SFAs. The basket assembly consists of 24 stainless steel guidesleeve assemblies, 28 carbon steel spacer discs, and four-support rod/spacer sleeve assemblies. The support rods and spacer sleeves are fabricated of precipitation hardened martensitic stainless steel.

The spacer disc details, shown in Figure A.3.1-4, identify the twenty-four cutouts for the SFAs and the four support rods. The spacer discs maintain cross-sectional spacing and support for the fuel assemblies and the guidesleeves when the 24PT4-DSC is in the horizontal position. When the 24PT4-DSC is in the vertical position, the spacer discs are held in place by the support rods and spacer sleeves; the rod assemblies maintain longitudinal separation between discs during all normal operating and postulated accident conditions. Fuel weight is transferred to the top or bottom cover plates by direct bearing.

Damaged fuel assemblies are stored in Failed Fuel Cans. The Failed Fuel Can is provided with a welded bottom closure and a removable top closure. Slots are provided in the Failed Fuel Can to allow independent removal of the can and the enclosed fuel assembly. Failed Fuel Cans are provided with screens at the bottom and top to contain fuel debris and allow fill/drainage of water from the Failed Fuel Can.

A.3.1.1.2 General Description of the AHSM

No change.

A.3.1.2 24PT4-DSC and AHSM Design Criteria

No change.

A.3.1.2.1 24PT4-DSC Design Criteria

A.3.1.2.1.1 Stress Criteria

No change.

The 24PT4-DSC is designed utilizing linear elastic and non-linear elastic-plastic analytical methods. ASME Code Service Level A and B allowables are used for normal and off-normal operating conditions, respectively. Service Level C and D allowables are used for accident conditions.

The 24PT4-DSC shell is designed by analysis to meet the criteria of the ASME Boiler and Pressure Vessel Code Section III, Division l, Subsection NB, 1992 Edition through 1994 Addenda, supplemented by Code Case N-595-1 [A3.2], ISG-15 [A3.3] and ISG-18 [A3.18] . Stress criteria for pressure boundary components are summarized in Table 3.1-2. Stress criteria for (partial penetration) pressure boundary top closure welds are summarized in Table A.3.1-2.

Table A.4.4-11
Technical Specifications 5.2.5.a Temperature Monitoring Limits for the 24PT4 DSC

	Max Temp (°F)	Max Temp Rise (°F) (in 12 hours)
Single Thermocouple (y = 34.5", x = 0, z = 4.75")	225	30[1]
Dual Thermocouple (y = 60", x = +/-15", z = -11.25")	*200*	5[2]

1. Based on a 24 kW DSC heat load, as noted in Technical Specification Section 5.2.5.a. at the analyzed location in the AHSM base.
2. Based on a 24 kW DSC heat load, as noted in Technical Specification Section 5.2.5.a. at the "as-built" dual thermocouple locations provided in the AHSM roof.

Table A.4.7-3
Summary of Water Heatup Calculation

Decay Heat, kW	Time, hrs* T_{pool}=140°F T_{sfb}=120°F
12	*38.6*
14	*31.6*
16	*27.0*
18	*23.6*
20	*21.0*
22	*18.9*
24	*17.2*

* Time is to be conservatively measured from the time that the first assembly is loaded in the DSC to account for heatup of water in the DSC while still in the spent fuel pool.

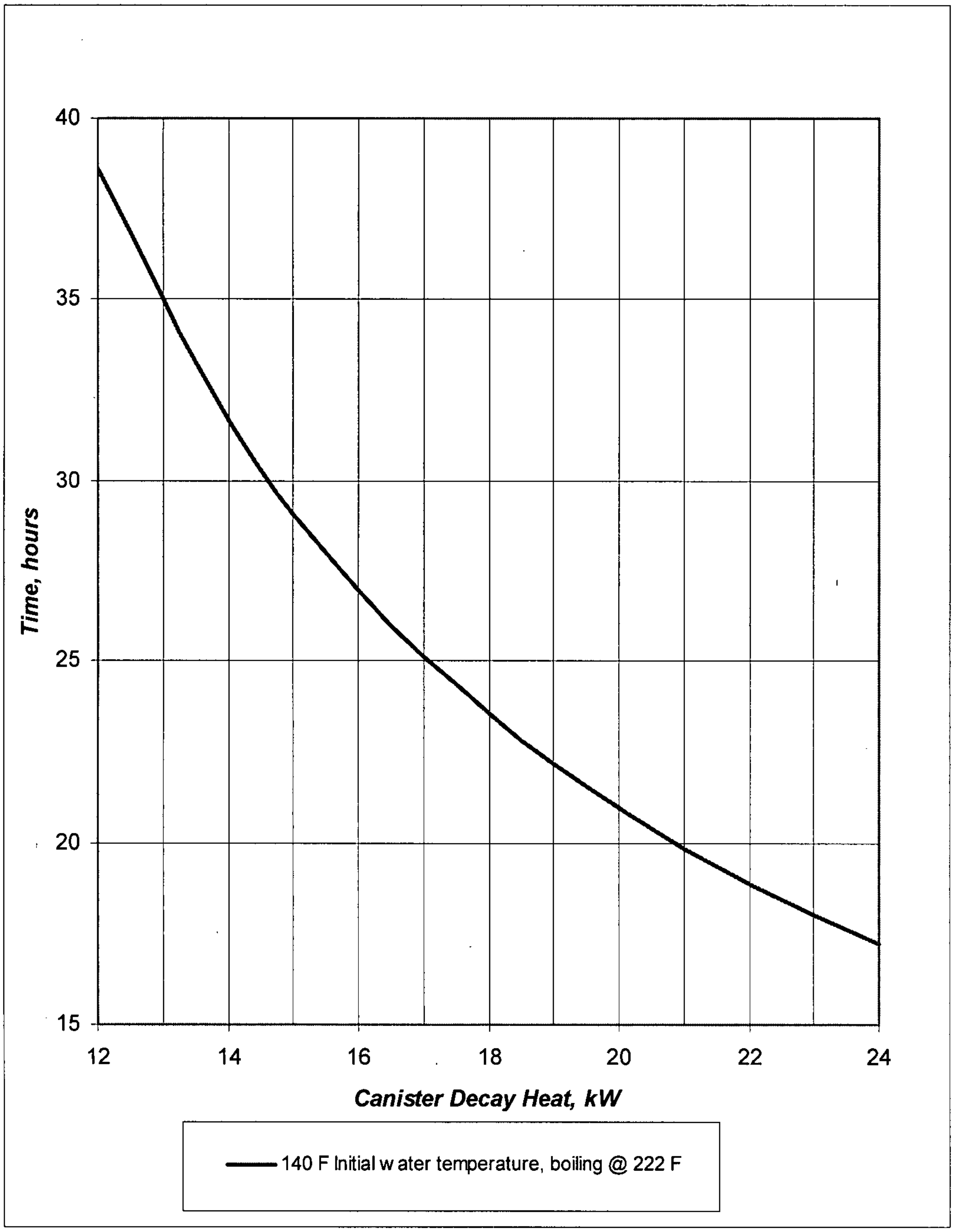

Figure A.4.7-9
Time to Reach Boiling Conditions inside 24PT4-DSC Cavity

Table A.6.3-3
Comparison of Criticality Model vs. Drawing Parameters (DSC Parameters)

Assembly	As-Modeled, cm		Drawings, cm	
	x	y	x	y
Assembly 1	13.4048	13.4048	13.4747	13.4747
Assembly 2	39.7637	13.4048	39.9923	13.4747
Assembly 3	65.6590	13.5255	66.0654	13.6525
Assembly 4	13.4048	39.7637	13.4747	39.9923
Assembly 5	41.7957	41.7957	42.0751	42.0751
Assembly 6	13.5255	65.6590	13.6525	66.0654
Assembly 7	-13.4048	13.4048	-13.4747	13.4747
Assembly 8	-39.7637	13.4048	-39.9923	13.4747
Assembly 9	-65.6590	13.5255	-66.0654	13.6525
Assembly 10	-13.4048	39.7637	-13.4747	39.9923
Assembly 11	-41.7957	41.7957	-42.0751	42.0751
Assembly 12	-13.5255	65.6590	-13.6525	66.0654
Assembly 13	-13.4048	-13.4048	-13.4747	-13.4747
Assembly 14	-39.7637	-13.4048	-39.9923	-13.4747
Assembly 15	-65.6590	-13.5255	-66.0654	-13.6525
Assembly 16	-13.4048	-39.7637	-13.4747	-39.9923
Assembly 17	-41.7957	-41.7957	-42.0751	-42.0751
Assembly 18	-13.5255	-65.6590	-13.6525	-66.0654
Assembly 19	13.4048	-13.4048	13.4747	-13.4747
Assembly 20	39.7637	-13.4048	39.9923	-13.4747
Assembly 21	65.6590	-13.5255	66.0654	-13.6525
Assembly 22	13.4048	-39.7637	13.4747	-39.9923
Assembly 23	41.7957	-41.7957	42.0751	-42.0751
Assembly 24	13.5255	-65.6590	13.6525	-66.0654

Parameter	As-Modeled	Drawings
Boral Sheet		
Total Thickness (maximum-inches)	0.236	*0.213*
Total Thickness (minimum-inches)	0.224	*0.197*
Al cover thickness (inches)	0.01	0.0536 MIN (25 mg/cm^2) 0.02861 MIN (68 mg/cm^2)
Poison Plate Wrapper Thickness (nominal)	0.0148	0.018
Guidesleeve/FF Can (nominal opening size)		
Outer (cm)	22.5552	22.6060
Maximum Outer Spacer Disc Opening Type A (cm)	23.5585 x 23.5585	23.6347 x 23.6347

23. At Licensee discretion, perform a helium sniff test on the top shield plug assembly and vent/siphon block.

24. If a leak is found, repair the weld in accordance with the Code of Construction. Re-pressurize the 24PT4-DSC and repeat the helium sniff test.

25. Once no leaks are detected, depressurize the 24PT4-DSC cavity by releasing the helium through the VDS to the plant's spent fuel pool or radioactive waste system.

26. Re-evacuate the 24PT4-DSC cavity using the VDS. The cavity pressure should be reduced in steps to approximately 10 torr, 5 torr, and 3 torr. After pumping down to each level, the pump is valved off and the cavity pressure is monitored. When the cavity pressure stabilizes, the pump is valved in to continue the vacuum drying process. Vacuum drying is complete when the pressure stabilizes for a minimum of 30 minutes at 3 torr or less in accordance with the Technical Specifications requirements.

NOTE: No time limits for vacuum drying apply since helium is present in the DSC prior to initiating vacuum drying operations per this step.

27. Open the valve on the vent port and allow helium to flow into the cavity to pressurize the 24PT4-DSC in accordance with the limits specified in the Technical Specifications.

28. Close the valves on the helium source.

NOTE: If during drying and backfilling the system is inadvertently vented, re-evacuation and backfilling with helium will be required.

A.8.1.1.4 <u>24PT4-DSC Sealing Operations</u>

1. Disconnect the VDS from the 24PT4-DSC. Seal weld the prefabricated covers over the vent and siphon ports and perform a dye penetrant weld examination.

2. Install the automated welding machine onto the outer top cover plate and place the outer top cover plate with the automated welding system onto the 24PT4-DSC. Verify proper fit up of the outer top cover plate.

NOTE: *At Licensee discretion a Strongback may be installed on the outer top cover plate to flatten the plate. This will require that the outer top cover plate to the 24PT4-DSC shell tack welds be made manually, as the AWS will not fit over the Strongback. Remove the Strongback after tack welding and install AWS prior to placing the outer top cover plate-weld root pass.*

3. Tack weld the outer top cover plate to the 24PT4-DSC shell. Place the outer top cover plate weld root pass. Perform dye penetrant examination of the root pass weld.

4. Weld out the outer top cover plate to the shell and perform dye penetrant examination on the weld surface.

5. Open the cask drain port valve and remove the remaining water from the TC/24PT4-DSC annulus.

6. Remove the automated welding machine from the 24PT4-DSC.

7. Rig the cask top cover plate and lower the cover plate onto the cask.

8. Bolt the cask cover plate into place, tightening the bolts to the required torque in a star pattern.

A.8.1.1.5 Transfer Cask Downending and Transport to ISFSI

No change.

A.8.1.1.6 24PT4-DSC Transfer to the AHSM

No change. If a neutron shield overflow system is used, monitor to maintain water inventory in cask.

A.8.1.1.7 Monitoring Operations

1. Perform routine security surveillance in accordance with the licensee's ISFSI security plan.

2. Perform a temperature measurement for each AHSM on a daily basis in accordance with Technical Specifications. Temperature monitoring is provided to alert operators to a possible blocked vent condition.

   The basis for temperature monitoring limits to be used as a function of thermocouple location is provided in Section A.4.4.2.4.

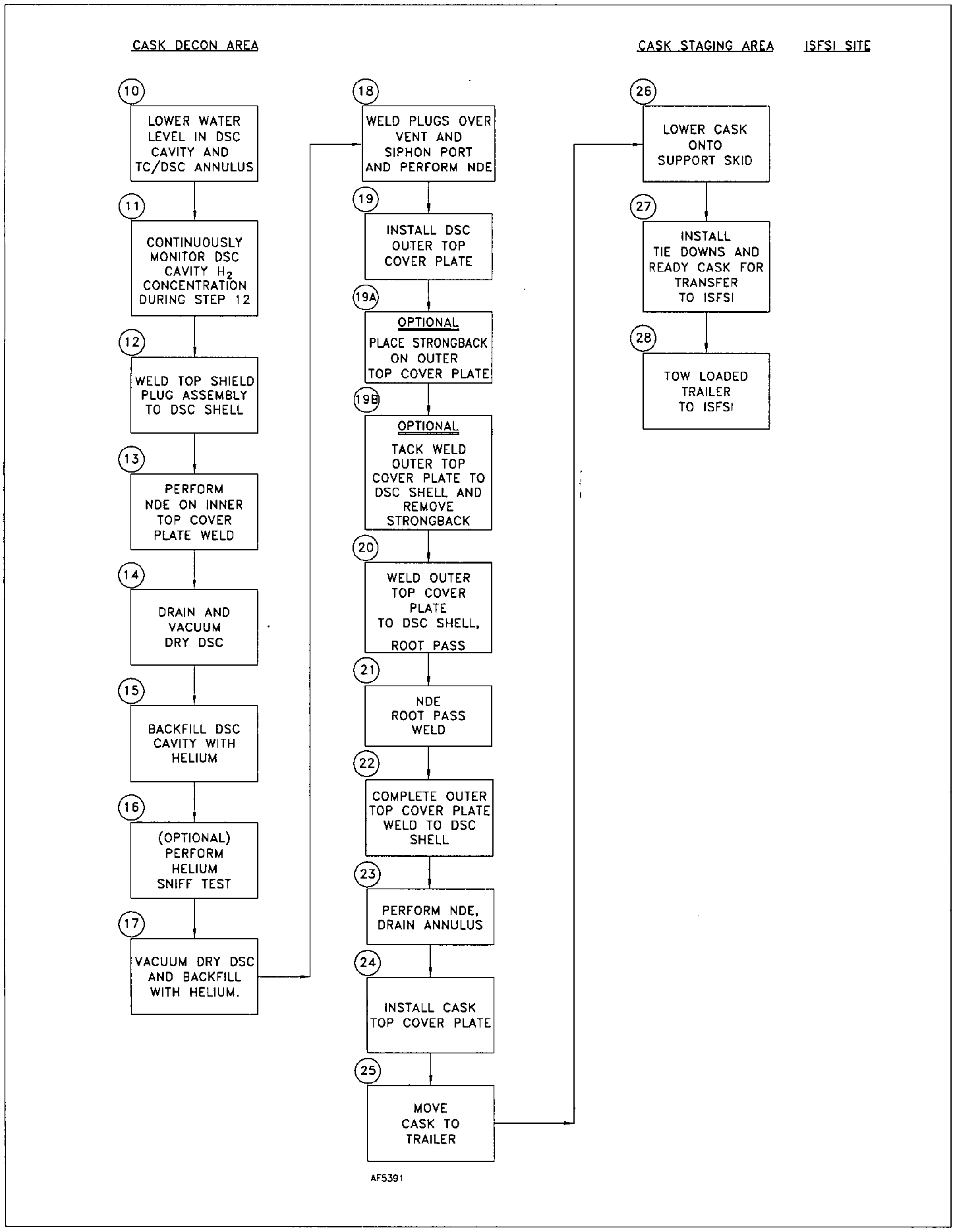

Figure A.8.1-1
Advanced NUHOMS® System Loading Operations Flow Chart
(continued)

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LR 721029-227 Rev. 0 *- (no associated UFSAR change)*

Change Description

This LR evaluated a non-conformance situation in which 155 kips of hydraulic ram force was applied to a dry shielded canister (DSC) outer bottom cover plate during insertion of the DSC into an advanced horizontal storage module (AHSM). The design basis load is 80 kips.

Evaluation Summary

The affect of applying a force of 155,000 lbs to the Outer Bottom Cover Plate (OBCP) of the DSC was evaluated. A stress evaluation was performed to assess the effect of the 155 kip ram push overload on the DSC. The 80 kips ram push load is an off-normal load condition that is evaluated to meet Service Level B stress limits. Therefore the 155 kip overload was also evaluated against the same Service Level B stress limits.

The evaluation for the 155 ram push load was based on elastic analyses using the design basis ANSYS models of the DSC used for the evaluation of the load cases under consideration. Because of the large magnitude of the applied load which causes additional bending deformation of the outer cover in the region inside the grapple ring a bounding case considering load transfer through the lead to the inner cover was considered.

The results showed that primary and primary plus secondary stresses in the pressure boundary components at the bottom end of the DSC are within the ASME Service Level B limits. The largest stress ratios for the pressure boundary components (shell and IBCP) are 50.61 / 60.0 = 0.84 and 57.15 / 87.9 = 0.65, respectively. Thus, the maximum stress ratios for these pressure boundary components (shell and IBCP) as reported in UFSAR Table A.3.6-4 of 0.97 and 0.74, respectively, remain bounding.

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

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

LR 721029-240 Rev. 0 *- (no associated UFSAR change)*

Change Description

This LR evaluated a non-conformance situation associated with the dry shielded canister (DSC) support structure, which supports the DSC within the advanced horizontal storage module (AHSM) during storage operations. The dimension from the DSC stop plate to a certain point along the DSC support rail was found to be 1/4" short in seven fabricated DSC support structures, as follows: TN drawing SCE-23-2007, Rev. 3, sheet 2, View B requires that the dimension between the DSC stop plate (Item 5) and front edge of the 4 5/8" x 4 1/4" hole in the Rail Extension Baseplate be 16' - 9 1/2" (201.5"). Contrary to this requirement, this dimension measures 201.25" for seven DSC support structures. The approved non-conformance disposition was to repair the components by machining the front face of the DSC stop plates by up to 1/4" to accommodate for the loss in length, and removing up to

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1/16" from the top toe of the 3/8" fillet weld between the DSC stop plates and the top surface of the top flange of the support rails, to eliminate any potential interference with the DSCs.

Evaluation Summary

The design function of the DSC stop plate is to restrain the longitudinal motion of the DSC during a seismic event and to define the end of the DSC travel during loading.

The approved repair disposition results in an increase in the calculated stresses of the stop plate and support rail/stop plate welded connection. The thinner plate reduces the shear area and section properties, which results in an increase in the bending and shear stresses.

Maximum bending stresses increase for the *normal* handling case from 2.20 ksi to 2.39 ksi, the *off-normal* case from 5.85 ksi to 6.37 ksi, and the *seismic* case from 7.0 ksi to 7.6 ksi. These results are still well below the allowable stresses of 13.56 ksi, 17.62 ksi and 21.69 ksi, respectively.

Maximum shear stresses also increase for the *normal* handling case from 3.34 ksi to 3.5 ksi, the *off-normal* case from 8.89 ksi to 9.36 ksi, and the *seismic* case from 10.63 ksi to 11.18 ksi These results are still below the allowable stresses of 9.04 ksi, 11.75 ksi and 12.65 ksi, respectively.

A 5/16" base metal along the top surface of the top flange decreases the weld allowable load for the *normal* handling case from 3.39 kip/in to 3.29 kip/in, the *off-normal* case from 4.40 kip/in to 4.277 kip/in, and for the *seismic* case from 4.74 kip/in to 4.605 kip/in. These results are still above the allowable loads of 1.38 kip/in, 3.67 kip/in and 4.39 kip/in, respectively.

There is no impact on the mechanical, thermal, shielding and criticality analyses. These results demonstrated that the nonconformance does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.