MARCH 1999

REVISION 2

NAC-MPC

SAFETY ANALYSIS REPORT

for the

NAC Multi-Purpose Canister System

Docket No. 72-1025

NAC INTERNATIONAL

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Chapter 13

1.5 License Drawings

This section presents the License Drawings for the NAC-MPC System.

1.5.1 NAC-MPC License Drawings

Drawing Number	Title	Revision No.	No. of Sheets
455-821	Adapter Ring, Transfer Adapter to NAC-STC MPC-Yankee	0	1
455-856	Name Plate - NAC-VCC Cask	0	1
455-859	Assembly, Transfer Adapter, MPC-Yankee	1	3
455-860	Assembly, Transfer Cask (TFR), MPC - Yankee	3	4
455-861	Weldment, Structure, Vertical Concrete Cask (VCC), MPC - Yankee	3	2
455-862	Loaded Vertical Concrete Cask (VCC), MPC - Yankee	2	1
455-863	Lid, Vertical Concrete Cask (VCC), MPC- Yankee	2	1
455-864	Shield Plug, Vertical Concrete Cask (VCC), MPC- Yankee	1	1
455-866	Reinforcing Bar and Concrete Placement, Vertical Concrete Cask (VCC), MPC- Yankee	0	3
455-870	Canister Shell, MPC- Yankee	3	1
455-871	Details, Canister, MPC- Yankee	3	2
455-872	Assembly, Transportable Storage Canister (TSC), MPC- Yankee	5	1
455-873	Assembly, Drain Tube, Canister, MPC- Yankee	2	1
455-881	PWR Fuel Tube, Captivated BORAL, MPC- Yankee	2	1
455-891	Bottom Weldment, Fuel Basket, MPC- Yankee	0	1
455-892	Top Weldment, Fuel Basket, MPC- Yankee	1	1
455-893	Support Disk and Misc. Basket Details, MPC- Yankee	3	1
455-894	Heat Transfer Disk, Fuel Basket, MPC- Yankee	1	1
455-895	Fuel Basket Assembly, MPC- Yankee	2	1

1.5.2 Yankee Class Reconfigured Fuel Assembly License Drawings

Drawing Number	Title	Revision No.	No. of Sheets
YR-00-060	Yankee-Class Reconfigured Fuel Assembly	1	1
YR-00-061	Yankee-Class Reconfigured Fuel Assembly, Shell Weldment	1	1
YR-00-062	Yankee-Class Reconfigured Fuel Assembly, Top End Fitting Assembly	1	1
YR-00-063	Yankee-Class Reconfigured Fuel Assembly, Bottom End Fitting Assembly	1	1
YR-00-064	Yankee-Class Reconfigured Fuel Assembly, Nozzle Bolt and Alignment Pin	1	1
YR-00-065	Yankee-Class Reconfigured Fuel Assembly, Fuel Basket Assembly	1	1
YR-00-066	Yankee-Class Reconfigured Fuel Assembly, Fuel Tube Assembly	1	1

FIGURE WITHHELD UNDER 10 CFR 2.390

ASSY	ASSY	ASSY					GROUP	NAME	DATE
QUANTITY									
SYM	GEOMETRY	TOLERANCES UNLESS OTHERWISE SPECIFIED							
	FLATNESS	3 PLACE DEC	TOL.	2 PLACE DEC	TOL.		PREPARER	R. [illegible]	3-17-99
	STRAIGHTNESS	UNDER 3		UNDER 6	±.04		CHECKER	[illegible]	[illegible]
	ANGULARITY	3-12		6-18	±.06		PROJECT MANAGER	[illegible]	3-17-99
	PERPENDICULARITY	OVER 12		OVER 18	±.09		VP/CHIEF ENGINEER	N/A	
	PARALLELISM	1 PLACE DEC.	±.1	FILLETS .03			DIRECTOR of PROJECTS	[illegible]	3/18/99
	CONCENTRICITY	FINISH (✓)-AA-125 MICRO IN		ANGLES ±.5°			LICENSING MANAGER	[illegible]	3/18/99
	TRUE POSITION	THREADS-UNIFIED CL2A-2B		CORNERS R.03			QUALITY	[illegible]	3/18/99
		NEXT ASSEMBLY: 455-872					SBU VP	NA	
		DRAWING TYPE: LICENSE							

NAC INTERNATIONAL

DETAILS,
CANISTER,
MPC-YANKEE

PROJECT	DESIGN PACKAGE	DRAWING	REV
455		871	3
SCALE 1/8	EST.WT.	SH 1 OF 2	10:59AM 3-17-99

FIGURE WITHHELD UNDER 10 CFR 2.390

NAC INTERNATIONAL

DETAILS,
CANISTER,
MPC–YANKEE

PROJECT 455	DESIGN PACKAGE	DRAWING 871	REV 3
SCALE 1/8	EST.WT.	SH 2 OF 2	11:00AM 3-17-99

8.1 Loading the NAC-MPC Storage System

The NAC-MPC storage system consists of three principal components: the transportable storage canister (canister), the transfer cask, and the vertical concrete cask (concrete cask). The transfer cask is used to hold the canister during loading and while the canister is being closed and sealed. The transfer cask is also used to transfer the canister to the concrete cask and to load the canister into the transport cask. The principal handling operations involve closing and sealing the canister by welding and loading it into the concrete cask. The vent and drain port locations are shown in Figure 8.1-1.

This procedure assumes that the canister with an empty basket is installed in the transfer cask, that the transfer cask is positioned in the decontamination area or other suitable work station, and that the concrete cask is positioned on a heavy-haul transporter in the cask receiving area or other suitable staging area. The staging area should be within the handling "footprint" of the cask handling crane.

The operator must ensure that the fuel assemblies selected for loading into the canister conform to the requirements of Table 2.1-1 and the Certificate of Compliance or Site Specific Approval.

8.1.1 Loading and Closing the Transportable Storage Canister

1. Visually inspect the basket fuel tubes to ensure they are unobstructed and free of debris. Ensure that the welding zones on the canister, shield and structural lids, and the port covers are prepared for welding. Ensure transfer cask door lock bolts are installed and secure.
2. Flood the canister with clean water until the water is about 4 inches from the top of the canister.

   Note: Do not fill the canister completely in order to avoid spilling water during the transfer to the spent fuel pool.
3. Attach a clean water line to the transfer cask.
4. If it is not already attached, attach the transfer cask lifting yoke to the cask handling crane, and engage the transfer cask lifting trunnions.

   Note: The minimum temperature of the transfer cask (i.e., external ambient temperature) must be verified to be higher than 0°F prior to lifting. See Appendix 12A, Section 3.1.9.
5. Raise the transfer cask and move it over the pool, following the prescribed travel path.
6. Lower the transfer cask to the pool surface and turn on the clean water line to flood the annulus between the transfer cask and canister.

7. Lower the transfer cask as the annulus fills with clean water until the trunnions are at the surface and hold that position until clean water fills the remainder of the canister and overflows the sides of the transfer cask. Then lower the transfer cask to the bottom of the pool cask loading area.

   Note: If an intermediate shelf is used to avoid wetting the cask handling crane hook, follow the plant procedure for use of the extension piece.

8. Disengage the transfer cask lifting yoke to provide clear access to the canister.
9. Load the previously designated fuel assemblies into the canister.
10. Attach a three-legged sling to the shield lid using the swivel hoist rings.
11. Using the cask handling crane, or auxiliary hook, lower the shield lid until it rests in the top of the canister. Note the time that the shield lid is installed.

    Note: Ensure that the shield lid key slot aligns with the key welded to the canister shell.

12. Raise the transfer cask until its top just clears the pool surface. Hold at that position, and using a suction pump, drain the pool water from above the shield lid. After the water is removed, continue to raise the cask.
13. As the cask is raised, spray the transfer cask outer surface with clean water to wash off any gross contamination.
14. When the cask is clear of the pool surface, but still over the pool, turn off the clean water flow to the annulus and allow the annulus water to drain to the pool. Move the cask to the decontamination area or other suitable work station.

    Note: Access to the top of the transfer cask is required. A suitable work platform may need to be erected.

15. Verify that the shield lid is level. Decontaminate the top of the transfer cask and shield lid as required to allow welding and inspection activities.

    Note: Supplemental shielding may be used for activities around the shield lid.

16. Insert the drain tube through the drain port of the shield lid into the basket drain tube sleeve. Torque the drain tube to 125 ± 5 ft-lbs. Install a mating quick-disconnect fitting in the vent line to open the vent. Remove the hoist rings.
17. Connect the suction pump to the drain port. Verify that the vent port is open. Remove approximately 50 gallons of water from the canister. Disconnect and remove the pump.

    Caution: The temperature of the water in the canister must be monitored in accordance with LCO 3.1.1, from this step through step 26.

18. Install the semiautomated welding equipment.

19. Attach the hydrogen gas detector to the vent port. Verify that the concentration of any detectable hydrogen gas is below 2.4%.

    Note: If the concentration exceeds 2.4%, operate the vacuum system to remove gases from the under side of the shield lid and re-verify hydrogen gas concentration.

20. Operate the welding equipment to complete the root weld joining the shield lid to the canister shell following approved procedures.

    Note: Stop welding if the hydrogen detector indicates a hydrogen concentration above 2.4% and clear hydrogen gas buildup.

21. Prepare the weld and perform a liquid penetrant weld examination of the root pass. Record the results of the weld examination.

    Note: The hydrogen detector may be removed from the vent port, if necessary.

22. Complete welding of the shield lid to the canister wall and remove the weld equipment.
23. Prepare the weld and perform a liquid penetrant weld examination of the final pass. Record the results of the weld examination.
24. Remove any lines attached to the drain port. Attach an air pressure line to the vent port. Pressurize the canister to 50 psig and hold the pressure. There must be no loss of pressure for 10 minutes (To be consistent with the specified canister transportation test pressure).
25. Release the pressure and visually inspect the shield lid to canister shell weld for indications of leaks and defects. Record the results of the inspection.
26. Attach the suction pump to the drain line. Ensure that the vent line is open. Using the pump, remove the remaining free water from the canister cavity.

    Note: Steps 26 through 35 must be completed within 16 hours in accordance with LCO 3.1.5.

27. Remove any free water in the drain port cavity. Install the drain port cover.

    Note: If previously removed, reinstall the hydrogen gas detector to the vent port. Operate the detector to verify that the concentration of hydrogen gas is below 2.4%. If not, use the vacuum system to clear hydrogen gas from the cavity and the drain line.

28. Weld the drain port cover to the shield lid.
29. Prepare the weld and perform a liquid penetrant examination of the drain port cover weld root and final passes. Record the results of the weld examination.
30. Attach the vacuum equipment to the vent port line.
31. Operate the vacuum equipment, until a vacuum of 3 mm of mercury exists in the canister, in accordance with the requirements of Technical Specification LCO 3.1.2.
32. Verify that no water remains in the canister by holding the vacuum for 30 minutes. If water is present in the cavity, the pressure will rise as the water vaporizes. Continue the vacuum/hold cycle until there is no indicated rise in pressure after 30 minutes.

33. Backfill the canister cavity with helium having a minimum purity of 99.9%.
34. Restart the vacuum equipment and evacuate the canister to 3 mm of mercury, in accordance with the requirements of Technical Specification LCO 3.1.2.
35. Backfill the canister cavity with helium, pressurizing it to 22 psia (approximately 7.5 psig) in accordance with the requirements of Technical Specification LCO 3.1.3.
36. Using a helium leak detector, verify that there is no leak at the shield lid weld to a sensitivity of 4 x 10^{-8} cm^3/second (helium) in accordance with the requirements of Technical Specification LCO 3.1.4.

    Note: Steps 36 through Step 12 of the concrete cask loading procedure (Section 8.1.2) must be completed within 26 hours in accordance with LCO 3.1.6.
37. Vent the canister helium pressure to one (1) atmosphere absolute (0 psig).
38. Remove any attachments to the vent port fitting. Dry any residual water that may be present in the vent port cavity.
39. Install the vent port cover and weld the vent port cover to the shield lid.
40. Prepare the weld and perform a liquid penetrant examination of the vent port cover weld root and final passes. Record the results of the weld examination.
41. Remove any supplemental shielding used during shield lid closure activities.
42. Attach a three-legged sling to the structural lid using the swivel hoist rings.

    Note: Verify that the structural lid is stamped, or otherwise marked, to provide traceability of the canister contents. Verify that the structural lid weld backing ring is in place on the structural lid.
43. Using the cask handling or the auxiliary crane, install the structural lid in the top of the canister. Verify that the structural lid does not protrude above the canister shell and is approximately centered in the canister shell. Verify that the gap in the backing ring is not aligned with the shield lid alignment key. Remove the lifting sling and the hoist rings.
44. Install the automated welding equipment on the structural lid.
45. Complete the root weld pass joining the structural lid to the canister shell.
46. Prepare the weld and perform a liquid penetrant examination of the weld root pass and record the results of the weld examination.
47. Complete the remainder of the weld, performing NDE (progressive liquid penetrant or ultrasonic testing) examination. Record the results of each weld examination.
48. Remove the welding equipment.

49. Prepare the weld and perform an ultrasonic inspection of the weld, if required, then perform a liquid penetrant examination of the final weld pass. Record the results of the weld examinations.
50. Perform a smear survey of the accessible area at the top of the canister to ensure that the surface contamination is less than the limits established for the site (typically less than 20 dpm/100 cm^2 alpha, and less than 1,000 dpm/ 100 cm^2 beta-gamma). Smear survey results shall meet the requirements of Technical Specification LCO 3.2.2.
51. Install the transfer cask retaining ring.
52. Decontaminate the external surface of the transfer cask.

8.1.2 Loading the Vertical Concrete Cask

This section of the loading procedure assumes that the vertical concrete cask (concrete cask) is located on the bed of a heavy-haul trailer under the cask handling crane and that the concrete cask shield plug and lid are not in place.

1. Using a suitable crane, place the transfer adapter on the top of the concrete cask.
2. Using the transfer adapter bolt hole pattern, align the adapter to the concrete cask. Bolt the adapter to the cask using four (4) socket head cap screws.
3. Verify that the bottom door connectors on the adapter plate are in the fully extended position.
4. If not already done, attach the transfer cask lifting yoke to the cask handling crane. Verify that the transfer cask retaining ring is installed.
5. Install six (6) swivel hoist rings in the structural lid of the canister. Verify that the hoist ring threads are fully engaged, and attach two (2) three-legged slings. Stack the slings on the top of the canister so they are available for use in lowering the canister into the concrete cask.
6. Engage the transfer cask trunnions with the transfer cask lifting yoke. Ensure that all lines are disconnected from the transfer cask.
7. Raise the transfer cask and move it over the concrete cask. Lower the transfer cask, ensuring that the transfer cask bottom door rails and connector tees align with the adapter plate rails and door connectors. Prior to final set down, remove transfer cask door lock bolts.

   Note: The minimum temperature of the transfer cask must be verified to be higher than 0°F (i.e., external ambient temperature) prior to lifting in accordance with Technical Specification LCO 3.1.9.
8. Ensure that the bottom door connector tees are engaged with the adapter plate door connectors.

9. Disengage the transfer cask yoke from the transfer cask and from the cask handling crane hook.
10. Return the cask handling crane hook to the top of the transfer cask and engage the two (2) three-legged slings attached to the canister by attaching the master links to the crane hook. Lift the canister slightly (about ½ inch) to take the canister weight off of the transfer cask bottom doors.

    Note: A load cell may be used to determine when the canister is supported by the crane. Avoid raising the canister to the point that the structural lid engages the transfer cask retaining ring, as this could result in lifting the transfer cask.

    Caution: The three-legged sling master links must be at least 67 inches above the canister lid. (Refer to Technical Specifications, Appendix 12A, Section 4.5.2).
11. Using the hydraulic system, open the bottom doors to access the concrete cask cavity.
12. Lower the canister into the concrete cask, using a slow crane speed as the canister nears the bottom of the concrete cask.
13. Disconnect the slings from the canister and close the transfer cask bottom doors.
14. Retrieve the transfer cask lifting yoke and attach the yoke to the transfer cask.
15. Lift the transfer cask off the concrete cask and return it to the decontamination area or designated work station.
16. Using the auxiliary crane, remove the adapter plate from the top of the concrete cask.
17. Remove the swivel hoist rings from the structural lid and replace them with bolts.
18. Using the auxiliary crane, retrieve the shield plug and install the shield plug in the top of the concrete cask.
19. Using the auxiliary crane, retrieve the concrete cask lid and install the lid in the top of the concrete cask using six stainless steel bolts.
20. Ensure that there is no foreign material left at the top of the concrete cask. Install the tamper-indicating seal.
21. Verify that the concrete cask surface dose rates are less than those established by the requirements of Technical Specification LCO 3.2.1 (The average surface dose rate shall not exceed 50 mrem per hour on the sides and 35 mrem per hour on the top. The dose rates measured at the inlets and outlets shall be less than 100 mrem per hour measured at a point that is the extension of the external surface.)

8.1.3 Transporting the Vertical Concrete Cask

This section of the procedure assumes that the loaded concrete cask is positioned on a heavy-haul trailer.

1. Using a suitable towing vehicle, tow the heavy-haul trailer to the dry storage pad (ISFSI). Verify that the bed of the trailer is approximately at the same height as the pad surface.
2. Install four (4) hydraulic jacks at the four (4) designated jacking points at the bottom cooling air vents.
3. Raise the concrete cask approximately 3 inches.

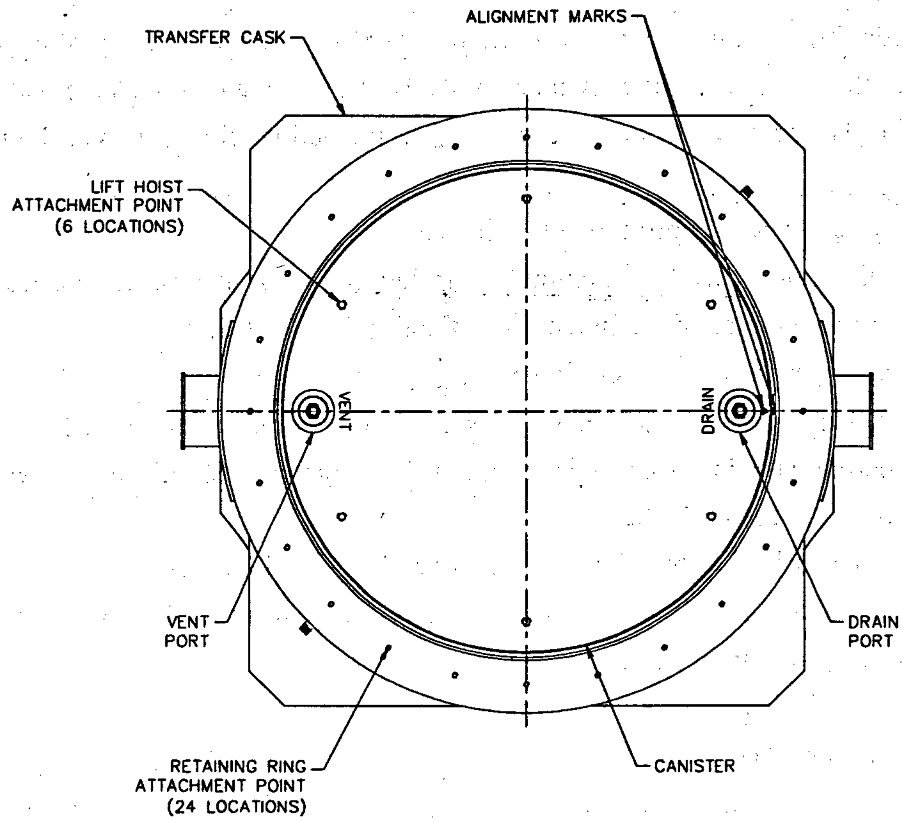
   Caution: Do not exceed a maximum lift height of 6 inches, in accordance with the requirements of Technical Specification LCO 3.1.8.
4. Move the air-bearing rig set under the cask.

   Note: A hydraulic skid may also be used to move the concrete cask. The height the concrete cask is raised depends upon the height of the skid or air pad set used, but may not exceed 6 inches.
5. Inflate the air-bearing rig set. Remove the four (4) hydraulic jacks.
6. Using a suitable towing vehicle, move the concrete cask from the bed of the transporter to the designated location on the storage pad.
7. Turn off the air-bearing rig set, allowing it to deflate.
8. Reinstall the four (4) hydraulic jacks and raise the concrete cask approximately 3 inches.

   Caution: Do not exceed a maximum lift height of 6 inches, in accordance with the requirements of Technical Specification LCO 3.1.8.
9. Remove the air-bearing rig set pads. Ensure that the surface of the dry storage pad under the cask is free of foreign objects.
10. Lower the concrete cask to the surface.

    Note: Ensure that the spacing between concrete casks is 15 (+1, -0) feet.
11. Remove the four (4) hydraulic jacks.
12. Install screens in the inlets and outlets.
13. Install/connect the temperature monitoring equipment.
14. Scribe/stamp the concrete cask name plate to indicate loading.

Figure 8.1-1 Vent and Drain Port Locations



8.2 Removal of the Transportable Storage Canister from the Vertical Concrete Cask

Removal of the loaded canister from the concrete cask is expected to occur at the time of shipment of the canistered fuel off site. Alternately, removal could be required in the unlikely event of an accident condition that rendered the concrete cask or canister unsuitable for continued long-term storage or for transport. This procedure identifies the general steps to return the loaded canister to the transfer cask and return the transfer cask to the decontamination station, or other designated work area. Since these steps are the reverse of those undertaken to place the canister in the concrete cask, as described in Section 8.1.2, they are summarized here.

At the option of the user, the canister may be removed from the concrete cask and transferred to another concrete cask or to the NAC-STC transport cask at the ISFSI site. This transfer is done using the transfer cask, which provides shielding for the canister contents during the transfer.

1. Using the hydraulic jacking system and the air pad set, move the concrete cask from the ISFSI pad to the heavy-haul trailer. The bed of the trailer must be approximately level with the surface of the pad.

   Caution: Do not exceed a maximum lift height of 6 inches when raising the concrete cask to install the air pad set in accordance with the requirements of Technical Specification LCO 3.1.8.
2. Tow the transporter to the cask receiving area or other designated work station.
3. Remove the concrete cask shield plug and lid. Install the hoist rings in the canister structural lid. Verify that the hoist ring threads are fully engaged and attach the lift slings. Install the transfer adapter.
4. Retrieve the transfer cask and position it on the transfer adapter on the top of the concrete cask.

   Note: The minimum temperature of the transfer cask must be verified to be higher than 0°F (i.e., external ambient temperature) prior to lifting in accordance with Technical Specification LCO 3.1.9.
5. Open the shield doors. Attach the canister lift slings to the cask handling crane hook.

   Caution: The three-legged sling master links must be at least 67 inches above the canister lid. (Refer to Technical Specifications, Appendix 12A, Section 4.5.2).
6. Raise the canister into the transfer cask. Use caution to avoid contacting the transfer cask retaining ring with the canister.

7. Close the shield doors. Lower the canister to rest on the bottom doors. Disconnect the canister slings from the crane hook.
8. Retrieve the transfer cask lifting yoke. Engage the transfer cask trunnions and move the transfer cask to the decontamination area or designated work station.

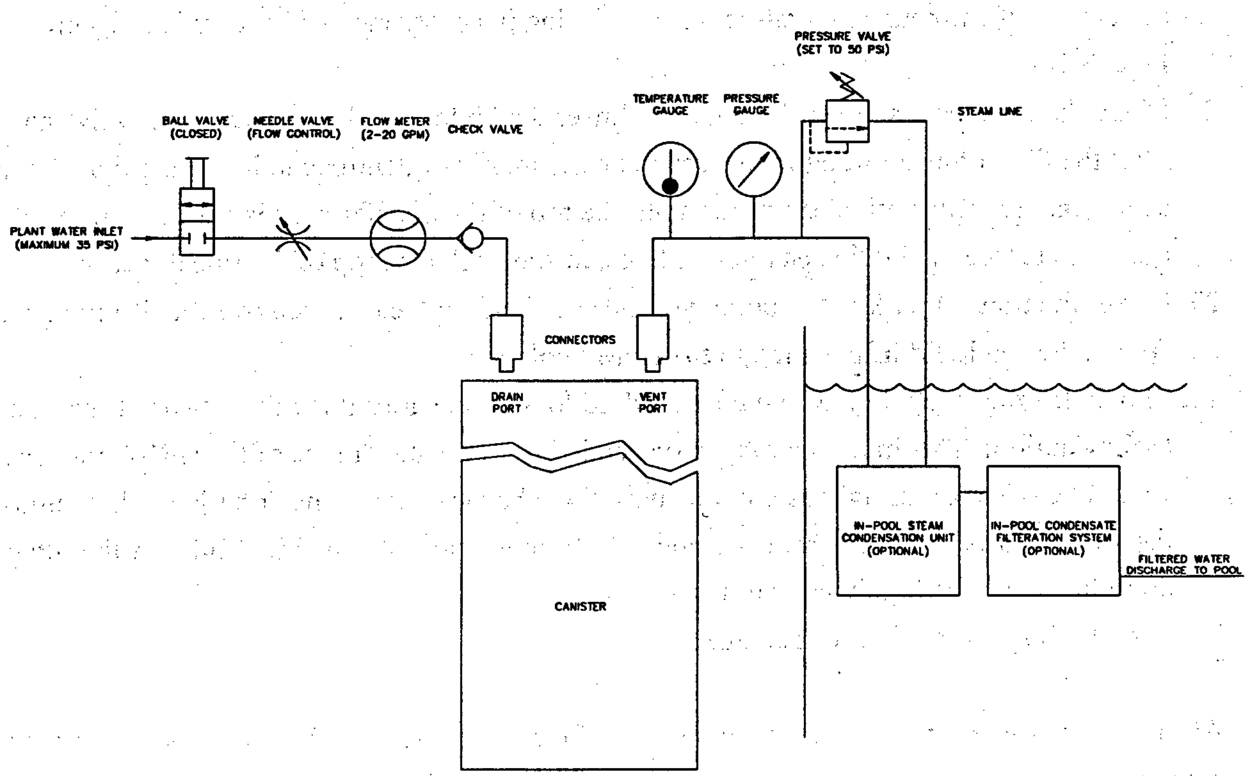
   Note: Prior to moving transfer cask, install and secure door lock bolts.

After the transfer cask containing the canister is in the decontamination area or other suitable work station, additional operations may be performed on the canister. It may be opened, transferred to another concrete cask, or placed in the NAC-STC transport cask.

20. Attach the clean water line to the transfer cask.
21. Retrieve the transfer cask lifting yoke and engage the transfer cask lifting trunnions.
    Note: The minimum temperature of the transfer cask must be verified to be higher than 0°F (i.e., external ambient temperature) prior to lifting in accordance with Technical Specification LCO 3.1.9.
22. Move the transfer cask over the pool and lower the bottom of the transfer cask to the surface. Start the flow of clean water to the transfer cask annulus. Continue to lower the transfer cask, as the annulus fills with clean water, until the top of the transfer cask is about 4 inches above the pool surface. Hold this position until clean water fills the top of the transfer cask.
23. Lower the transfer cask to the bottom of the cask loading area and remove the lifting yoke.
24. Attach the shield lid lifting sling to the crane hook.
25. Slowly lift the shield lid. Move the shield lid to one side after it is raised clear of the transfer cask (Caution: The drain line tube is suspended from the under side of the shield lid. The lid should be raised as straight as possible until the tube clears the canister basket. Use caution if the shield lid is removed from the pool. The under side of the shield lid and the attached drain line could be highly contaminated.).
26. Visually inspect the fuel for damage.

At this point, the spent fuel could be transferred from the canister to the fuel racks. If the fuel is damaged, special rigging could be required to remove the fuel. In addition, the bottom of the canister could be highly contaminated. Care must be exercised in the handling of the transfer cask when it is removed from the pool. Highly radioactive particles could rest on flat surfaces of the transfer cask resulting in high dose rates.

Figure 8.3-1 Canister Reflood Piping and Controls Schematic



Note: The fuel cooldown procedure must conform to the requirements of Technical Specification LCO 3.1.7.

The basket assembly welds are liquid penetrant examined in accordance with ASME Code Section V, Article 6. The acceptance criteria are in accordance with ASME Code Section III, NG-5350.

All welding of canister and basket components is performed using procedures and welders qualified in accordance with the ASME Code Section IX. Welding of the fabricated steel components of the concrete cask is performed using procedures and welders qualified in accordance with AWS D1.1 or ASME Code Section IX.

9.1.1.2 Fabrication Inspections

Materials used in the fabrication of the NAC-MPC storage cask and canister are procured with certifications and supporting documentation, as necessary, to assure compliance with procurement specifications. All materials are receipt inspected for appropriate acceptance requirements and for traceability to required material certification.

The canister assembly is fabricated to the requirements of ASME Code Section III, Subsection NB. Specific exceptions to the ASME Code are described in Chapter 2 and 7. The basket assembly is fabricated to ASME Code Section III, Subsection NG. Shop fabricated components of the storage cask are fabricated in accordance with ANSI/AWS D1.1-96 or ASME Code Section VIII.

A complete dimensional inspection of all critical components and a components fit-up test is performed on the canister assembly to ensure proper assembly in the field. Acceptance criteria for dimensions shall conform to the fabrication drawings.

Concrete strength and density shall be field verified to American Concrete Institute (ACI) and American Society for Testing and Materials (ASTM) standards to ensure adequacy. Reinforcing steel is installed per specification requirements based on ACI-318.

On completion of fabrication, the canister, basket, and other shop fabricated components shall be inspected for cleanliness. All components shall be free of any foreign material, oil, grease and solvents. Carbon steel components assembled for the storage cask shall be coated with a corrosion-resistant paint.

9.1.2 Structural and Pressure Test

The canister is pressure tested at the time of use. After loading of the canister basket with spent fuel, the shield lid is welded in place after approximately 50 gallons of water are removed from the canister. Prior to removing the remaining spent fuel pool water from the canister, the canister is pressure tested at 50 psig. This pressure is held for 10 minutes. Any loss of pressure during the test period is unacceptable, and the leak must be located and repaired. The pressure test is described in Section 8.1.

The transfer cask lifting trunnions and bottom shield doors shall be load tested in accordance with the requirements of ANSI N14.6 "Special Lifting Devices for Shipping Containers Weighing 10,000 pounds (4500 kg) or More for Nuclear Materials."

The lifting trunnion load test shall consist of applying a vertical load of 429,039 pounds, which is 300 percent of the maximum service load of 143,013 pounds. The bottom shield door load test shall consist of applying a vertical load of 186,810 pounds, which is 300 percent of the maximum service load (62,270 pounds).

The load tests shall consist of applying vertical loads to the lifting trunnions and bottom shield door components. The load will be held for a minimum of 10 minutes and will be performed in accordance with approved written procedures.

Following completion of the lifting trunnion and bottom shield door load tests, all trunnion and door rail welds and all load bearing surfaces shall be visually inspected for permanent deformation, galling or cracking. Inspections utilizing liquid penetrant examination shall be performed in accordance with the ASME Code Section V, Article 6. Acceptance criteria shall be in accordance with ASME Code Section III, NF-5350.

Any evidence of permanent deformation, cracking, galling of the load bearing surfaces or unacceptable liquid penetrant results shall be cause for rejection of the affected component.

12.0 OPERATING CONTROLS AND LIMITS

This chapter identifies operating controls and limits, technical parameters and surveillance requirements imposed to ensure the safe operation of the NAC-MPC System. Section 12.1 provides the proposed operating controls and limits, which are presented in Technical Specification format in Appendix 12A of this Chapter. The bases for the specified controls and limits are presented in Appendix 12B of this Chapter.

Sections 4.4 and 4.5 of Appendix 12A present Site Specific Parameters and Design Specifications that are important to the safe operations of the NAC-MPC System, but that are not included as Technical Specifications. These include items which are singular events, those that cannot be readily determined or re-verified at the time of use of the system, or that are easily implemented, verified and corrected, if necessary, at the time the action is undertaken. Sections 5.1 and 5.2 of Appendix 12A provides a description of a suggested training program intended to assist the user in meeting the requirements of Subpart I of 10 CFR 72 for use of the NAC-MPC System. Section 5.3 of Appendix 12A presents the requirements for the first system placed in service. Section 5.4 of Appendix 12A presents the requirements for the NAC-MPC thermal monitoring program.

12.1 Proposed Operating Controls and Limits

The NAC-MPC System is designed to provide passive dry storage of containerized Yankee Class spent fuel. The system has few operating controls. The principal controls and limits for the NAC-MPC System are satisfied by the selection of fuel for storage that meets the technical specifications presented in Section 2.1 and in Tables 12A2-1 and 12A2-2 of Appendix 12A. The general areas where controls and limits are necessary for safe operation of the NAC-MPC System are shown in Table 12-1. The conditions for use of the system that are defined in the table, are based on the specifications and functionality of the system and on the safety assessments for normal and accident conditions. Appendix 12B presents the bases for the Technical Specifications, which describe the development of the operating controls and limits.

12.2 Proposed Training Topics for the NAC-MPC System

The proposed required training for using the NAC-MPC System is presented in Sections 5.1 and 5.2 of Appendix 12A to this Chapter. A principal purpose of the training program is to ensure that controls and limits of the system design are understood and met in operations and use. The training also ensures that design features of the system are correctly used, that procedural requirements are met, and that compliance with procedures is documented.

Training is considered in two venues. The first is discussion or classroom training. The second is dry run training. Classroom training considers documentation and procedure review, including controls and limits and their bases. Dry run training is performed at the licensee's site and considers equipment fitup, interfacing and operations, including documentation of tasks, inspections and test conditions.

Specific information included in any training topic may be site specific, but must consider and include, the approved site procedure(s) to be used in NAC-MPC System handling, loading, closing, and storage. Each training program should be developed in accordance with the licensee's general site training program requirements.

12.3 Special Requirements for the First System Placed in Service

The thermal performance of the first NAC-MPC System placed in service at a site shall be documented as described in Section 5.3 of Appendix 12A to this Chapter.

12.4 Surveillance After a Natural Phenomena Off-Normal or Accident Event

The NAC-MPC storage cask shall be inspected within 24 hours after the occurrence of a natural phenomena, off-normal or accident event in the area of the ISFSI. This inspection must specifically verify that the concrete cask air inlets and outlets are not blocked. At least one-half of the inlets and outlets must be cleared to restore air circulation within 24 hours.

An extended period of extreme heat can reduce the strength of the concrete below the design basis evaluated in Chapters 3 and 11.

The concrete cask and the canister shall be inspected if they experience a drop from a height of more than 6.0 inches or a tipover.

12.5 Administrative Controls

Controls used by NAC International as part of the NAC-MPC design and fabrication are provided in the NAC Quality Assurance Manual and Quality Procedures. The NAC International Quality Assurance Program is discussed in Chapter 13.0. If procurement and fabrication of the NAC-MPC System are performed by others, a Quality Assurance Program prepared in accordance with 10 CFR 72 Subpart G shall be implemented. Site-specific controls for the organization, administrative system, procedures, record keeping, review, audit and reporting necessary to ensure that the NAC-MPC storage system installation is operated in a safe manner are the responsibility of the user of the system.

Table 12-1 NAC-MPC System Controls and Limits

Control or Limit	Applicable Technical Specification	Condition or Item Controlled
1. Fuel Characteristics	Table 12A2-1	Type and Condition
	Table 12A2-2	Dimensions and Weight
	Table 12A2-1	Burnup and Minimum Initial Enrichment
	Table 12A2-1	Cool Time
2. Canister	3.1.6	Time in Transfer Cask
Fuel Loading	Table 12A2-1	Weight and Number of Assemblies
Water	3.1.1	Water Temperature
Drying	3.1.2	Vacuum Pressure
Backfilling	3.1.3	Helium Pressure
Sealing	3.1.4	Helium Leak Rate
Vacuum	3.1.5	Drying Time
External Surface	3.2.2	Level of Contamination
Unloading	3.1.7	Cooldown Requirements
3. Concrete Cask	3.2.1	Surface Dose Rates
	Note 1	Cask Spacing
	3.1.8	Cask Handling Height
4. Surveillance	Note 2	Air Inlets and Outlets
	Note 2	Air Outlet Temperature
	Note 3	Annual Vertical Concrete Cask Concrete Inspection
5. Transfer Cask	3.1.9	Minimum Temperature
6. ISFSI Concrete Pad	Note 4	Pad Concrete Thickness
	Note 4	Pad Subsoil Thickness
	Note 4	Pad Concrete Compressive Strength

1. Limits are presented in Section 4.5.1.1 of Appendix 12A.
2. Monitoring requirements are presented in Section 5.4 of Appendix 12A.
3. Limits are applied annually.
4. Limits are verified at the time of construction of the ISFSI.

APPENDIX 12A

NAC-MPC SYSTEM
TECHNICAL SPECIFICATIONS

Appendix 12A
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Appendix 12A
Table of Contents (Continued)

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3.1 NAC-MPC SYSTEM Integrity

3.1.4 CANISTER Helium Leak Rate

LCO 3.1.4 There shall be no indication of a helium leak at a test sensitivity of 4 x 10^{-8} cm^3/sec (helium) through the CANISTER shield lid to CANISTER shell confinement weld to demonstrate a helium leak rate less than 8 x 10^{-8} cm^3/sec (helium) as specified in Table 12A3-1.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER helium leak rate limit not met.	A.1 Establish CANISTER helium leak rate within limit.	25 days
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the NAC-MPC SYSTEM.	5 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify CANISTER helium leak rate is within limit	Prior to TRANSPORT OPERATIONS.

3.1 NAC-MPC SYSTEM Integrity

3.1.5 CANISTER Maximum Time in Vacuum Drying

LCO 3.1.5 The following limits for vacuum drying time shall be met, as appropriate:

1. The time duration from completion of draining the CANISTER through completion of vacuum dryness testing and the introduction of helium backfill shall not exceed 16 hours.
2. The time duration from end of external forced air cooling of the CANISTER through completion of vacuum dryness testing and the introduction of helium backfill shall not exceed 10 hours.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO time limits not met	A.1 Commence filling CANISTER with helium	2 hours
	AND	
	A.2 Place TRANSFER CASK with helium filled loaded CANISTER in spent fuel pool.	2 hours
	AND	
	A.3 Maintain TRANSFER CASK and CANISTER in spent fuel pool for a minimum of 24 hours.	Prior to restart of LOADING OPERATIONS

3.1 NAC-MPC SYSTEM Integrity

3.1.7 Fuel Cooldown Requirements (Continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Initiate CANISTER cooldown flow to loaded CANISTER.	Within 30 hours after removal of CANISTER from CONCRETE CASK and placement in Transfer Cask.
SR 3.1.7.2	Verify that the cooldown water temperature and flow rate are within limits.	Once within 1 hour prior to initiating cooldown AND 1 hour thereafter.

3.1 NAC-MPC SYSTEM Integrity

3.1.8 CONCRETE CASK Maximum Lifting Height

LCO 3.1.8 A CONCRETE CASK containing a CANISTER loaded with INTACT FUEL ASSEMBLYs or RECONFIGURED FUEL ASSEMBLYs shall be lifted in accordance with the following requirement

a. A lift height $\leq$ 6 inches

APPLICABILITY: During TRANSPORT OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. NAC-MPC SYSTEM lifting requirements not met.	A.1 Initiate actions to meet CONCRETE CASK maximum lifting height.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.8.1	Verify CONCRETE CASK lifting requirements are met.	After the CONCRETE CASK is raised to install or remove air pad and prior to TRANSPORT OPERATIONS

3.1 NAC-MPC SYSTEM Integrity

3.1.9 TRANSFER CASK Minimum Operating Temperature

LCO 3.1.9 The TRANSFER CASK shall not be used for loaded CANISTER transfer operations outside of the fuel handling facility when the external ambient temperature is ≤ 0°F.

APPLICABILITY: During LOADING or UNLOADING OPERATIONS

ACTIONS

---------------------------------------NOTE---------------------------------------
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. External ambient temperature below LCO limit	A.1 Do not perform TRANSFER CASK operations external to the facility.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.9.1	Measure external ambient temperature.	Prior to start of LOADING or UNLOADING OPERATIONS AND 1 hour thereafter.

Table 12A3-1
CANISTER Limits

CANISTER	LIMITS
NAC-MPC CANISTER	
a. CANISTER Vacuum Drying Pressure	≤ 3 mm of Mercury for ≥ 30 min
b. CANISTER Helium Leak Rate	≤ $8x10^{-8}$ std cc/sec (helium)
c. CANISTER Helium Backfill Pressure	0 (+1, -0) psig
d. CANISTER Pressure Test	15.0 (+2,-0) psig for ≥ 10 min

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.1 <u>NAC-MPC SYSTEM Average Surface Dose Rates</u>

LCO 3.2.1 CONCRETE CASK dose rates shall be measured at the locations shown in Figure 12A3-1. The average surface dose rates of each CONCRETE CASK shall not exceed:

a. 50 mrem/hour (neutron + gamma) on the side (on the concrete surfaces)

b. 35 mrem/hour (neutron + gamma) on the top;

c. 100 mrem/hour (neutron + gamma) at air inlet and outlet vents.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----------------------------------NOTE-----------------------------------
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CONCRETE CASK average surface dose rate limits not met.	A.1 Administratively verify correct fuel loading. <u>AND</u>	24 hours

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.1 CONCRETE CASK Average Surface Dose Rates (Continued)

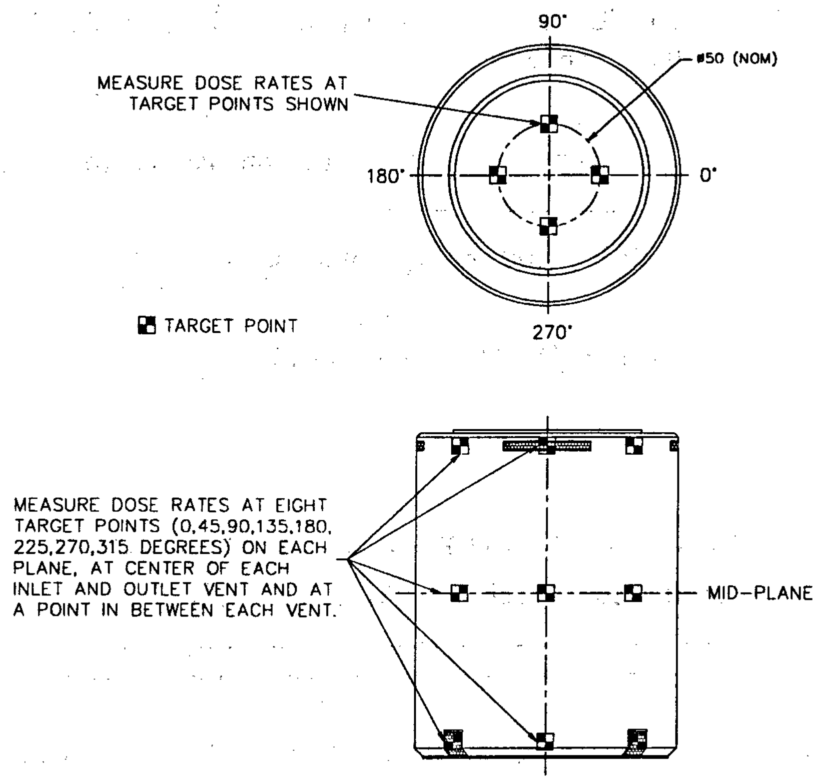
CONDITION	REQUIRED ACTION	COMPLETION TIME
	A.2 Verify that the dose rate from the cask will not cause the ISFSI to exceed the offsite radiation protection requirements of 10 CFR 20 and 10 CFR 72.	Prior to TRANSPORT OPERATIONS
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the NAC-MPC SYSTEM.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify average surface dose rates of CONCRETE CASK containing fuel assemblies are within limits.	Prior to TRANSPORT OPERATIONS

Figure 12A3-1

CONCRETE CASK Surface Dose Rate Measurement



3.2 NAC-MPC SYSTEM Radiation Protection

3.2.2 CANISTER Surface Contamination

LCO 3.2.2 Removable contamination on the accessible exterior surfaces of the CANISTER or accessible interior surfaces of the TRANSFER CASK shall each not exceed:

a. 1000 dpm/100 cm^2 from beta and gamma sources and

b. 20 dpm/100 cm^2 from alpha sources.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

---NOTE---
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER or TRANSFER CASK removable surface contamination limits not met.	A.1 Restore CANISTER and TRANSFER CASK removable surface contamination to within limits.	Prior to TRANSPORT OPERATIONS

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.2 CANISTER Surface Contamination (Continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.2.1	Verify that the removable contamination on the accessible exterior surfaces of the CANISTER containing fuel is within limits.	Prior to TRANSPORT OPERATIONS
SR 3.2.2.2	Verify that the removable contamination on the accessible interior surfaces of the TRANSFER CASK do not exceed limits.	Prior to TRANSPORT OPERATIONS

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Table 12A4-1

List of ASME Code Exceptions for the NAC-MPC CANISTER (Continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Vessel and Shield Lid	NB-6111	All completed pressure retaining systems shall be pressure tested.	The CANISTER shield lid to shell weld is performed in the field following fuel assembly loading. The CANISTER, including the shield lid weld, is then pneumatically (air-over-water) pressure tested as defined in Chapter 9 and described in Chapter 8. Accessibility for leakage inspections precludes a Code compliant hydrostatic test. The shield lid-to-shell weld is re-examined by liquid penetrant (PT) examination following the pneumatic pressure test. The shield lid weld is also leak tested to leak-tight criteria of ANSI N14.5. The vent port and drain port cover welds are examined by root and final PT examination. The structural lid secondary enclosure weld is not pressure tested, but is examined by UT and final surface PT or progressive PT.
CANISTER Vessel	NB-7000	Vessels are required to have overpressure protection.	No overpressure protection is provided. The function of the CANISTER is to confine radioactive contents under normal, off-normal, and accident conditions of storage. The CANISTER vessel is designed to withstand a maximum internal pressure considering 100% fuel rod failure and maximum accident temperatures.

Table 12A4-1

List of ASME Code Exceptions for the NAC-MPC CANISTER (Continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Vessel	NB-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-MPC SYSTEM is marked and identified in accordance with 10 CFR 72 requirements. Code stamping is not required. The QA data package will be in accordance with NAC's approved QA program.
CANISTER Basket Assembly	NG-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-MPC SYSTEM will be marked and identified in accordance with 10 CFR 72 requirements. No Code stamping is required. The CANISTER basket data package will be in conformance with NAC's approved QA program.
CANISTER Vessel and Basket Assembly Material	NB-2130/ NG-2130	States requirements for certification of material to NCA-3861 and NCA-3862	The NAC-MPC CANISTER Vessel and Basket Assembly component materials are procured in accordance with the specifications for materials in ASME Code Section II. The component materials will be obtained from NAC approved Suppliers in accordance with NAC's approved QA program.

5.3 Special Requirements for First NAC-MPC SYSTEM Placed in Service

The heat transfer characteristics of the NAC-MPC SYSTEM will be recorded by temperature measurements of the first NAC-MPC SYSTEM placed in service with a heat load equal to or greater than 7.5 kW.

A letter report summarizing the results of the measurements shall be submitted to the NRC for each cask subsequently loaded with a higher heat load, up to the 12.5 kW maximum heat load for the NAC-MPC SYSTEM. The calculation and the measured temperature data shall be reported to the NRC in accordance with 10 CFR 72.4. The calculation and comparison need not be reported to the NRC for CANISTERs that are subsequently loaded with lesser loads than the latest reported case.

5.4 Programs

5.4.1 CONCRETE CASK Thermal Monitoring Program

The following programs shall be established, implemented and maintained.

This program provides guidance for the temperature measurement and visual inspection activities that are used to monitor the thermal performance of each CONCRETE CASK.

a. The ambient air temperature and the air outlet temperatures are measured and compared every 24 hours. The temperature difference between the air outlet temperatures and the ambient air temperature is calculated and recorded. The air inlets and outlets are inspected and verified to be free of blockage every 24 hours.

b. If any air outlet temperature, or temperature difference between air outlet and ambient temperature shows an unexplained reading, appropriate actions are taken to determine the cause and to return the outlet temperatures to acceptable values. One of the immediate actions will be to increase the frequency of temperature monitoring until normal conditions are returned.

c. If an air outlet temperature exceeds the ambient air temperature by 92°F, the NRC will be notified and actions will be taken to evaluate the effects and impact of the elevated temperature on the CONCRETE CASK and CANISTER. A temperature differential of 92°F corresponds to a concrete temperature of 165°F. The long-term normal concrete temperature limit for the CONCRETE CASK is 200°F and the short-term bulk concrete temperature limit is 350°F.

APPENDIX 12B

NAC-MPC SYSTEM
TECHNICAL SPECIFICATIONS BASES

Appendix 12B
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3.1 NAC-MPC SYSTEM Integrity

3.1.1 CANISTER Water Temperature

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies that meet the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. The CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination and dose measurements are completed prior to moving the TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred to the CONCRETE CASK, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is moved to the ISFSI.

The CANISTER water level is lowered (approximately 50 gallons) following removal from the pool to remove moisture from the shield lid-to-CANISTER shell weld area. The water in the CANISTER is not completely drained as it provides neutron and gamma shielding for the spent fuel assemblies and therefore, results in lower personnel exposure to operations, welding and inspection personnel. However, the decay heat from the spent fuel begins heating the water in the CANISTER immediately after removal of the TRANSER CASK and loaded CANISTER from the spent fuel pool. In the event that the shield lid-to-CANISTER shell welding , nondestructive examination and subsequent pneumatic pressure testing are not completed in a timely manner, the CANISTER water could reach 212°F and begin to boil off. To prevent CANISTER water boiling, the water temperature is monitored by taking a water sample from the drain line beginning, at most, 18 hours after removal from the spent fuel pool and continuing every 1/2 hour thereafter. If the CANISTER water temperature reaches 200°F, a cooling water recirculation flow will be initiated to maintain and reduce.the CANISTER water temperature below 200°F. The recirculation flow is pumped from the CANISTER drain line through an in-pool condenser unit and returned to the CANISTER through the vent connector

Upon successful completion of the shield lid welding, the recirculation flow is terminated, the shield lid is pneumatically pressure tested, and the CANISTER is drained, vacuum dried, and backfilled with helium.

APPLICABLE SAFETY ANALYSIS

The maintenance of CANISTER water temperatures below 200°F ensures that uncontrolled boiling of the cavity water will not occur. Such boiling could provide excessive moisture in the shield lid-to-CANISTER shell weld area, which could interfere with obtaining a high quality weld. Uncontrolled boiling would also reduce the CANISTER water level thereby reducing the shielding of the spent fuel and resulting in higher dose rates to operations personnel. By analysis reported in the Safety Analysis Report, the CANISTER water temperatures will not reach 212°F for a time period exceeding 20 hours with a full loading of design basis fuel assemblies.

Monitoring the CANISTER water temperature, and initiating recirculation flow when required to maintain the temperature at or below 200°F, ensures that uncontrolled boiling will not occur.

LCO

Monitoring and maintaining CANISTER water temperatures at or below 200°F ensures that uncontrolled boiling will not occur during cask preparation activities.

APPLICABILTLY OPERATIONS

The monitoring of CANISTER water temperature is performed during LOADING OPERATIONS before the CANISTER is transferred to the CONCRETE CASK and transported to the ISFSI. TRANSPORT OPERATIONS would not commence if the water from the CANISTER is not drained and vacuum dried. Therefore, CANISTER water temperature monitoring is not required during TRANSPORT OPERATIONS or STORAGE OPERATIONS.

APPLICABILITY	CONCRETE CASK lifting height restrictions apply during TRANSPORT OPERATIONS, which include movement of the CONCRETE CASK while secured on the heavy haul trailer. CONCRETE CASK and TRANSFER CASK handling and drop events postulated to occur in the fuel loading facilities are addressed in the user's FSAR or PSDAR.
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate condition entry is allowed for each NAC-MPC SYSTEM. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each NAC-MPC SYSTEM not meeting the LCO. Subsequent NAC-MPC SYSTEMs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. <u>A.1</u> If the CONCRETE CASK lifting height requirement is not met, immediate action must be initiated and completed expeditiously to comply with the lifting height requirements, in order to preserve the NAC-MPC SYSTEM design and analysis basis.
SURVEILLANCE REQUIREMENTS	SR 3.1.8.1 The CONCRETE CASK lift height requirement must be verified to be met after the CONCRETE CASK is secured to the transporter and prior to the transporter beginning to move the CONCRETE CASK to the ISFSI. This ensures potential drop accidents during TRANSPORT OPERATIONS are bounded by the drop analyses.
REFERENCES	1. SAR, Sections 8.1 and 8.3.

3.1 NAC-MPC SYSTEM Integrity

3.1.9 TRANSFER CASK Minimum Operating Temperature

BASES

BACKGROUND

The TRANSFER CASK is a shielded handling device designed to lift and protect the CANISTER during fuel LOADING and UNLOADING OPERATIONS. It is used to perform the vertical transfer of the CANISTER to and from the CONCRETE CASK. This transfer operation can occur within the confines of the fuel loading facility or in the open environment adjacent to the facility.

The structural integrity of the TRANSFER CASK and its capability to handle and shield a loaded CANISTER is ensured by maintaining the TRANSFER CASK ferrous material temperatures significantly above the materials' nil ductility transition temperatures (NDTT), thereby precluding brittle fracture.

APPLICABLE SAFETY ANALYSIS

The structural analysis of the TRANSFER CASK is based on the ductile performance of the structural material. The TRANSFER CASK structural materials were selected for their low temperature fracture toughness. In accordance with NRC Reg Guide 7.11 (Ref. 1), the lowest service temperature of a ferrous material component should be established at a minimum of 40°F above the NDTT for the material. For the NAC-MPC transfer cask, the NDTT established in the SAR is -50°F. Therefore the minimum ambient temperature limit of 0°F is established. Conservatively, the decay heat from the contained spent fuel is not assumed to maintain the TRANSFER CASK material temperatures above ambient.

LCO

Limiting the TRANSFER CASK operations outside of covered or heated facilities when the external ambient temperature is below the minimum temperature limit maintains the NAC-MPC SYSTEM within the design and analysis basis of the SAR (Ref. 2). The minimum operating temperature selected is based on the properties of the materials of construction of the TRANSFER CASK.

APPLICABILITY	The minimum operating temperature limit applies for TRANSFER CASK operations external to the fuel facility during LOADING or UNLOADING OPERATIONS
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate condition entry is allowed for each NAC-MPC SYSTEM. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each NAC-MPC SYSTEM not meeting the LCO. Subsequent NAC-MPC SYSTEMs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. <u>A.1</u> For external TRANSFER CASK operations, if the external ambient temperature is at, or below, the minimum operating temperature limit, immediate action must be initiated to stop the LOADING or UNLOADING OPERATIONS sequence to ensure that the TRANSFER CASK is not operated outside of the fuel facility.
SURVEILLANCE REQUIREMENTS	SR 3.1.9.1 The external ambient temperature shall be measured, prior to and during the LOADING or UNLOADING OPERATIONS, to ensure that the ambient temperature does not fall below the established TRANSFER CASK minimum operating temperature for operations external to the fuel building.
REFERENCES	1. NRC RG 7.11. 2. SAR, Sections 2.2, 3.4, 4.1, 8.1 and 8.3.

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.1 CONCRETE CASK Average Surface Dose Rates

BASES

BACKGROUND	The regulations governing the operation of an ISFSI set limits on the control of occupational radiation exposure and radiation doses to the general public (Ref. 1). Occupational radiation exposure should be kept as low as reasonably achievable (ALARA) and within the limits of 10 CFR Part 20. Radiation doses to the public are limited for both normal and accident conditions in accordance with 10 CFR 72.
APPLICABLE SAFETY ANALYSIS	The CONCRETE CASK average surface dose rates are not an assumption in any accident analysis, but are used to ensure compliance with regulatory limits on occupational dose and dose to the public.
LCO	The limits on CONCRETE CASK average surface dose rates are based on the shielding analysis of the NAC-MPC SYSTEM (Ref. 2). The limits are selected to minimize radiation exposure to the public and maintain occupational dose ALARA to personnel working in the vicinity of the NAC-MPC SYSTEMs. The LCO specifies sufficient locations for taking dose rate measurements to ensure the dose rates measured are indicative of the effectiveness of the shielding material.
APPLICABILITY	The CONCRETE CASK average surface dose rates apply during LOADING OPERATIONS. These limits ensure that the CONCRETE CASK average surface dose rates during TRANSPORT OPERATIONS, STORAGE OPERATIONS, and UNLOADING OPERATIONS are bounded by the shielding safety analyses. Radiation doses during STORAGE OPERATIONS are monitored by the NAC-MPC SYSTEM user in accordance with the plant-specific radiation protection program required by 10 CFR 72.212(b)(6).
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each loaded CONCRETE CASK. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each

CONCRETE CASK not meeting the LCO. Subsequent NAC-MPC SYSTEMs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the CONCRETE CASK average surface dose rates are not within limits, it could be an indication that a fuel assembly was inadvertently loaded into the CANISTER that did not meet the Functional and Operating Limits in Section 2.1. Administrative verification of the CANISTER fuel loading, by means such as review of video recordings and records of the loaded fuel assembly serial numbers, can establish whether a misloaded fuel assembly is the cause of the out-of-limit condition. The Completion time is based on the time required to perform such a verification.

A.2

If the CONCRETE CASK average surface dose rates are not within limits and it is determined that the CONCRETE CASK was loaded with the correct fuel assemblies, an analysis may be performed. This analysis will determine if the CONCRETE CASK, once located at the ISFSI, would result in the ISFSI offsite or occupational calculated doses exceeding regulatory limits in 10 CFR Part 20 or 10 CFR Part 72. If it is determined that the out of limit average surface dose rates do not result in an the regulatory limits being exceeded, TRANSPORT OPERATIONS may proceed.

B.1

If it is verified that the fuel was misloaded and the ISFSI offsite radiation protection requirements of 10 CFR Part 20 or 10 CFR Part 72 will not be met with the CONCRETE CASK average surface dose rates above the LCO limit, the fuel assemblies must be placed in a safe condition in the spent fuel pool. The Completion Time is reasonable based on the time required to transfer the CANISTER to the TRANSFER CASK, remove the structural lid and vent and drain port cover welds, perform fuel cooldown operations, cut the shield lid weld, move the TRANSFER CASK and CANISTER into the spent fuel pool, remove the shield lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

SURVEILLANCE REQUIREMENTS	SR 3.2.1.1 This SR ensures that the CONCRETE CASK average surface dose rates are within the LCO limits prior to transporting the NAC-MPC SYSTEM to the ISFSI. The surface dose rates are measured approximately at the locations indicated on Figure 12A3-1, following standard industry practices for determiniing average surface dose rates for large containers.
REFERENCES	1. 10 CFR Parts 20 and 72. 2. SAR Sections 5.1 and 8.1.

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.2 CANISTER Surface Contamination

BASES

BACKGROUND	A TRANSFER CASK containing an empty CANISTER is immersed in the spent fuel pool in order to load the spent fuel assemblies. The external surfaces of the CANISTER are maintained clean by the application of clean water to the annulus of the TRANSFER CASK. However, there is potential for the surface of the CANISTER to become contaminated with the radioactive material in the spent fuel pool water. This contamination is removed prior to moving the CONCRETE CASK containing the CANISTER to the ISFSI in order to minimize the radioactive contamination to personnel or the environment. This allows the ISFSI to be entered without additional radiological controls to prevent the spread of contamination and reduces personnel dose, due to the spread of loose contamination or airborne contamination. This is consistent with ALARA practices.
APPLICABLE SAFETY ANALYSIS	The radiation protection measures implemented at the ISFSI are based on the assumption that the exterior surfaces of the CANISTER have been decontaminated. Failure to decontaminate the surfaces of the CANISTER could lead to higher-than-projected occupational dose and potential site contamination.
LCO	Removable surface contamination on the CANISTER exterior surfaces is limited to 1000 dpm/100 cm^2 from beta and gamma sources and 20 dpm/100 cm^2 from alpha sources. These limits are taken from the guidance in IE Circular 81-07 (Ref. 2) and are based on the minimum level of activity that can be routinely detected under a surface contamination control program using direct survey methods. Only loose contamination is controlled, as fixed contamination will not result from the CANISTER loading process. Experience has shown that these limits are low enough to prevent the spread of contamination to clean areas and are significantly less than the levels, which would cause significant personnel skin dose.

LCO 3.2.2 requires removable contamination to be within the specified limits for the accessible exterior surfaces of the CANISTER. The location and number of CANISTER surface swipes used to verify compliance with this LCO are determined based on standard industry practice and the user's plant-specific contamination measurement program for objects of this size. Accessible portions of the CANISTER are the upper portion of the CANISTER external shell wall accessible after draining of the TRANSFER CASK annulus and the structural lid. The user shall determine a reasonable number and location of swipes for the accessible portion of the CANISTER. The objective is to determine a removable contamination value representative of the entire upper circumference of the CANISTER and the structural lid, while implementing sound ALARA practices.

Verification swipes and measurements of removable surface contamination levels on the inside surfaces of the TRANSFER CASK shall be performed following transfer of the CANISTER to the CONCRETE CASK. These measurements will provide indirect evidence that the inaccessible surfaces of the CANISTER do not have removable contamination levels exceeding the limit.

APPLICABILITY

Verification that the CANISTER accessible surface contamination is less than the LCO limit is performed during LOADING OPERATIONS. This occurs before TRANSPORT OPERATIONS and STORAGE OPERATIONS. Measurement of the CANISTER surface contamination is unnecessary during UNLOADING OPERATIONS as surface contamination would have been measured prior to moving the subject CANISTER to the ISFSI.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each CANISTER. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the removable surface contamination of the CANISTER that has been loaded with spent fuel is not within the LCO limits, action must be initiated to decontaminate the CANISTER and bring the removable surface contamination within limits. The Completion Time of "Prior to TRANSPORT OPERATIONS" is appropriate, given that the time needed to complete the decontamination is indeterminate and surface contamination does not affect the safe storage of the spent fuel assemblies. The heat-up of the CANISTER and stored spent fuel, and the allowable time in the TRANSFER CASK shall be controlled by LCO 3.1.6.

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1

This SR verifies that the removable surface contamination on the accessible surface of the CANISTER is less than the limits in the LCO. The Surveillance is performed using smear surveys to detect removable surface contamination. The Frequency requires performing the verification prior to initiating TRANSPORT OPERATIONS in order to confirm that the CANISTER can be moved to the ISFSI without spreading loose contamination.

SR 3.2.2.2

This SR verifies that the removable surface contamination on the interior surfaces of the TRANSFER CASK is less than the limits, thereby providing indirect confirmation that the removable surface contamination on the inaccessible surfaces of the CANISTER are within the limits. It also confirms that the proper functioning of the annulus clean water fill system. The Surveillance is performed using smear surveys to detect removable surface contamination. The Frequency requires performing the verification prior to TRANSPORT OPERATIONS.

REFERENCES

1. SAR Section 8.1.
2. NRC IE Circular 81-07.

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NAC-MPC SYSTEM
TECHNICAL SPECIFICATIONS

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Table of Contents

Table of Contents (Continued)

1.0 USE AND APPLICATION

1.1 Definitions

---NOTE---

The defined terms of this section appear in capitalized type and are applicable throughout these Technical Specifications and Bases.

Term	Definition
ACTIONS	ACTIONS shall be that part of a Specification that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
CANISTER	See TRANSPORTABLE STORAGE CANISTER
CONCRETE CASK	See VERTICAL CONCRETE CASK
DAMAGED FUEL ASSEMBLY	DAMAGED FUEL ASSEMBLY is a fuel assembly having individual fuel rods with known or suspected cladding defects greater than a hairline crack or a pinhole leak.
DAMAGED FUEL ROD	DAMAGED FUEL ROD is a fuel rod with known or suspected cladding defects greater than a hairline crack or a pinhole leak.
FUEL DEBRIS	FUEL DEBRIS is fuel in the form of particles, loose pellets, and fragmented rods or assemblies.
INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)	The facility within the perimeter fence licensed for storage of spent fuel within NAC-MPC SYSTEMs (see also 10 CFR 72.3).

1.1 Definitions (continued)

INTACT FUEL ASSEMBLY	INTACT FUEL ASSEMBLY is a fuel assembly without known or suspected cladding defects greater than a pinhole leak or a hairline crack and which can be handled by normal means. A fuel assembly shall not be classified as an INTACT FUEL ASSEMBLY unless solid Zircaloy or stainless steel rods are used to replace missing fuel rods and which displaces an amount of water equal to that displaced by the original fuel rod(s).
INTACT FUEL ROD	INTACT FUEL ROD is a fuel rod without known or suspected cladding defects greater than a pinhole leak or a hairline crack.
LOADING OPERATIONS	LOADING OPERATIONS include all licensed activities on an NAC-MPC SYSTEM while it is being loaded with fuel assemblies. LOADING OPERATIONS begin when the first fuel assembly is placed in the CANISTER and end when the NAC-MPC SYSTEM is secured on the transporter.
RECONFIGURED FUEL ASSEMBLY (RFA)	A stainless steel canister having the same external dimensions as a standard Yankee Class spent fuel assembly that ensures criticality control geometry and which permits gaseous and liquid media to escape while minimizing dispersal of gross particulates. The RECONFIGURED FUEL ASSEMBLY may contain a maximum of 64 INTACT FUEL RODS, DAMAGED FUEL RODS or FUEL DEBRIS from any type of Yankee Class spent fuel assembly.

1.1 Definitions (continued)

NAC-MPC SYSTEM	NAC-MPC SYSTEM includes the components approved for loading and storage of spent fuel assemblies at the ISFSI. The NAC-MPC SYSTEM consists of a CONCRETE CASK, a TRANSFER CASK and a CANISTER.
STORAGE OPERATIONS	STORAGE OPERATIONS include all licensed activities that are performed at the ISFSI, while an NAC-MPC SYSTEM containing spent fuel is located on the storage pad within the ISFSI perimeter.
TRANSPORT OPERATIONS	TRANSPORT OPERATIONS include all licensed activities involved in moving a loaded NAC-MPC CONCRETE CASK AND CANISTER to and from the ISFSI. TRANSPORT OPERATIONS begin when the NAC-MPC SYSTEM is first secured on the transporter and end when the NAC-MPC SYSTEM is at its destination and no longer secured on the transporter.
TRANSPORTABLE STORAGE CANISTER (CANISTER)	TRANSPORTABLE STORAGE CANISTER is the sealed container that consists of a tube and disk fuel basket in a cylindrical canister shell that is welded to a baseplate, shield lid with welded port covers, and structural lid. The CANISTER provides the confinement boundary for the confined spent fuel.
TRANSFER CASK	TRANSFER CASK is a shielded lifting device that holds the CANISTER during LOADING and UNLOADING OPERATIONS and during closure welding, vacuum drying, leak testing, and non-destructive examination of the CANISTER closure welds. The TRANSFER CASK is also used to transfer the CANISTER into and from the CONCRETE CASK, and into the transport cask.

1.1 Definitions (continued)

UNLOADING OPERATIONS	UNLOADING OPERATIONS include all licensed activities on an NAC-MPC SYSTEM to be unloaded of the contained fuel assemblies. UNLOADING OPERATIONS begin when the NAC-MPC SYSTEM is no longer secured on the transporter and end when the last fuel assembly is removed from the NAC-MPC SYSTEM. UNLOADING OPERATIONS may include transfer of a loaded CANISTER from the CONCRETE CASK to the transport cask.
VERTICAL CONCRETE CASK (CONCRETE CASK)	CONCRETE CASK is the cask that receives and holds the sealed CANISTER. It provides the gamma and neutron shielding and convective cooling of the spent fuel confined in the CANISTER.

1.0 USE AND APPLICATION

1.2 Logical Connectors

PURPOSE

The purpose of this section is to explain the meaning of logical connectors.

Logical connectors are used in Technical Specifications (TS) to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in Technical Specifications are "AND" and "OR." The physical arrangement of these connectors constitutes logical conventions with specific meanings.

BACKGROUND

Several levels of logic may be used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentations of the logical connectors.

When logical connectors are used to state a Condition, Completion Time, Surveillance, or Frequency, only the first level of logic is used; the logical connector is left justified with the statement of the Condition, Completion Time, Surveillance, or Frequency.

1.2 Logical Connectors (continued)

EXAMPLES

The following examples illustrate the use of logical connectors.

EXAMPLES

EXAMPLE 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met	A.1 Verify. . . AND A.2 Restore. . .	

In this example, the logical connector "AND" is used to indicate that when in Condition A, both Required Actions A.1 and A.2 must be completed.

1.2 Logical Connectors (continued)

EXAMPLES (continued)

EXAMPLE 1.2-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met	A.1 Stop. . .	
	OR	
	A.2.1 Verify. . .	
	AND	
	A.2.2	
	A.2.2.1 Reduce. . .	
	OR	
	A.2.2.2 Perform. . .	
	OR	
	A.3 Remove. . .	

This example represents a more complicated use of logical connectors. Required Actions A.1, A.2, and A.3 are alternative choices, only one of which must be performed as indicated by the use of the logical connector "OR" and the left justified placement. Any one of these three Actions may be chosen. If A.2 is chosen, then both A.2.1 and A.2.2 must be performed as indicated by the logical connector "AND." Required Action A.2.2 is met by performing A.2.2.1 or A.2.2.2. The indented position of the logical connector "OR" indicated that A.2.2.1 and A.2.2.2 are alternative choices, only one of which must be performed.

1.0 USE AND APPLICATION

1.3 Completion Times

PURPOSE

The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.

BACKGROUND

Limiting Conditions for Operations (LCOs) specify the lowest functional capability or performance levels of equipment required for safe operation of the NAC-MPC SYSTEM. The ACTIONS associated with an LCO state conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).

DESCRIPTION

The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., equipment or variable not within limits) that requires entering an ACTIONS Condition, unless otherwise specified, provided that the NAC-MPC SYSTEM is in a specified condition stated in the Applicability of the LCO. Prior to the expiration of the specified Completion Time, Required Actions must be completed. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the NAC-MPC SYSTEM is not within the LCO Applicability.

Once a Condition has been entered, subsequent subsystems, components, or variables expressed in the Condition, discovered to be not within limits, will <u>not</u> result in separate entry into the Condition, unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.

1.3 Completion Times (continued)

EXAMPLES

The following examples illustrate the use of Completion Times with different types of Conditions and changing Conditions.

EXAMPLE 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1	Perform Action B.1	12 hours
	AND		
	B.2	Perform Action B.2	36 hours

Condition B has two Required Actions. Each Required Action has its own Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to complete action B.1 within 12 hours AND complete action B.2 within 36 hours. A total of 12 hours is allowed for completing action B.1 and a total of 36 hours (not 48 hours) is allowed for completing action B.2 from the time that Condition B was entered. If action B.1 is completed within six hours, the time allowed for completing action B.2 is the next 30 hours because the total time allowed for completing action B.2 is 36 hours.

1.3 Completion Times (continued)

EXAMPLES (continued)

EXAMPLE 1.3-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One System not within limit.	A.1 Restore System to within limit.	7 days
B. Required Action and associated Completion Time not met.	B.1 Complete action B.1 AND B.2 Complete action B.2	12 hours 36 hours

When a System is determined not to meet the LCO, Condition A is entered. If the System is not restored within seven days, Condition B is also entered, and the Completion Time clocks for Required Actions B.1 and B.2 start. If the System is restored after Condition B is entered, Conditions A and B are exited; therefore, the Required Actions of Condition B may be terminated.

1.3 Completion Times (continued)

EXAMPLES (continued)

EXAMPLE 1.3-3

ACTIONS

---NOTE---

Separate Condition entry is allowed for each component.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met	A.1 Restore compliance with LCO	4 hours
B. Required Action and associated Completion Time not met.	B.1 Complete action B.1 AND B.2 Complete action B.2	6 hours 12 hours

The Note above the ACTIONS table is a method of modifying how the Completion Time is tracked. If this method of modifying how the Completion Time is tracked was applicable only to a specific Condition, the Note would appear in that Condition rather than at the top of the ACTIONS Table.

The Note allows Condition A to be entered separately for each component, and Completion Times to be tracked on a per component basis. When a component is determined to not meet the LCO, Condition A is entered and its Completion Time starts. If subsequent components are determined to not meet the LCO, Condition A is entered for each component and separate Completion Times are tracked for each component.

1.3 Completion Times (continued)

EXAMPLES	EXAMPLE 1.3-3 (continued)
IMMEDIATE COMPLETION TIME	When "Immediately" is used as a Completion Time, the Required Action should be pursued without delay and in a controlled manner.

1.0 USE AND APPLICATION

1.4 Frequency

PURPOSE

The purpose of this section is to define the proper use and application of Frequency requirements.

DESCRIPTION

Each Surveillance Requirement (SR) has a specified Frequency in which the Surveillance must be met in order to meet the associated Limiting Condition for Operation (LCO). An understanding of the correct application of the specified Frequency is necessary for compliance with the SR.

The "specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Surveillance Requirement (SR) Applicability. The "specified Frequency" consists of requirements of the Frequency column of each SR.

Situations where a Surveillance could be required (i.e., its Frequency could expire), but where it is not possible or not desired that it be performed until sometime after the associated LCO is within its Applicability, represent potential SR 3.0.4 conflicts. To avoid these conflicts, the SR (i.e., the Surveillance or the Frequency) is stated such that it is only "required" when it can be and should be performed. With an SR satisfied, SR 3.0.4 imposes no restriction.

The use of "met" or "performed" in these instances conveys specific meanings. A Surveillance is "met" only after the acceptance criteria are satisfied. Known failure of the requirements of a Surveillance, even without a Surveillance specifically being "performed", constitutes a Surveillance not "met."

1.4 Frequency

EXAMPLES The following examples illustrate the various ways that Frequencies are specified.

EXAMPLE 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify pressure within limit	12 hours

Example 1.4-1 contains the type of SR most often encountered in the Technical Specifications (TS). The Frequency specifies an interval (12 hours) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent interval. Although the Frequency is stated as 12 hours, SR 3.0.2 allows an extension of the time interval to 1.25 times the interval specified in the Frequency for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1 (such as when the equipment or variables are outside specified limits, or the facility is outside the Applicability of the LCO). If the interval specified by SR 3.0.2 is exceeded while the facility is in a condition specified in the Applicability of the LCO, the LCO is not met in accordance with SR 3.0.1.

If the interval as specified by SR 3.0.2 is exceeded while the facility is not in a condition specified in the Applicability of the LCO for which performance of the SR is required, the Surveillance must be performed within the Frequency requirements of SR 3.0.2, prior to entry into the specified condition. Failure to do so would result in a violation of SR 3.0.4.

1.4 Frequency (continued)

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify flow is within limits	Once within 12 hours prior to starting activity AND 24 hours thereafter

Example 1.4-2 has two Frequencies. The first is a one time performance Frequency, and the second is of the type shown in Example 1.4-1. The logical connector "AND" indicates that both Frequency requirements must be met. Each time the example activity is to be performed, the Surveillance must be performed within 12 hours prior to starting the activity.

The use of "once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND"). This type of Frequency does not qualify for the 25% extension allowed by SR 3.0.2.

"Thereafter" indicates future performances must be established per SR 3.0.2, but only after a specified condition is first met (i.e., the "once" performance in this example). If the specified activity is canceled or not performed, the measurement of both intervals stops. New intervals start upon preparing to restart the specified activity.

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2.0 FUNCTIONAL AND OPERATING LIMITS

2.1 Functional and Operating Limits

2.1.1 Fuel to be Stored in the NAC-MPC SYSTEM

INTACT FUEL ASSEMBLIES, INTACT FUEL RODS, DAMAGED FUEL RODS and FUEL DEBRIS placed in a RECONFIGURED FUEL ASSEMBLY meeting the limits specified in Table 2-1 may be stored in the NAC-MPC SYSTEM.

The values shown in Tables 2-1 and 2-2 are design nominal record values.

2.2 Functional and Operating Limit Violations

If any Functional and Operating Limits of Table 2-1 are violated, the following actions shall be completed:

2.2.1 The affected fuel assemblies shall be placed in a safe condition.

2.2.2 Within 24 hours, notify the NRC Operations Center.

2.2.3 Within 30 days, submit a special report that describes the cause of the violation and actions taken to restore compliance and prevent recurrence.

Table 2-1
Fuel Assembly Limits

I. NAC-MPC CANISTER

A. Allowable Contents

1. Uranium oxide Yankee Class INTACT FUEL ASSEMBLIES listed in Table 2-2 and meet the following specifications:

a. Cladding Type:	Zircaloy or Stainless Steel as specified in Table 2-2 for the applicable fuel assembly class (Note: Type A and Type B configurations in Table 2-2 identify variations in the arrangement of the outer row of fuel rods that accommodate the insertion of control blades in the reactor.)
b. Enrichment:	As specified in Table 2-2 for the applicable fuel assembly type.
c. Decay Heat Per Assembly:	
i. Zircaloy-Clad Fuel:	$\leq$ 347 Watts
ii. Stainless Steel-Clad Fuel:	$\leq$ 264 Watts
d. Post-irradiation Cooling Time and Average Burnup Per Assembly:	
i. Zircaloy-Clad Fuel:	As specified in Table 2-2 for the applicable fuel assembly type.
ii. Stainless Steel-Clad Fuel:	As specified in Table 2-2 for the applicable fuel assembly type.

Table 2-1

Fuel Assembly Limits (Continued)

f. Nominal Fuel Assembly Length:	Maximum = 111.8 inches Minimum = 109.0 inches
g. Nominal Fuel Assembly Width:	≤ 7.64 inches
h. Fuel Assembly Weight:	
i. Zircaloy-Clad Fuel:	≤ 850 lbs
ii. Stainless Steel-Clad Fuel:	≤ 900 lbs
i. Minimum Length of Bottom Fuel Nozzle:	6.7 inches (17.0 cm)

2. Uranium oxide Yankee Class INTACT FUEL RODS, DAMAGED FUEL RODS or FUEL DEBRIS placed in RECONFIGURED FUEL ASSEMBLIES (RFA). The original fuel assemblies for the INTACT FUEL RODS, DAMAGED FUEL RODS and FUEL DEBRIS shall meet the criteria specified in Table 2-2 for the fuel assembly class, and meet the following additional specifications:

a. Cladding Type:	Zircaloy or Stainless Steel as specified in Table 2-2 for the applicable fuel assembly type.
b. Enrichment:	As specified in Table 2-2 for the applicable fuel assembly type.
c. Decay Heat Per RFA:	≤ 102 Watts
d. Post-irradiation Cooling Time and Average Burnup Per Original Assembly:	
i. Zircaloy-Clad Fuel:	As specified in Table 2-2 for the applicable fuel assembly type.

Table 2-1
Fuel Assembly Limits (Continued)

ii. Stainless Steel-Clad Fuel:	As specified in Table 2-2 for the applicable fuel assembly type.
e. Nominal Original Fuel Assembly Length:	≤ 111.8 inches
f. Nominal Original Fuel Assembly Width:	≤ 7.64 inches
g. Maximum Weight:	≤ 850 lbs, including RFA
h. Maximum mass U per RFA:	66.33 kg

B. Quantity per CANISTER:
Up to 36 INTACT FUEL ASSEMBLIES and RFAs to the maximum content weight limit of 30,600 pounds.

C. INTACT FUEL ASSEMBLIES and RFAs shall not contain control components.

D. INTACT FUEL ASSEMBLIES shall not contain empty fuel rod positions. A solid Zircaloy or stainless steel rod that would displace an equivalent amount of water as an intact fuel rod shall replace any missing fuel rods.

Table 2-2 INTACT FUEL ASSEMBLY Characteristics

Fuel Assembly Type	Combustion Engineering Type A	Combustion Engineering Type B	Exxon Type A	Exxon Type B	Exxon Type A	Exxon Type B	Westinghouse Type A	Westinghouse Type B	United Nuclear Type A	United Nuclear Type B
ASSEMBLY CONFIGURATION[2]										
Assembly Length (cm)	283.9	283.9	283.3	283.3	283.9	283.9	282.6	282.6	282.4	282.4
Assembly Width (cm)	19.2	19.2	19.3	19.3	19.3	19.3	19.3	19.3	19.4	19.4
Assembly Weight (kg)	352	350.6	372	372	372	372	408.2	408.2	385.5	385.5
Enrichment-wt. % ^{235}U										
Maximum	3.90	3.90	4.00	4.00	4.00	4.00	4.94	4.94	4.00	4.00
Minimum	3.70	3.70	3.50	3.50	3.50	3.50	4.94	4.94	4.00	4.00
Max. Burnup (MWD/MTU)	36,000[1]	36,000[1]	36,000	36,000	36,000	36,000	32,000	32,000	32,000	32,000
Max. Initial Heavy Metal KgU/assembly	239.4	238.4	239.4	238.4	239.4	238.4	286.9	286.0	245.6	244.6
Min. Cool Time (yr)	8.1[1]	8.1[1]	16.0	16.0	9.0	9.0	21.0	21.0	13.0	13.0
Max. Decay Heat (kW)	0.347[1]	0.347[1]	0.269	0.269	0.331	0.331	0.264	0.264	0.257	0.257
FUEL ROD CONFIGURATION										
Fuel Rod Pitch (cm)	1.20	1.20	1.20	1.20	1.20	1.20	1.07	1.07	1.19	1.19
Active Fuel Length (cm)	231.1	231.1	231.1	231.1	231.1	231.1	234.0	234.0	231.1	231.1
Rod OD (cm)	0.93	0.93	0.93	0.93	0.93	0.93	0.86	0.86	0.93	0.93
Clad ID (cm)	0.81	0.81	0.81	0.81	0.81	0.81	0.76	0.76	0.81	0.81
Clad Material	Zircaloy	Zircaloy	Zircaloy	Zircaloy	Zircaloy	Zircaloy	SS	SS	Zircaloy	Zircaloy
Pellet OD (cm)	0.79	0.79	0.79	0.79	0.79	0.79	0.75	0.75	0.79	0.79
Rods per Assembly	231	230	231	230	231	230	305	304	237	236

1. Combustion Engineering fuel may be loaded at a maximum burnup of 32,000 MWD/MTU, a minimum enrichment of 3.5 wt% ^{235}U and cool time of 8.0 years. The maximum decay heat for this assembly is 0.304 kW.

2. Type A and Type B configurations identify variations in the arrangement of the outer row of fuel rods that accommodate the insertion of control blades in the reactor.

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1	LCOs shall be met during specified conditions in the Applicability, except as provided in LCO 3.0.2.
LCO 3.0.2	Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5. If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.
LCO 3.0.3	Not applicable to an NAC-MPC SYSTEM.
LCO 3.0.4	When an LCO is not met, entry into a specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS or that are related to the unloading of an NAC-MPC SYSTEM. Exceptions to this Specification are stated in the individual Specifications. These exceptions allow entry into specified conditions in the Applicability where the associated ACTIONS to be entered allow operation in the specified conditions in the Applicability only for a limited period of time.
LCO 3.0.5	Equipment removed from service or not in service in compliance with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate it meets the LCO or that other equipment meets the LCO. This is an exception to LCO 3.0.2 for the System to return to service under administrative control to perform the testing.

LCO 3.0.6	Not applicable to an NAC-MPC SYSTEM.
LCO 3.0.7	Not applicable to an NAC-MPC SYSTEM.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1

SRs shall be met during the specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be a failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO, except as provided in SR 3.0.3. Surveillances do not have to be performed on equipment or variables outside specified limits.

SR 3.0.2

The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply. If a Completion Time requires periodic performance on a "once per..." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this Specification are stated in the individual Specifications.

SR 3.0.3

If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed from the time of discovery up to 24 hours or up to the limit of the specified Frequency, whichever is less. This delay period is permitted to allow performance of the Surveillance.

If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.3 (continued)	When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.
SR 3.0.4	Entry into a specified condition in the Applicability of an LCO shall not be made, unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into specified conditions in the Applicability that are required to comply with Actions or that are related to the unloading of an NAC-MPC SYSTEM.

3.1 NAC-MPC SYSTEM Integrity

3.1.1 CANISTER Water Temperature

LCO 3.1.1 The temperature of the water in the CANISTER shall be maintained to be less than 200°F.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

---NOTE---

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER water temperature limit not met.	A.1 Establish water circulation in the CANISTER to restore CANISTER water temperature to less than 200°F.	2 hours
B. Required Action and Associated Completion Time not met.	B.1 Place the CANISTER in a safe condition.	Immediately
	AND	
	B.2 Remove all fuel assemblies from the NAC-MPC SYSTEM.	30 days

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.1.1	Verify water temperature in CANISTER is less than 200°F.	Once within 18 hours after TRANSFER CASK with loaded CANISTER is removed from the fuel pool AND 30 minutes thereafter.

3.1 NAC-MPC SYSTEM Integrity

3.1.2 CANISTER Vacuum Drying Pressure

LCO 3.1.2 The CANISTER vacuum drying pressure shall meet the limit specified in Table 3-1.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER vacuum drying pressure limit not met.	A.1 Establish CANISTER cavity vacuum drying pressure within limit.	25 days
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the NAC-MPC SYSTEM.	5 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	Verify CANISTER cavity vacuum drying pressure is within limit	Within 24 hours after completion of CANISTER draining.

3.1 NAC-MPC SYSTEM Integrity

3.1.3 CANISTER Helium Backfill Pressure

LCO 3.1.3 The CANISTER helium backfill pressure shall meet the limit specified in Table 3-1.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER helium backfill pressure limit not met.	A.1 Establish CANISTER helium backfill pressure within limit.	25 days
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the NAC-MPC SYSTEM.	5 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Verify CANISTER helium backfill pressure is within limit	Within 24 hours after completion of CANISTER draining.

3.1 NAC-MPC SYSTEM Integrity

3.1.4 CANISTER Helium Leak Rate

LCO 3.1.4 There shall be no indication of a helium leak at a test sensitivity of 4 x 10^{-8} cm^3/sec (helium) through the CANISTER shield lid to CANISTER shell confinement weld to demonstrate a helium leak rate less than 8 x 10^{-8} cm^3/sec (helium) as specified in Table 3-1.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER helium leak rate limit not met.	A.1 Establish CANISTER helium leak rate within limit.	25 days
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the NAC-MPC SYSTEM.	5 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify CANISTER helium leak rate is within limit	Prior to TRANSPORT OPERATIONS.

3.1 NAC-MPC SYSTEM Integrity

3.1.5 CANISTER Maximum Time in Vacuum Drying

LCO 3.1.5 The following limits for vacuum drying time shall be met, as appropriate:

1. The time duration from completion of draining the CANISTER through completion of vacuum dryness testing and the introduction of helium backfill shall not exceed 16 hours.
2. The time duration from end of external forced air cooling of the CANISTER through completion of vacuum dryness testing and the introduction of helium backfill shall not exceed 10 hours.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO time limits not met	A.1 Commence filling CANISTER with helium AND	2 hours
	A.2 Place TRANSFER CASK with helium filled loaded CANISTER in spent fuel pool. AND	2 hours
	A.3 Maintain TRANSFER CASK and CANISTER in spent fuel pool for a minimum of 24 hours.	Prior to restart of LOADING OPERATIONS

3.1 NAC-MPC SYSTEM Integrity

3.1.5 CANISTER Maximum Time in Vacuum Drying (Continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.5.1	Monitor elapsed time from start of vacuum drying operations until start of helium backfill.	Once at start of vacuum drying operations AND 3 hours thereafter.
SR 3.1.5.2	Monitor elapsed time from start of vacuum drying operations following in-pool cooling until start of helium backfill.	Once at start of vacuum drying operations AND 2 hours thereafter.

3.1 NAC-MPC SYSTEM Integrity

3.1.6 CANISTER Maximum Time in TRANSFER CASK

LCO 3.1.6 The following limits for CANISTER time in TRANSFER CASK shall be met, as appropriate:

1. The time duration from completion of backfilling the CANISTER with helium through completion of the CANISTER transfer operation from the TRANSFER CASK to the CONCRETE CASK shall not exceed 26 hours.
2. The time duration from completion of in-pool or external forced air cooling of the CANISTER through completion of the CANISTER transfer operation from the TRANSFER CASK to the CONCRETE CASK shall not exceed 15 hours. This LCO time limit is also applicable if LCO 3.1.5.1 was not met during vacuum drying operations.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----------------------------------NOTE-----------------------------------
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO time limits not met	A.1	
	A1.1. Place TRANSFER CASK with helium filled loaded CANISTER in spent fuel pool	2 hours
	AND	
	A.1.2 Maintain TRANSFER CASK and CANISTER in spent fuel pool for a minimum of 24 hours	Prior to restart of LOADING OPERATIONS
	OR	

3.1 NAC-MPC SYSTEM Integrity

3.1.6 CANISTER Maximum Time in TRANSFER CASK (Continued)

	A.2 A.2.1 Commence supplying air to the TRANSFER CASK bottom two fill/drain lines at a rate of 1,000 CFM and a maximum temperature of 75°F AND A.2.2 Maintain airflow for a minimum of 24 hours	2 hours Prior to restart of LOADING OPERATIONS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.1	Monitor elapsed time from start of helium backfill until completion of transfer of loaded CANISTER into CONCRETE CASK.	Once at completion of vacuum dryness verification test AND 3 hours thereafter.
SR 3.1.6.2	Monitor elapsed time from completion of in-pool or forced air cooling until completion of transfer of loaded CANISTER into CONCRETE CASK	Once at completion of cooling operations AND 3 hours thereafter.

3.1 NAC-MPC SYSTEM Integrity

3.1.7 Fuel Cooldown Requirements

LCO 3.1.7 A loaded CANISTER and its fuel contents shall be cooled down in accordance with the following specifications:

a. Nitrogen gas flush for a minimum of 10 minutes

b. Minimum cooling water temperature of 70 °F

c. Cooling water flow rate of 5 (+3, -0) gallons per minute at inlet pressure of 25 (+10, -0) psig

d. Maintain cooling water flow through CANISTER until outlet water temperature ≤ 200 °F

e. Maximum canister pressure ≤ 50 psig

APPLICABILITY: During UNLOADING OPERATIONS

-----NOTE-----

The LCO is only applicable to wet UNLOADING OPERATIONS.

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER cooldown requirements not met.	A.1 Initiate actions to meet CANISTER cooldown requirements.	Immediately

3.1 NAC-MPC SYSTEM Integrity

3.1.7 Fuel Cooldown Requirements (Continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Initiate CANISTER cooldown flow to loaded CANISTER.	Within 30 hours after removal of CANISTER from CONCRETE CASK and placement in Transfer Cask.
SR 3.1.7.2	Verify that the cooldown water temperature and flow rate are within limits.	Once within 1 hour prior to initiating cooldown AND 1 hour thereafter.

3.1 NAC-MPC SYSTEM Integrity

3.1.8 CONCRETE CASK Maximum Lifting Height

LCO 3.1.8 A CONCRETE CASK containing a CANISTER loaded with INTACT FUEL ASSEMBLYs or RECONFIGURED FUEL ASSEMBLYs shall be lifted in accordance with the following requirement

a. A lift height $\leq$ 6 inches

APPLICABILITY: During TRANSPORT OPERATIONS

ACTIONS

-NOTE-

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. NAC-MPC SYSTEM lifting requirements not met.	A.1 Initiate actions to meet CONCRETE CASK maximum lifting height.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.8.1	Verify CONCRETE CASK lifting requirements are met.	After the CONCRETE CASK is raised to install or remove air pad and prior to TRANSPORT OPERATIONS

3.1 NAC-MPC SYSTEM Integrity

3.1.9 TRANSFER CASK Minimum Operating Temperature

LCO 3.1.9 The TRANSFER CASK shall not be used for loaded CANISTER transfer operations outside of the fuel handling facility when the external ambient temperature is ≤ 0°F.

APPLICABILITY: During LOADING or UNLOADING OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. External ambient temperature below LCO limit	A.1 Do not perform TRANSFER CASK operations external to the facility.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.9.1	Measure external ambient temperature.	Prior to start of LOADING or UNLOADING OPERATIONS AND 1 hour thereafter.

Table 3-1
CANISTER Limits

CANISTER	LIMITS
NAC-MPC CANISTER	
a. CANISTER Vacuum Drying Pressure	$\leq$ 3 mm of Mercury for $\geq$ 30 min
b. CANISTER Helium Leak Rate	$\leq$ 8×10^{-8} std cc/sec (helium)
c. CANISTER Helium Backfill Pressure	0 (+1, -0) psig
d. CANISTER Pressure Test	15.0 (+2,-0) psig for $\geq$ 10 min

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.1 NAC-MPC SYSTEM Average Surface Dose Rates

LCO 3.2.1 CONCRETE CASK dose rates shall be measured at the locations shown in Figure 3-1. The average surface dose rates of each CONCRETE CASK shall not exceed:

a. 50 mrem/hour (neutron + gamma) on the side (on the concrete surfaces)

b. 35 mrem/hour (neutron + gamma) on the top;

c. 100 mrem/hour (neutron + gamma) at air inlet and outlet vents.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CONCRETE CASK average surface dose rate limits not met.	A.1 Administratively verify correct fuel loading. AND	24 hours

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.1 CONCRETE CASK Average Surface Dose Rates (Continued)

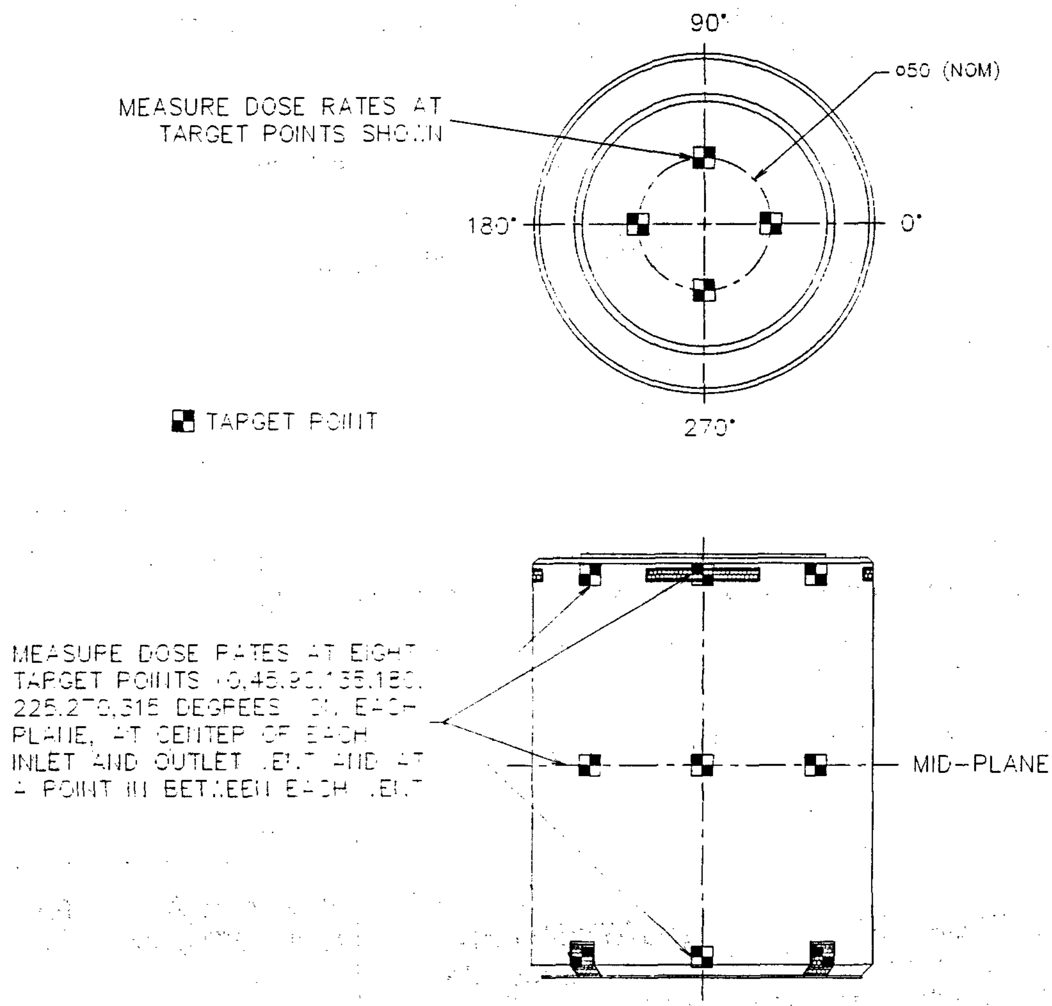
CONDITION	REQUIRED ACTION	COMPLETION TIME
	A.2 Verify that the dose rate from the cask will not cause the ISFSI to exceed the offsite radiation protection requirements of 10 CFR 20 and 10 CFR 72.	Prior to TRANSPORT OPERATIONS
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the NAC-MPC SYSTEM.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify average surface dose rates of CONCRETE CASK containing fuel assemblies are within limits.	Prior to TRANSPORT OPERATIONS

Figure 3-1

CONCRETE CASK Surface Dose Rate Measurement



3.2 NAC-MPC SYSTEM Radiation Protection

3.2.2 CANISTER Surface Contamination

LCO 3.2.2 Removable contamination on the accessible exterior surfaces of the CANISTER or accessible interior surfaces of the TRANSFER CASK shall each not exceed:

a. 1000 dpm/100 cm^2 from beta and gamma sources and

b. 20 dpm/100 cm^2 from alpha sources.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each NAC-MPC SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER or TRANSFER CASK removable surface contamination limits not met.	A.1 Restore CANISTER and TRANSFER CASK removable surface contamination to within limits.	Prior to TRANSPORT OPERATIONS

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.2 CANISTER Surface Contamination (Continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.2.1	Verify that the removable contamination on the accessible exterior surfaces of the CANISTER containing fuel is within limits.	Prior to TRANSPORT OPERATIONS
SR 3.2.2.2	Verify that the removable contamination on the accessible interior surfaces of the TRANSFER CASK do not exceed limits.	Prior to TRANSPORT OPERATIONS

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4.0 DESIGN FEATURES

4.1 Site

4.1.1 Site Location

Not applicable

4.2 Storage Features

4.2.1 Storage Cask

The NAC-MPC SYSTEM consists of the VERTICAL CONCRETE CASK (CONCRETE CASK) and its integral TRANSPORTABLE STORAGE CANISTER (CANISTER).

4.2.2 Storage Capacity

The total storage capacity of the ISFSI is limited by plant-specific license conditions.

4.2.3 Storage Pad(s)

Not applicable

4.3 Codes and Standards

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 1995 Edition with Addenda, is the governing Code for the NAC-MPC CANISTER.

The American Concrete Institute Specifications ACI-349 and ACI-318 govern the NAC-MPC Vertical Concrete Cask design and construction, respectively.

The American National Standards Institute ANSI N14.6 and NUREG-0612 govern the NAC-MPC Transfer Cask design and construction.

4.3.1 Exceptions to the ASME Code

Codes and Standards

The NAC-MPC CANISTER and fuel basket structure are designed and fabricated in accordance with the ASME Code, Section III, Division 1, Subsections NB and NG, respectively. Exceptions to the applicable ASME Code requirements are listed in Table 4-1.

Proposed alternatives to ASME Code Section III, 1995 Edition with Addenda, including exceptions allowed by Table 4-1 may be used as authorized by the Director of the Office of Nuclear Material Safety and Safeguards or Designee. The justification in Table 4-1 demonstrates that:

1. The proposed alternatives will provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of ASME Code, Section III, 1995 Edition with Addenda would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Table 4-1

List of ASME Code Exceptions for the NAC-MPC CANISTER

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER	NB-1100	Statement of requirements for Code stamping of components.	CANISTER is designed and will be fabricated in accordance with ASME Code, Section III, Subsection NB to the maximum practical extent, but Code stamping is not required.
CANISTER Shield Lid and Structural Lid Welds	NB-4243	Full penetration welds required for Category C joints (flat head to main shell per NB-3352.3).	Shield lid and structural lid to canister shell welds are not full penetration welds. These field welds are performed independently to provide a redundant closure. Leaktightness of the canister is verified by testing.
CANISTER Structural Lid Weld	NB-4421	Requires removal of backing ring.	Structural lid to canister shell weld uses a backing ring that is not removed. The backing ring permits completion of the groove weld; it is not considered in any analyses; it has no detrimental effect on the canister's function.
CANISTER Vent Port Cover and Drain Port Cover to Shield Lid Welds; Shield Lid to Canister Shell Weld	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	Root and final surface liquid penetrant examination to be performed per ASME Code Section V, Article 6, with acceptance in accordance with NB-5350.

Table 4-1

List of ASME Code Exceptions for the NAC-MPC CANISTER (Continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Structural Lid to Shell Weld	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	The CANISTER structural lid to canister shell closure weld is performed in the field following fuel assembly loading. The structural lid-to-shell weld will be verified by either ultrasonic (UT) or progressive liquid penetrant (PT) examination. If progressive PT examination is used, at a minimum, it will include the root and final surfaces and sufficient intermediate layers to detect critical flaws. If UT examination is used, it will be followed by a final surface PT examination. For either UT or PT examination, the maximum, undetectable flaw size is demonstrated to be smaller than the critical flaw size. The critical flaw size is determined in accordance with ASME Section XI methods. The examination of the weld will be performed by qualified personnel per ASME Code Section V, Articles 5 (UT) and 6 (PT) with acceptance per ASME Code Section III, NB-5330 (UT) and NB-5350 for (PT).

C C C

Table 4-1

List of ASME Code Exceptions for the NAC-MPC CANISTER (Continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Vessel and Shield Lid	NB-6111	All completed pressure retaining systems shall be pressure tested.	The CANISTER shield lid to shell weld is performed in the field following fuel assembly loading. The CANISTER, including the shield lid weld, is then pneumatically (air-over-water) pressure tested as defined in Chapter 9 and described in Chapter 8. Accessibility for leakage inspections precludes a Code compliant hydrostatic test. The shield lid-to-shell weld is re-examined by liquid penetrant (PT) examination following the pneumatic pressure test. The shield lid weld is also leak tested to leak-tight criteria of ANSI N14.5. The vent port and drain port cover welds are examined by root and final PT examination. The structural lid secondary enclosure weld is not pressure tested, but is examined by UT and final surface PT or progressive PT.
CANISTER Vessel	NB-7000	Vessels are required to have overpressure protection.	No overpressure protection is provided. The function of the CANISTER is to confine radioactive contents under normal, off-normal, and accident conditions of storage. The CANISTER vessel is designed to withstand a maximum internal pressure considering 100% fuel rod failure and maximum accident temperatures.

Table 4-1

List of ASME Code Exceptions for the NAC-MPC CANISTER (Continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Vessel	NB-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-MPC SYSTEM is marked and identified in accordance with 10 CFR 72 requirements. Code stamping is not required. The QA data package will be in accordance with NAC's approved QA program.
CANISTER Basket Assembly	NG-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-MPC SYSTEM will be marked and identified in accordance with 10 CFR 72 requirements. No Code stamping is required. The CANISTER basket data package will be in conformance with NAC's approved QA program.
CANISTER Vessel and Basket Assembly Material	NB-2130/ NG-2130	States requirements for certification of material to NCA-3861 and NCA-3862	The NAC-MPC CANISTER Vessel and Basket Assembly component materials are procured in accordance with the specifications for materials in ASME Code Section II. The component materials will be obtained from NAC approved Suppliers in accordance with NAC's approved QA program.

4.4 Site Specific Parameters and Analyses

Site-specific parameters and analyses that will need verification by the NAC-MPC SYSTEM user, are as a minimum, as follows:

1. The temperature of 75°F is the maximum average yearly temperature. The average daily ambient temperature shall be 100°F or less.

2. The temperature extremes of 125°F with incident solar radiation and -40°F for storage of the CANISTER inside the CONCRETE CASK.

3. The design basis earthquake horizontal and vertical seismic acceleration levels are bounded by the values shown below:

Design-Basis Earthquake Input on the Top Surface of an ISFSI Pad

Horizontal g-level in each of Two Orthogonal Directions	Corresponding Vertical g-level (upward)
0.25g	0.25 x 0.667 = 0.167g

4. The analyzed flood condition of 15 fps water velocity and a height of 50 feet of water (full submergence of the loaded cask) are not exceeded.

5. The potential for fire and explosion shall be addressed, based on site-specific considerations. This includes the condition that the fuel tank of the cask handling equipment used to move the loaded CONCRETE CASK onto the ISFSI site contains no more than 50 gallons of fuel.

4.4 Site Specific Parameters and Analyses (continued)

6. In addition to the requirement of 10 CFR 72.212(b)(2)(ii), the ISFSI pad and foundation shall include the following characteristics as applicable to the end drop and tip-over analyses:

a.	Concrete thickness	36 inch maximum
b.	Pad Subsoil thickness	72 inch minimum
c.	Concrete compressive strength	≤3,000 psi at 28 days
d.	Concrete density (ρ)	$125 \leq \rho \leq 140$ lbs/ft^3
e.	Soil density (ρ)	$85 \leq \rho \leq 115$ lbs/ft^3
f.	Soil Stiffness	≤ 250 psi/in.

The concrete pad maximum thickness excludes the ISFSI pad footer. The compressive strength of concrete should be determined according to the test method given in Section 5.6 of ACI 318. Steel reinforcement is used in the pad. The placement of the reinforcement, including its area and spacing, are determined by analysis and installed in accordance with ACI 318. The soil stiffness should be determined according to the test method described in Chapter 9 of the Civil Engineering Reference Manual, 6th Edition.

7. In cases where engineered features (i.e., berms, shield walls) are used to ensure that requirements of 10 CFR 72.104(a) are met, such features are to be considered important to safety and must be evaluated to determine the applicable Quality Assessment Category on a site specific basis.

4.5 Design Specifications

4.5.1 Specification Important for Thermal Performance

1. The spacing of the NAC-MPC SYSTEM shall be a minimum of 15 feet (center-to-center).
2. Helium shall have a minimum purity of 99.9%.

4.5.2 Specification Important to CANISTER Lifting

The minimum distance from the master link of the CANISTER lifting slings to the top of the CANISTER shall be 67 inches.

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5.0 ADMINISTRATIVE CONTROLS

5.1 NAC-MPC SYSTEM Training

Training modules shall be developed under the general licensee's training program as required by 10 CFR 72.212(b)(6). Training modules shall require a comprehensive, program for the operation and maintenance of the NAC-MPC SYSTEM and the Independent Spent Fuel Storage Installation (ISFSI). The training modules shall include the following elements, at a minimum:

- Regulatory Requirements Overview
- NAC-MPC SYSTEM Design and Operational Features
- ISFSI Facility Design (overview)
- Certificate of Compliance Conditions
- Technical Specifications, Controls, Limits and Conditions of Use
- Identification of Components and Equipment Important to Safety
- Surveillance Requirements
- NAC-MPC SYSTEM and ISFSI procedures, including:
    - Documentation, Inspection and Compliance Requirements
    - Handling the CONCRETE CASK and Empty CANISTER
    - Handling the Transfer Cask
    - Loading and Closing the CANISTER
    - Loading the CONCRETE CASK
    - Moving the CONCRETE CASK and CANISTER and Placement on the ISFSI
- Special Processes and Equipment, including Leak Testing, Welding and Weld Examination
- Auxiliary Equipment, including Lifting Yokes and Slings
- Off-Normal and Accident Conditions, Response and Corrective Actions
- Radiological Safety and ALARA
- Operating Experience

Training session participation should be documented as required to establish qualification to performed the designated tasks.

5.2 Dry Run Training

A dry run training exercise of the loading, closure, handling, unloading, and transfer of the NAC-MPC Storage System shall be conducted by the licensee before the system is initially loaded. This demonstrates equipment fitup and interfacing, provides the opportunity to illustrate key features, operations, inspections and test conditions. It also allows comparison of procedural steps to component handling requirements. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to, the following:

- Moving the Concrete Cask into its Designated Loading Area
- Moving the Transfer Cask Holding the Empty Canister into the Spent Fuel Pool
- Loading One or More Dummy Fuel Assemblies into the Canister, Including Independent Verification
- Installing the Shield Lid
- Removal of the Transfer Cask from the Spent Fuel Pool
- Closing and Sealing of the Canister to Demonstrate Pressure Testing, Vacuum Drying, Helium Backfilling, Welding, Weld Inspection and Documentation, and Leak Testing
- Transfer Cask Movement Through the Designated Load Path
- Transfer Cask Installation on the Concrete Cask
- Placement of the Canister in the Concrete Cask
- Transport of the Concrete Cask to the ISFSI
- Canister Unloading, Including Reflooding and Weld Removal or Cutting

Demonstration of closing and sealing the canister may be performed using a mockup of the canister. The mockup should closely approximate the actual canister to allow qualification of personnel in the welding and testing tasks as required. The closed mockup is also used to demonstrate the activities necessary to open and unload the canister.

Participation in dry run training should be documented as required to establish qualification to perform designated tasks.

5.3 Special Requirements for First NAC-MPC SYSTEM Placed in Service

The heat transfer characteristics of the NAC-MPC SYSTEM will be recorded by temperature measurements of the first NAC-MPC SYSTEM placed in service with a heat load equal to or greater than 7.5 kW.

A letter report summarizing the results of the measurements shall be submitted to the NRC for each cask subsequently loaded with a higher heat load, up to the 12.5 kW maximum heat load for the NAC-MPC SYSTEM. The calculation and the measured temperature data shall be reported to the NRC in accordance with 10 CFR 72.4. The calculation and comparison need not be reported to the NRC for CANISTERs that are subsequently loaded with lesser loads than the latest reported case.

5.4 Programs

5.4.1 CONCRETE CASK Thermal Monitoring Program

The following programs shall be established, implemented, and maintained.

This program provides guidance for the temperature measurement and visual inspection activities that are used to monitor the thermal performance of each CONCRETE CASK.

a. The ambient air temperature and the air outlet temperatures are measured and compared every 24 hours. The temperature difference between the air outlet temperatures and the ambient air temperature is calculated and recorded. The air inlets and outlets are inspected and verified to be free of blockage every 24 hours.

b. If any air outlet temperature, or temperature difference between air outlet and ambient temperature shows an unexplained reading, appropriate actions are taken to determine the cause and to return the outlet temperatures to acceptable values. One of the immediate actions will be to increase the frequency of temperature monitoring until normal conditions are returned.

c. If an air outlet temperature exceeds the ambient air temperature by 92°F, the NRC will be notified and actions will be taken to evaluate the effects and impact of the elevated temperature on the CONCRETE CASK and CANISTER. A temperature differential of 92°F corresponds to a concrete temperature of 165°F. The long-term normal concrete temperature limit for the CONCRETE CASK is 200°F and the short-term bulk concrete temperature limit is 350°F.

APPENDIX B

NAC-MPC SYSTEM
TECHNICAL SPECIFICATIONS BASES

Appendix B
Table of Contents

1.0 Introduction

This Appendix presents the design or operational condition, or regulatory requirement, which establishes the bases for the Technical Specifications.

The section and paragraph numbering used in this Appendix corresponds to the numbering used in the technical specifications for the Functional and Operating Limits (Section 2.0) and the Limiting Condition for Operations or Surveillance (Section 3.0). This allows direct comparison of the limit or condition described in the technical specifications with its corresponding bases in this Appendix.

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2.0 Functional And Operating Limits

2.1 Fuel to be Stored in the NAC-MPC SYSTEM

BASES

BACKGROUND	The NAC-MPC SYSTEM design requires specifications for the spent fuel to be stored, such as the type of spent fuel, minimum and maximum allowable enrichment prior to irradiation, maximum burnup, minimum acceptable port-irradiation cooling time prior to storage, maximum decay heat, and conditions of the spent fuel (i.e., INTACT FUEL, DAMAGED FUEL OR FAILED FUEL). Other important limitations are the dimensions and weight of the fuel assemblies. Requirements for fuel to be loaded into the NAC-MPC SYSTEM are specified in Sections 2.1.1 and 2.1.2 the technical specifications. Specific limitations for the NAC-MPC SYSTEM are specified in Table 2-1 as referred to in the Functional and Operating Limits, Section 2.1.1 of the technical specifications. These limitations support the assumptions and inputs used in the thermal, structural, shielding, and criticality evaluations performed for the NAC-MPC SYSTEM. Actions required to respond to violations of any Functional and Operating Limits are provided in Section 2.2.
APPLICABLE SAFETY ANALYSES	To ensure that the shield lid is not placed on a canister containing an unauthorized fuel assembly, facility procedures require verification of the loaded fuel assemblies to ensure that the correct fuel assemblies have been loaded in the canister.
FUNCTIONAL AND OPERATING LIMITS	2.1.1 Functional and Operating Limit 2.1.1 refers to Table 2-1 for the specific fuel assembly characteristic limits for Yankee Class fuel assemblies authorized for loading into the NAC-MPC SYSTEM. These fuel assembly characteristics include parameters such as cladding material, enrichment, decay heat generation, post-irradiation cooling time, burnup, and fuel assembly length, width, and weight. Table 2-2 is referenced from Table 2-1 and provides additional specific fuel characteristic limits for the fuel assemblies based on the fuel assembly class type.

The fuel assembly characteristic limits of Tables 2-1 and 2-2 must be met to ensure that the thermal, structural, shielding, and criticality analyses supporting the NAC-MPC SYSTEM Safety Analysis Report are bounding.

FUNCTIONAL AND OPERATING LIMITS VIOLATIONS

2.2.1

If any Functional and Operating Limit of 2.1.1 are violated, the limitations on fuel assemblies to be loaded are not met. Action must be taken to place the affected fuel assembly(s) in a safe condition. This safe condition may be established by returning the affected fuel assembly(s) to the spent fuel pool. However, it is acceptable for the affected fuel assemblies to temporarily remain in the NAC-MPC SYSTEM, in a wet or dry condition, if that is determined to be a safe condition.

2.2.2 and 2.2.3

Notification of the Functional and Operating Limit violation to the NRC is required within 24 hours. Written reporting of the violation must be accomplished within 30 days. This notification and written report are independent of any reports and notification that may be required by 10 CFR 72.216.

REFERENCES

1. SAR, Sections 2.1, 4.4; Chapters 5 and 6.

3.0 Limiting Condition for Operation (LCO) Applicability

BASES

LCOs	LCO 3.0.1, 3.0.2, 3.0.4, and 3.0.5 establish the general requirements applicable to all Specifications and apply at all times, unless otherwise stated.
LCO 3.0.1	LCO 3.0.1 establishes the Applicability statement within each individual Specification as the requirement for when the LCO is required to be met (i.e., when the NAC-MPC SYSTEM is in the specified conditions of the Applicability statement of each Specification).
LCO 3.0.2	LCO 3.0.2 establishes that upon discovery of a failure to meet an LCO, the associated ACTIONS shall be met. The Completion Time of each Required Action for an ACTIONS Condition is applicable from the point in time that an ACTIONS Condition is entered. The Required Actions establish those remedial measures that must be taken within the specified Completion Times when the requirements of an LCO are not met. This Specification establishes that:

a. Completion of the Required Actions within the specified Completion Times constitutes compliance with a Specification; and,

b. Completion of the Required Actions is not required when an LCO is meet within the specified Completion Time, unless otherwise specified.

There are two basic Required Action types. The first Required Action type specifies a time limit, the Completion Time to restore a system or component or to restore variables to within specified limits, in which the LCO must be met. Whether stated as a Required Action or not, correction of the entered Condition is an action that may always be considered upon entering ACTIONS. The second Required Action type specifies the remedial measures that permit continued activities that are not further restricted by the Completion Time. In this case, compliance with the Required Actions provides an acceptable level of safety for continued operation.

LCO 3.0.2 (continued)

Completing the Required Actions is not required when an LCO is met or is no longer applicable, unless otherwise stated in the individual Specifications.

The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally. The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of Surveillance, preventive maintenance, corrective maintenance, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience.

LCO 3.0.3

This specification is not applicable to the NAC-MPC SYSTEM because it describes conditions under which a power reactor must be shut down when an LCO is not met and an associated ACTION is not met or provided. The placeholder is retained for consistency with the power reactor technical specifications.

LCO 3.0.4

LCO 3.0.4 establishes limitations on changes in specified conditions in the Applicability when an LCO is not met. It precludes placing the facility in a specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist:

a. NAC-MPC SYSTEM conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered; and

b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in NAC-MPC SYSTEM activities being required to exit the Applicability desired to be entered to comply with the Required Actions.

Compliance with Required Actions that permit continued operation for an unlimited period of time in a specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the NAC-MPC SYSTEM. Therefore, in such cases, entry into a specified condition in the Applicability may be made in accordance with the provisions of the Required Actions.

LCO 3.0.4 (continued)	The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components before entering an associated specified condition in the Applicability. The provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability that are related to the unloading of the NAC-MPC SYSTEM. Exceptions to LCO 3.0.4 are stated in the individual Specifications. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.
LCO 3.0.5	LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or determined to not meet the LCO to comply with the ACTIONS. The sole purpose of the Specification is to provide an exception to LCO 3.0.2 (e.g. to not comply with the applicable Required Action[s]) to allow the performance of testing to demonstrate: a. The equipment being returned to service meets the LCO; or b. Other equipment meets the applicable LCOs. The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the allowed testing. This Specification does not provide time to perform any other preventive or corrective maintenance.
LCO 3.0.6	Not Applicable
LCO 3.0.7	Not Applicable

3.0 Surveillance Requirement (SR) Applicability

BASES

Surveillance Requirements (SRs)	SR 3.0.1 through SR 3.0.4 establish the general requirements applicable to all Specifications and apply at all times, unless otherwise stated.

SR 3.0.1

SR 3.0.1 establishes the requirement that SRs must be met during the specified conditions in the Applicability for which the requirements of the LCO apply, unless otherwise specified in the individual SRs. This Specification is to ensure that Surveillance is performed to verify that systems and components meet the LCO and variables are within specified limits. Failure to meet Surveillance within the specified Frequency, in accordance with SR 3.0.2, constitutes a failure to meet an LCO.

Systems and components are assumed to meet the LCO when the associated SRs have been met. Nothing in this Specification, however, is to be construed as implying that systems or components meet the associated LCO when:

a. The systems or components are known to not meet the LCO, although still meeting the SRs; or,

b. The requirements of the Surveillance(s) are known to be not met between required Surveillance performances.

Surveillances do not have to be performed when the NAC-MPC SYSTEM is in a specified condition for which the requirements of the associated LCO are not applicable, unless otherwise specified.

Surveillances, including those invoked by Required Actions, do not have to be performed on equipment that has been determined to not meet the LCO because the ACTIONS define the remedial measures that apply. Surveillances have to be met and performed in accordance with SR 3.0.2, prior to returning equipment to service. Upon completion of maintenance, appropriate post maintenance testing is required. This includes ensuring applicable Surveillances are not failed and their most recent performance is in accordance with SR 3.0.2. Post

SR 3.0.1 (continued) maintenance testing may not be possible in the current specified conditions in the Applicability, due to the necessary NAC-MPC SYSTEM parameters not having been established. In these situations, the equipment may be considered to meet the LCO provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a specified condition where other necessary post maintenance tests can be completed.

SR 3.0.2

SR 3.0.2 establishes the requirements for meeting the specified Frequency for Surveillances and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per..." interval.

This extension facilitates Surveillance scheduling and considers facility conditions that may not be suitable for conducting the Surveillance (e.g., transient conditions or other ongoing Surveillance or maintenance activities).

The 25% extension does not significantly degrade the reliability that results from performing the Surveillance at its specified Frequency. This is based on the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the SRs. The exceptions to SR 3.0.2 are those Suveillances for which the 25% extension of the interval specified in the Frequency does not apply. These exceptions are stated in the individual Specifications as a Note in the Frequency stating, "SR 3.0.2 is not applicable."

As stated in SR 3.0.2, the 25% extension also does not apply to the initial portion of a periodic Completion Time that requires performance on a "once per..." basis. The 25% extension applies to each performance after the initial performance. The initial performance of the Required Action, whether it is a particular Surveillance or some other remedial action, is considered a single action with a single Completion time. One reason for not allowing the 25% extension to this Completion Time is that such an action usually verifies that no loss of function has occurred by checking the status of redundant or diverse components or accomplishes the function of the affected equipment in an alternative manner.

SR 3.0.2 (continued)

The provisions of SR 3.0.2 are not intended to be used repeatedly, merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

SR 3.0.3

SR 3.0.3 establishes the flexibility to defer declaring affected equipment as not meeting the LCO or an affected variable outside the specified limits when a Surveillance has not been completed within the specified Frequency. A delay period of up to 24 hours or up to the limit of the specified Frequency, whichever is less, applies from the point in time that it is discovered that the Surveillance has not been performed in accordance with SR 3.0.2, and not at the time that the specified Frequency was not met.

This delay period provides adequate time to complete Surveillances that have been missed. This delay period permits the completion of a Surveillance before complying with Required Actions or other remedial measures that might preclude completion of the Surveillance.

The basis for this delay period includes: consideration of facility conditions, adequate planning, availability of personnel, the time required to perform the Surveillance, the safety significance of the delay in completing the required Surveillance, and the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the requirements. When a Surveillance with a Frequency, based not on time intervals, but upon specified NAC-MPC SYSTEM conditions, is discovered not to have been performed when specified, SR 3.0.3 allows the full delay period of 24 hours to perform the Surveillance.

SR 3.0.3 also provides a time limit for completion of Surveillances that become applicable as a consequence of changes in the specified conditions in the Applicability imposed by the Required Actions.

Failure to comply with specified Frequencies for SRs is expected to be an infrequent occurrence. Use of the delay period established by SR 3.0.3 is a flexibility, which is not intended to be used as an operational convenience to extent Surveillance intervals.

SR 3.0.3 (continued)

If a Surveillance is not completed within the allowed delay period, then the equipment is considered to not meet the LCO or the variable is considered outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon expiration of the delay period. If a Surveillance is failed within the delay period, then the equipment does not meet the LCO, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon the failure of the Surveillance.

Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1.

SR 3.0.4

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a specified condition in the Applicability.

This Specification ensures that system and component requirements and variable limits are met before entry into specified conditions in the Applicability for which these systems and components ensure safe operation of NAC-MPC SYSTEM activities.

The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components before entering an associated specified condition in the Applicability.

However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a change in specified condition. When a system, subsystem, division, component, device, or variable is outside its specified limits, the associated SR(s) are not required to be performed per SR 3.0.1, which states that Surveillances do not have to be performed on equipment that has been determined to not meet the LCO.

SR 3.0.4 (continued) When equipment does not meet the LCO, SR 3.0.4 does not apply to the associated SR(s), since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in a SR 3.0.4 restriction to changing specified conditions of the Applicability. However, since the LCO is not in this situation, LCO 3.0.4 will govern any restrictions that may be (or may not) apply to specified condition changes.

The provisions of SR 3.0.4 shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability that are related to the unloading of the NAC-MPC SYSTEM.

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances, when the prerequisite condition(s) specified in a Surveillance procedure require entry into the specified condition in the Applicability of the associated LCO, prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering LCO Applicability, would have its Frequency specified such that is not "due" until the specific conditions needed are met.

Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.

3.1 NAC-MPC SYSTEM Integrity

3.1.1 CANISTER Water Temperature

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies that meet the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. The CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination and dose measurements are completed prior to moving the TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred to the CONCRETE CASK, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is moved to the ISFSI.

The CANISTER water level is lowered (approximately 50 gallons) following removal from the pool to remove moisture from the shield lid-to-CANISTER shell weld area. The water in the CANISTER is not completely drained as it provides neutron and gamma shielding for the spent fuel assemblies and therefore, results in lower personnel exposure to operations, welding and inspection personnel. However, the decay heat from the spent fuel begins heating the water in the CANISTER immediately after removal of the TRANSER CASK and loaded CANISTER from the spent fuel pool. In the event that the shield lid-to-CANISTER shell welding , nondestructive examination and subsequent pneumatic pressure testing are not completed in a timely manner, the CANISTER water could reach 212°F and begin to boil off. To prevent CANISTER water boiling, the water temperature is monitored by taking a water sample from the drain line beginning, at most, 18 hours after removal from the spent fuel pool and continuing every 1/2 hour thereafter. If the

CANISTER water temperature reaches 200°F, a cooling water recirculation flow will be initiated to maintain and reduce the CANISTER water temperature below 200°F. The recirculation flow is pumped from the CANISTER drain line through an in-pool condenser unit and returned to the CANISTER through the vent connector.

Upon successful completion of the shield lid welding, the recirculation flow is terminated, the shield lid is pneumatically pressure tested, and the CANISTER is drained, vacuum dried, and backfilled with helium.

APPLICABLE SAFETY ANALYSIS

The maintenance of CANISTER water temperatures below 200°F ensures that uncontrolled boiling of the cavity water will not occur. Such boiling could provide excessive moisture in the shield lid-to-CANISTER shell weld area, which could interfere with obtaining a high quality weld. Uncontrolled boiling would also reduce the CANISTER water level thereby reducing the shielding of the spent fuel and resulting in higher dose rates to operations personnel. By analysis reported in the Safety Analysis Report, the CANISTER water temperatures will not reach 212°F for a time period exceeding 20 hours with a full loading of design basis fuel assemblies.

Monitoring the CANISTER water temperature, and initiating recirculation flow when required to maintain the temperature at or below 200°F, ensures that uncontrolled boiling will not occur.

LCO

Monitoring and maintaining CANISTER water temperatures at or below 200°F ensures that uncontrolled boiling will not occur during cask preparation activities.

APPLICABILITY OPERATIONS

The monitoring of CANISTER water temperature is performed during LOADING OPERATIONS before the CANISTER is transferred to the CONCRETE CASK and transported to the ISFSI. TRANSPORT OPERATIONS would not commence if the water from the CANISTER is not drained and vacuum dried. Therefore, CANISTER water temperature monitoring is not required during TRANSPORT OPERATIONS or STORAGE OPERATIONS.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each CANISTER. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the water in the CANISTER exceeds the specified temperature limits, actions must be taken to meet the LCO. The Completion Time is sufficient to initiate water circulation through an in-pool condenser unit to maintain and reduce the CANISTER water temperature at or below 200°F.

B.1

If water circulation cannot be initiated within the Completion Time, Actions shall be taken Immediately to place the CANISTER in a safe condition. Such Actions could include venting and addition of water to the CANISTER, or returning the CANISTER and TRANSFER CASK to the spent fuel pool. The Completion Time is Immediately to assure that uncontrolled boiling of the CANISTER water is precluded.

B.2

If the shield lid-to-CANISTER shell welding operations cannot be completed in compliance with the acceptance criteria, the fuel must be placed in a safe condition. SR 3.1.1.1 and A.1 actions may be continued until it becomes necessary to perform B.1 or B.2. The time frame for completing B.2 cannot be extended by continuing A.1. The Completion Time is reasonable based on the time required to reflood the CANISTER, remove the shield lid-to-shell weld, move the TRANSFER CASK and CANISTER into the spent fuel pool, remove the shield lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1

By monitoring CANISTER water temperatures beginning a maximum of 18 hours after removal from the spent fuel pool and every 30 minutes thereafter ensures that the water temperature is not allowed to exceed 200°F. By requiring the initiation of CANISTER cooling water recirculation, uncontrolled boiling of the CANISTER cavity water is precluded.

REFERENCES

1. SAR Section 4.4 and 8.1.

3.1 NAC-MPC SYSTEM Integrity

3.1.2 CANISTER Vacuum Drying Pressure

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the lid welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. Additional dose rates are measured, and the CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination measurements are completed prior to moving TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is then moved to the ISFSI.

CANISTER cavity vacuum drying is utilized to remove residual moisture from the CANISTER cavity after the water is drained from the CANISTER. Any water not drained from the CANISTER cavity evaporates, due to the vacuum. This is aided by the temperature increase, due to the heat generation of the fuel.

APPLICABLE SAFETY ANALYSIS

The confinement of radioactivity (including fission product gases, fuel fines, volatiles, and crud) during the storage of design basis spent fuel in the CANISTER is ensured by the multiple confinement boundaries and systems. The barriers relied on are: the fuel pellet matrix; the metallic fuel cladding tubes where the fuel pellets are contained; and the CANISTER where the fuel assemblies are stored. Long-term integrity of the fuel and cladding depends on storage in an inert atmosphere. This is accomplished by removing water and oxidizing gases from the CANISTER and backfilling the cavity with helium. The thermal analysis assumes that the CANISTER cavity is dry and filled with helium.

The heat-up of the CANISTER and contents will occur during CANISTER vacuum drying but is controlled by LCO 3.1.5.

LCO

A vacuum pressure, meeting the limit specified in Table 3-1, indicates that liquid water has evaporated and been removed from the CANISTER cavity. Removing water from the CANISTER cavity helps to ensure the long-term maintenance of fuel cladding integrity.

APPLICABILITY OPERATIONS

Cavity vacuum drying is performed during LOADING OPERATIONS before the TRANSFER CASK holding the CANISTER is moved to transfer the CANISTER to the CONCRETE CASK. Therefore, the vacuum requirements do not apply after the CANISTER is backfilled with helium and leak tested prior to TRANSPORT OPERATIONS and STORAGE OPERATIONS.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each CANISTER. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the CANISTER cavity vacuum drying pressure limit cannot be met, actions must be taken to meet the LCO. Failure to successfully complete cavity vacuum drying could have many causes, such as failure of the vacuum drying system, inadequate draining, ice clogging of the drain lines, or leaking CANISTER welds. The Completion Time is sufficient to determine and correct most failure mechanisms. Excessive heat-up of the CANISTER and contents is precluded by LCO 3.1.5.

B.1

If the CANISTER fuel cavity cannot be successfully vacuum dried, the fuel must be placed in a safe condition. Corrective actions may be taken after the fuel is placed in a safe condition to perform the A.1 action provided that the initial conditions for performing A.1 are met.

A.1 may be repeated as necessary prior to performing B.1. The time frame for completing B.1 cannot be extended by re-performing A.1. The Completion Time is reasonable based on the time required to reflood the CANISTER, perform fuel cooldown operations, cut the shield lid weld, move the TRANSFER CASK into the spent fuel pool, and remove the CANISTER shield lid in an orderly manner and without challenging personnel.

SURVEILLANCE REQUIREMENTS

SR 3.1.2.1

The long-term integrity of the stored fuel is dependent on storage in a dry, inert environment. Cavity dryness is demonstrated by evacuating the cavity to a very low absolute pressure and verifying that the pressure is held over a specified period of time. A low vacuum pressure is an indication that the cavity is dry. The surveillance must be performed within 24 hours after completion of CANISTER draining. This allows sufficient time to backfill the CANISTER cavity with helium, while minimizing the time the fuel is in the CANISTER without water or the assumed inert atmosphere in the cavity.

REFERENCES

1. SAR Sections 4.4, 7.1 and 8.1.

3.1 NAC-MPC SYSTEM Integrity

3.1.3 CANISTER Helium Backfill Pressure

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the lid welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. Additional dose rates are measured, and the CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination measurements are completed prior to moving TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is then moved to the ISFSI.

Backfilling of the CANISTER cavity with helium promotes heat transfer from the spent fuel to the CANISTER structure and the inert atmosphere protects the fuel cladding. Providing a helium pressure equal to atmospheric pressure ensures that there will be no in-leakage of air over the life of the CANISTER, which might be harmful to the heat transfer features of the NAC-MPC SYSTEM and harmful to the fuel.

APPLICABLE SAFETY ANALYSIS

The confinement of radioactivity (including fission product gases, fuel fines, volatiles, and crud) during the storage of spent fuel in the CANISTER is ensured by the multiple confinement boundaries and systems. The barriers relied on are: the fuel pellet matrix, the metallic fuel cladding tubes where the fuel pellets are contained, and the CANISTER where the fuel assemblies are stored. Long-term integrity of the fuel and cladding depends on the ability of the NAC-MPC SYSTEM to remove heat from the CANISTER and reject it to the environment. This is accomplished by removing water from the

CANISTER cavity and backfilling the cavity with an inert gas. The heat-up of the CANISTER and contents will continue following backfilling with helium but is controlled by LCO 3.1.6.

The thermal analyses of the CANISTER assume that the CANISTER cavity is dry and filled with dry helium.

LCO

Backfilling the CANISTER cavity with helium at a pressure equal to atmospheric pressure ensures that there is no air in-leakage into the CANISTER, which could decrease the heat transfer properties and result in increased cladding temperatures and damage to the fuel cladding over the storage period. The helium backfill pressure specified in Table 3-1 was selected based on a minimum helium purity of 99.9% to ensure that the CANISTER internal pressure and heat transfer from the CANISTER to the environment is maintained consistent with the design and analysis bases of the CANISTER.

APPLICABILITY

Helium backfill is performed during LOADING OPERATIONS, before the TRANSFER CASK and CANISTER are moved to the CONCRETE CASK for transfer of the CANISTER. Therefore, the backfill pressure requirements do not apply after the CANISTER is backfilled with helium and leak tested prior to TRANSPORT OPERATIONS and STORAGE OPERATIONS.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each CANISTER. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs, that do not meet the LCO are governed by subsequent condition entry and application of associated Required Actions.

A.1

If the backfill pressure cannot be obtained, actions must be taken to meet the LCO. The Completion Time is sufficient to determine and correct most failures, which would prevent backfilling of the CANISTER cavity with helium.

B.1

If the CANISTER cavity cannot be backfilled with helium to the specified pressure, the fuel must be placed in a safe condition. Corrective actions may be taken after the fuel is placed in a safe condition to perform the A.1 action provided that the initial conditions for performing A.1 are met. A.1 may be repeated as necessary prior to performing B.1. The time frame for completing B.1 can not be extended by re-performing A.1. The Completion Time is reasonable based on the time required to re-flood the CANISTER, perform cooldown operations, cut the CANISTER shield lid weld, move the TRANSFER CASK and CANISTER into the spent fuel pool, remove the CANISTER shield lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

SURVEILLANCE REQUIREMENTS

SR 3.1.3.1

The long-term integrity of the stored fuel is dependent on the storage in a dry, inert atmosphere, and maintenance of adequate heat transfer mechanisms. Filling the CANISTER cavity with helium at a pressure within the range specified in Table 3-1 will ensure that there will be no air in-leakage, which could potentially damage the fuel. This pressure of helium gas is sufficient to maintain fuel cladding temperatures within acceptable levels.

Backfilling of the CANISTER cavity must be performed successfully on each CANISTER before placing it in storage. The Surveillance must be performed within 24 hours after draining the CANISTER. This allows sufficient time to backfill the annulus with helium, while minimizing the time the loaded CANISTER is in the TRANSFER CASK without the assumed inert atmosphere in the cavity.

REFERENCES

1. SAR Sections 4.4, 7.1 and 8.1.

3.1 NAC-MPC SYSTEM Integrity

3.1.4 CANISTER Helium Leak Rate

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the lid welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. Additional dose rates are measured, and the CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination measurements are completed prior to moving TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is then moved to the ISFSI.

Backfilling the CANISTER cavity with helium promotes heat transfer from the fuel to the CANISTER shell. The inert atmosphere protects the fuel cladding. Prior to transferring the CANISTER to the CONCRETE CASK, the CANISTER helium leak rate is verified to meet leak tight requirements to ensure that the fuel and radioactive materials are confined.

APPLICABLE SAFETY ANALYSIS

The confinement of radioactivity (including fission product gases, fuel fines, volatiles, and crud) during the storage of spent fuel in the CANISTER is ensured by the multiple confinement boundaries and systems. The barriers relied on are: the fuel pellet matrix; the metallic fuel cladding tubes where the fuel pellets are contained; and the CANISTER where the fuel assemblies are stored. Long-term integrity of the fuel and cladding depends on maintaining an inert atmosphere, and maintaining the cladding temperatures below established long-term limits. This is accomplished by removing water and oxidizing gases from the CANISTER and backfilling the cavity with helium. The heat-up of the CANISTER and contents will continue following backfilling the cavity and leak testing the shield lid-to-shell weld but is controlled by LCO 3.1.6.

LCO

Verifying that the CANISTER cavity helium leak rate is below the leak tight limit specified in Table 3-1 ensures the CANISTER shield lid is sealed. Verifying the helium leakage rate is below leak tight levels will also ensure that the assumptions in the accident analyses and radiological evaluations are maintained.

APPLICABILITY

The leak tight helium leak rate verification is performed during LOADING OPERATIONS before the TRANSFER CASK and integral CANISTER are moved for transfer operations to the CONCRETE CASK. TRANSPORT OPERATIONS would not commence if the CANISTER helium leak rate was not below the test sensitivity. Therefore, CANISTER leak rate testing is not required during TRANSPORT OPERATIONS or STORAGE OPERATIONS.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each CANISTER. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the helium leak rate limit is not met, actions must be taken to meet the LCO. The Completion Time is sufficient to determine and correct most failures, which could cause a helium leak rate in excess of the limit.

B.1

If the CANISTER leak rate cannot be brought within the limit, the fuel must be placed in a safe condition. Corrective actions may be taken after the fuel is placed in a safe condition to perform the A.1 action provided that the initial conditions for performing A.1 are met. A.1 may be repeated as necessary prior to performing B.1. The time frame for completing B.1 can not be extended by re-performing A.1. The Completion Time is reasonable based on the time required to re-flood the CANISTER, perform fuel cooldown operations, cut the CANISTER shield lid weld, move the TRANSFER CASK and CANISTER into the spent fuel pool, remove the CANISTER shield lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

The primary design consideration of the CANISTER is that it is leak tight to ensure that off-site dose limits are not exceeded and to ensure that the helium remains in the CANISTER during long-term storage. Long-term integrity of the stored fuel is dependent on storage in a dry, inert environment.

Verifying that the helium leak rate meets leak tight requirements must be performed successfully on each CANISTER prior to TRANSPORT OPRATIONS. This allows sufficient time to backfill the CANISTER cavity with helium and perform the leak test, while minimizing the time the fuel is in the CANISTER and loaded in the TRANSFER CASK.

REFERENCES

1. SAR Sections 7.1 and 8.1.

3.1 NAC-MPC SYSTEM Integrity

3.1.5 CANISTER Maximum Time in Vacuum Drying

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the lid welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. Additional dose rates are measured, and the CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination measurements are completed prior to moving the TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is then moved to the ISFSI.

Limiting the elapsed time from start of CANISTER vacuum drying operations through dryness verification testing and subsequent backfilling of the CANISTER with helium ensures that the short-term temperature limits established in the Safety Analyses Report for the spent fuel cladding and CANISTER materials are not exceeded.

APPLICABLE SAFETY ANALYSIS

Limiting the total time for loaded CANISTER vacuum drying operations ensures that the short-term temperature limits for the fuel cladding and CANISTER materials are not exceeded. If vacuum drying operations are not completed in the required time period, the CANISTER is backfilled with helium, the TRANSFER CASK and loaded CANISTER are returned to the spent fuel pool, and the TRANSFER CASK and loaded CANISTER are kept in the spent fuel pool for a minimum of 24 hours.

Analysis reported in the Safety Analysis Report conclude that spent fuel cladding and CANISTER material short-term temperature limits will not be exceeded for total elapsed times exceeding 16 hours in vacuum drying and 26 hours in the TRANSFER CASK backfilled with helium. After 24 hours of in-pool cooling operations, the spent fuel cladding temperature will be below 466°F. Analyses in the Safety Analysis Report show that short-term limits will not be reached for a minimum of 10 hours under vacuum drying operations and 15 hours in the TRANSFER CASK backfilled with helium following 24 hours of in-pool cooling.

LCO

Limiting the length of time for vacuum drying operations on the CANISTER ensures that the spent fuel cladding and CANISTER material temperatures remain below the short-term temperature limits in the SAR for the NAC-MPC SYSTEM.

APPLICABILITY

The elapsed time restrictions for vacuum drying operation on a loaded CANISTER apply during LOADING OPERATIONS from the completion point of CANISTER draining operations through the completion point of the CANISTER dryness verification testing. The LCO is not applicable to TRANSPORT OPERATIONS or STORAGE OPERATIONS.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each NAC-MPC SYSTEM. This is acceptable, since the Required Actions for each condition provide appropriate compensatory measures for each NAC-MPC SYSTEM not meeting the LCO. Subsequent NAC-MPC systems that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

A.1.1
If the LCO time limit is exceeded, the CANISTER will be backfilled with helium to a pressure of 0(+1,-0) psig.

AND

A.2

The TRANSFER CASK and load CANISTER shall be returned to the spent fuel pool for in-pool cooling operations.
AND

A.3

The TRANSFER CASK and loaded CANISTER shall be maintained in the spent fuel pool for a minimum of 24 hours and when problems, which caused a delay in completing vacuum drying operations are resolved, if any, LOADING OPERATIONS can be re-commenced.

SURVEILLANCE REQUIREMENTS

SR 3.1.5.1

The elapsed time shall be monitored from completion of CANISTER draining through completion of the CANISTER vacuum dryness verification testing. Monitoring the elapsed time ensures that helium backfill and in-pool cooling operations can be initiated in a timely manner during LOADING OPERATIONS to prevent exceeding short-term temperature limits.

SR 3.1.5.2

The elapsed time shall be monitored from the end of the in-pool cooling through completion of the CANISTER vacuum dryness verification testing. Monitoring the elapsed time ensures that helium backfill and in-pool cooling operations can be initiated in a timely manner during LOADING OPERATIONS to prevent short-term temperature limits from being exceeded.

REFERENCES

1. SAR Sections 4.4 and 8.1.

3.1 NAC-MPC SYSTEM Integrity

3.1.6 CANISTER Maximum Time in the TRANSFER CASK

BASES

BACKGROUND

A TRANSFER CASK with an empty CANISTER is placed into the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield lid is then placed on the CANISTER. The TRANSFER CASK and CANISTER are raised out of the spent fuel pool. The TRANSFER CASK and CANISTER are then moved into the cask decontamination area, where dose rates are measured and the CANISTER shield lid is welded to the CANISTER shell and the lid welds are inspected and pressure tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is backfilled with helium and leak tested. Additional dose rates are measured, and the CANISTER vent port and drain port covers and structural lid are installed and welded. Non-destructive examinations are performed on the welds. Contamination measurements are completed prior to moving TRANSFER CASK and CANISTER in position to transfer the CANISTER to the CONCRETE CASK. After the CANISTER is transferred, average CONCRETE CASK surface dose rate measurements are taken. The CONCRETE CASK is then moved to the ISFSI.

Backfilling the CANISTER cavity with helium promotes heat transfer from the fuel and the inert atmosphere protects the fuel cladding. Limiting the total time the loaded CANISTER is in the TRANSFER CASK, prior to its placement in the CONCRETE CASK, ensures that the short-term temperature limits established in the Safety Analysis Report for the spent fuel cladding and CANISTER materials are not exceeded.

APPLICABLE SAFETY ANALYSIS

Limiting the total time a loaded CANISTER backfilled with helium is authorized in the TRANSFER CASK, prior to placement in the CONCRETE CASK, ensures that the short-term temperature limits for the spent fuel cladding and CANISTER materials are not exceeded. Upon placement of the loaded CANISTER in the CONCRETE CASK, the temperatures of the CANISTER and stored spent fuel will return to below the established long-term temperature limits due to the more efficient passive heat transfer characteristics of the CONCRETE CASK. Ensuring temperatures are maintained below short-term limits for a limited time period and returning them to below long-term limits will prevent damage to the spent fuel cladding and the as-analyzed performance of the CANISTER materials.

Analyses reported in the Safety Analysis Report conclude that spent fuel cladding and CANISTER material short-term temperature limits will not be exceeded for a total elapsed time in excess of 26 hours with the loaded CANISTER backfilled with helium and inside the TRANSFER CASK. After 24 hours of either in-pool cooling or forced airflow cooling operations, the spent fuel cladding and CANISTER temperatures will be at or below their long-term limits. Analyses in the Safety Analysis Report show that short-term temperature limits will not be reached for a minimum of a further 15 hours with the CANISTER in the TRANSFER CASK. These elapsed times are based on vacuum drying times of 16 and 10 hours, respectively, prior to initiation of helium backfill operations.

The forced air cooling basis is an inlet maximum air temperature of 75°F which is the maximum normal ambient air temperature in the thermal analysis. The 1,000 CFM air flow rate exceeds the CONCRETE CASK natural convective cooling flow rate a minimum of 10 percent. This comparative analysis conservatively excludes the higher flow velocity resulting from the smaller annulus between the TRANSFER CASK and CANISTER which would result in improved heat transfer from the CANISTER.

LCO

Limiting the length of time that the loaded CANISTER backfilled with helium is allowed to remain in the TRANSFER CASK ensures that the spent fuel cladding and CANISTER material temperatures remain below the short-term temperature limits established in the SAR for the NAC-MPC SYSTEM. The time duration is a function of the design of the TRANSFER CASK and the NAC-MPC SYSTEM.

APPLICABILITY

The elapsed time restrictions on the loaded CANISTER apply during LOADING OPERATIONS from the completion point of the CANISTER vacuum dryness verification through completion of the transfer from the TRANSFER CASK to the CONCRETE CASK.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate condition entry is allowed for each NAC-MPC system. This is acceptable, since the Required Actions for each condition provide appropriate compensatory measures for each NAC-MPC SYSTEM not meeting the LCO. Subsequent NAC-MPC systems that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

A.1.1
If either LCO time limit is exceeded, the TRANSFER CASK containing the loaded CANISTER backfilled with helium will be returned to the spent fuel pool to allow the cooler spent fuel pool water to reduce the TRANSFER CASK, CANISTER, and spent fuel cladding temperatures to below long-term temperature limits.

AND

A.1.2
The TRANSFER CASK and loaded CANISTER shall be kept in the spent fuel pool for minimum of 24 hours and when problems, which caused a delay in transferring the loaded CANISTER to the CONCRETE CASK are resolved, if any, the LOADING OPERATIONS can be re-commenced.

OR

A.2

A.2.1
If either LCO time limit is exceeded, the CANISTER will be backfilled with helium.

AND

A.2.2
A cooling airflow of 1,000 CFM at a maximum temperature of 75°F shall be initiated. The airflow will be routed to the two fill/drain lines at the base of the TRANSFER CASK and will flow through the annulus and cool the CANISTER.

AND

A.2.3
The cooling airflow shall be maintained for a minimum of 24 hours and when problems, which caused a delay in completing the CANISTER transfer to the CONCRETE CASK are resolved, if any, LOADING OPERATIONS can be re-commenced.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

The elapsed time shall be monitored from completion of CANISTER dryness verification until CANISTER transfer operations into the CONCRETE CASK are completed. The SR ensures that CANISTER material and fuel cladding short-term temperature limits are not exceeded.

SR 3.1.6.2

The elapsed time shall be monitored from the completion of in-pool or forced air cooling until CANISTER transfer operations into the CONCRETE CASK are completed. This SR ensures that CANISTER materials and fuel cladding short-term temperature limits are not exceeded. This SR is applicable to the maximum time the CANISTER backfilled with helium can be loaded in the TRANSFER CASK if in-pool cooling operations were performed during vacuum drying operations under LCO 3.1.5.

REFERENCES

1. SAR Sections 4.4 and 8.1.

3.1 NAC-MPC SYSTEM Integrity

3.1.7 Fuel Cooldown Requirements

BASES

BACKGROUND

In the event that a CANISTER must be unloaded, the CONCRETE CASK with its enclosed CANISTER is returned to the fuel building, the CANISTER is removed from the CONCRETE CASK using the TRANSFER CASK, and the TRANSFER CASK and CANISTER are placed in the cask preparation area to begin the process of fuel unloading. The structural lid and vent and drain port cover welds are removed. The CANISTER cavity gas is sampled to determine the level of radioactive gases in the cavity. A flow of nitrogen gas is established to flush radioactive gases from the cavity. A cooldown system is attached to the drain connection (inlet) and vent connection (outlet). A controlled water flow rate with a specified minimum water temperature is established to the drain connection with the steam and water being discharged from the vent to the spent fuel pool or radioactive water treatment system. Cooling water flow is maintained until the CANISTER is filled and the contents sufficiently cooled down to allow placement of the TRANSFER CASK and CANISTER in the spent fuel pool.

Following cooldown, the shield lid weld is removed and the TRANSFER CASK and CANISTER are placed in the fuel pool. The shield lid is removed and the fuel assemblies are removed and placed in storage rack locations. The TRANSFER CASK and CANISTER are removed from the spent fuel pool and decontaminated.

APPLICABLE SAFETY ANALYSIS

The use of a controlled cooldown process allows the reflooding of the CANISTER and cooling of the stored fuel assemblies in a manner which precludes the creation of excessive thermal stresses in the fuel cladding, which could result in cladding rupture and steam pressures in the cavity that could exceed the CANISTER's design pressure.

By controlling the water flow rate and minimum water temperature, the rate of fuel cooldown is controlled, thereby preventing fuel cladding failure and maintenance of a steam pressure within the CANISTER design pressure, thus ensuring CANISTER structural integrity.

LCO

Controlling the inlet water flow rate and temperature ensures that there is no excessive thermally induced stress in the fuel cladding leading to failure and the steam pressure will be maintained below analyzed design values. The exit water temperature is monitored to ensure that the CANISTER contents are sufficiently cooled down to allow return of the CANISTER to the spent fuel pool for fuel assembly unloading.

APPLICABILITY

The inlet water flow rate and temperature and water/steam outlet temperatures are controlled and measured during UNLOADING OPERATIONS after the CANISTER has been transferred to the TRANSFER CASK from the CONCRETE CASK. Therefore, the CANISTER fuel cooldown LCO does not apply during TRANSPORT OPERATIONS and STORAGE OPERATIONS. A note has been added to the Applicability for LCO 3.1.6, which states that the APPLICABILITY is only applicable to wet UNLOADING OPERATIONS. This is acceptable, since the intent of the LCO is to avoid uncontrolled CANISTER pressurization due to steam creation during CANISTER reflooding. This is not a concern for dry UNLOADING OPERATIONS.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each NAC-MPC SYSTEM. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the inlet water flow rate and minimum temperature requirements are not met, actions must be taken to restore the parameters to within the limits. The Completion Time is defined as Immediately to ensure actions are taken to correct the LCO before fuel cladding damage or overpressurization of the CANISTER has occurred. No additional actions are appropriate, since this LCO applies during UNLOADING OPERATIONS, which cannot proceed until the LCO is met.

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1

This SR ensures that the temperatures of the CANISTER, basket and fuel contents do not exceed short-term limits prior to initiation of cooldown operations.

SR 3.1.7.2

The long-term integrity of the fuel assembly is dependant on the material condition of the fuel assembly cladding. Minimizing cladding damage, due to excessive thermally induced stresses in the cooldown process, ensures continuing cladding integrity for future wet or dry fuel storage. By controlling the flow rate and entry water temperature, the creation of steam pressures exceeding design values is prevented.

REFERENCES

1. SAR, Sections 4.4 and 8.3, and Chapter 3.

3.1 NAC-MPC SYSTEM Integrity

3.1.8 CONCRETE CASK Maximum Lifting Height

BASES

BACKGROUND

A loaded CONCRETE CASK is transported between the loading facility and the ISFSI using a heavy haul trailer. The CONCRETE CASK is handled in the vertical orientation. The height to which the CONCRETE CASK is lifted is limited to ensure that its structural integrity, and that of the installed CANISTER, are not compromised should it be dropped.

APPLICABLE SAFETY ANALYSIS

The structural analyses of the CONCRETE CASK and CANISTER demonstrate that the end drop of a CONCRETE CASK from the Technical Specification height limits to a surface having the structural characteristics described in Design Features Section 4.4.6, will not compromise the NAC-MPC SYSTEM integrity or result in physical damage to the contained fuel assemblies. The structural analyses evaluated a CONCRETE CASK tip-over event onto an ISFSI surface also having structural characteristics, as described in Design Features, Section 4.4.6.

LCO

Limiting the CONCRETE CASK lifting height during TRANSPORT OPERATIONS maintains the NAC-MPC SYSTEM within the design and analysis basis. The maximum lifting height is a function of the NAC-MPC SYSTEM design.

Site Specific Parameters and Analysis, Section 4.4, provides the characteristics of the drop surface assumed in the analyses. As required by 10 CFR 72.212(b)(3), each licensee must "...determine whether or not the reactor site parameters...are enveloped by the cask design bases... ."

APPLICABILITY	CONCRETE CASK lifting height restrictions apply during TRANSPORT OPERATIONS, which include movement of the CONCRETE CASK while secured on the heavy haul trailer. CONCRETE CASK and TRANSFER CASK handling and drop events postulated to occur in the fuel loading facilities are addressed in the user's FSAR or PSDAR.
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate condition entry is allowed for each NAC-MPC SYSTEM. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each NAC-MPC SYSTEM not meeting the LCO. Subsequent NAC-MPC SYSTEMs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. <u>A.1</u> If the CONCRETE CASK lifting height requirement is not met, immediate action must be initiated and completed expeditiously to comply with the lifting height requirements, in order to preserve the NAC-MPC SYSTEM design and analysis basis.
SURVEILLANCE REQUIREMENTS	SR 3.1.8.1 The CONCRETE CASK lift height requirement must be verified to be met after the CONCRETE CASK is secured to the transporter and prior to the transporter beginning to move the CONCRETE CASK to the ISFSI. This ensures potential drop accidents during TRANSPORT OPERATIONS are bounded by the drop analyses.
REFERENCES	1. SAR, Sections 8.1 and 8.3.

3.1 NAC-MPC SYSTEM Integrity

3.1.10 TRANSFER CASK Minimum Operating Temperature

BASES

BACKGROUND

The TRANSFER CASK is a shielded handling device designed to lift and protect the CANISTER during fuel LOADING and UNLOADING OPERATIONS. It is used to perform the vertical transfer of the CANISTER to and from the CONCRETE CASK. This transfer operation can occur within the confines of the fuel loading facility or in the open environment adjacent to the facility.

The structural integrity of the TRANSFER CASK and its capability to handle and shield a loaded CANISTER is ensured by maintaining the TRANSFER CASK ferrous material temperatures significantly above the materials' nil ductility transition temperatures (NDTT), thereby precluding brittle fracture.

APPLICABLE SAFETY ANALYSIS

The structural analysis of the TRANSFER CASK is based on the ductile performance of the structural material. The TRANSFER CASK structural materials were selected for their low temperature fracture toughness. In accordance with NRC Reg Guide 7.11 (Ref. 1), the lowest service temperature of a ferrous material component should be established at a minimum of 40°F above the NDTT for the material. For the NAC-MPC transfer cask, the NDTT established in the SAR is -50°F. Therefore the minimum ambient temperature limit of 0°F is established. Conservatively, the decay heat from the contained spent fuel is not assumed to maintain the TRANSFER CASK material temperatures above ambient.

LCO

Limiting the TRANSFER CASK operations outside of covered or heated facilities when the external ambient temperature is below the minimum temperature limit maintains the NAC-MPC SYSTEM within the design and analysis basis of the SAR (Ref. 2). The minimum operating temperature selected is based on the properties of the materials of construction of the TRANSFER CASK.

APPLICABILITY	The minimum operating temperature limit applies for TRANSFER CASK operations external to the fuel facility during LOADING or UNLOADING OPERATIONS
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate condition entry is allowed for each NAC-MPC SYSTEM. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each NAC-MPC SYSTEM not meeting the LCO. Subsequent NAC-MPC SYSTEMs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. <u>A.1</u> For external TRANSFER CASK operations, if the external ambient temperature is at, or below, the minimum operating temperature limit, immediate action must be initiated to stop the LOADING or UNLOADING OPERATIONS sequence to ensure that the TRANSFER CASK is not operated outside of the fuel facility.
SURVEILLANCE REQUIREMENTS	SR 3.1.8.1 The external ambient temperature shall be measured, prior to and during the LOADING or UNLOADING OPERATIONS, to ensure that the ambient temperature does not fall below the established TRANSFER CASK minimum operating temperature for operations external to the fuel building.
REFERENCES	1. NRC RG 7.11. 2. SAR, Sections 2.2, 3.4, 4.1, 8.1 and 8.3.

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.1 CONCRETE CASK Average Surface Dose Rates

BASES

BACKGROUND	The regulations governing the operation of an ISFSI set limits on the control of occupational radiation exposure and radiation doses to the general public (Ref. 1). Occupational radiation exposure should be kept as low as reasonably achievable (ALARA) and within the limits of 10 CFR Part 20. Radiation doses to the public are limited for both normal and accident conditions in accordance with 10 CFR 72.
APPLICABLE SAFETY ANALYSIS	The CONCRETE CASK average surface dose rates are not an assumption in any accident analysis, but are used to ensure compliance with regulatory limits on occupational dose and dose to the public.
LCO	The limits on CONCRETE CASK average surface dose rates are based on the shielding analysis of the NAC-MPC SYSTEM (Ref. 2). The limits are selected to minimize radiation exposure to the public and maintain occupational dose ALARA to personnel working in the vicinity of the NAC-MPC SYSTEMs. The LCO specifies sufficient locations for taking dose rate measurements to ensure the dose rates measured are indicative of the effectiveness of the shielding material.
APPLICABILITY	The CONCRETE CASK average surface dose rates apply during LOADING OPERATIONS. These limits ensure that the CONCRETE CASK average surface dose rates during TRANSPORT OPERATIONS, STORAGE OPERATIONS, and UNLOADING OPERATIONS are bounded by the shielding safety analyses. Radiation doses during STORAGE OPERATIONS are monitored by the NAC-MPC SYSTEM user in accordance with the plant-specific radiation protection program required by 10 CFR 72.212(b)(6).
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each loaded CONCRETE CASK. This is acceptable, since the Required

Actions for each Condition provide appropriate compensatory measures for each CONCRETE CASK not meeting the LCO. Subsequent NAC-MPC SYSTEMs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the CONCRETE CASK average surface dose rates are not within limits, it could be an indication that a fuel assembly was inadvertently loaded into the CANISTER that did not meet the Functional and Operating Limits in Section 2.1. Administrative verification of the CANISTER fuel loading, by means such as review of video recordings and records of the loaded fuel assembly serial numbers, can establish whether a misloaded fuel assembly is the cause of the out-of-limit condition. The Completion time is based on the time required to perform such a verification.

A.2

If the CONCRETE CASK average surface dose rates are not within limits and it is determined that the CONCRETE CASK was loaded with the correct fuel assemblies, an analysis may be performed. This analysis will determine if the CONCRETE CASK, once located at the ISFSI, would result in the ISFSI offsite or occupational calculated doses exceeding regulatory limits in 10 CFR Part 20 or 10 CFR Part 72. If it is determined that the out of limit average surface dose rates do not result in an the regulatory limits being exceeded, TRANSPORT OPERATIONS may proceed.

B.1

If it is verified that the fuel was misloaded and the ISFSI offsite radiation protection requirements of 10 CFR Part 20 or 10 CFR Part 72 will not be met with the CONCRETE CASK average surface dose rates above the LCO limit, the fuel assemblies must be placed in a safe condition in the spent fuel pool. The Completion Time is reasonable based on the time required to transfer the CANISTER to the TRANSFER CASK, remove the structural lid and vent and drain port cover welds, perform fuel cooldown operations, cut the shield lid weld, move the TRANSFER CASK and CANISTER into the spent fuel pool, remove the shield lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1

This SR ensures that the CONCRETE CASK average surface dose rates are within the LCO limits prior to transporting the NAC-MPC SYSTEM to the ISFSI. The surface dose rates are measured approximately at the locations indicated on Figure 3-1, following standard industry practices for determining average surface dose rates for large containers.

REFERENCES

1. 10 CFR Parts 20 and 72.
2. SAR Sections 5.1 and 8.1.

3.2 NAC-MPC SYSTEM Radiation Protection

3.2.2 CANISTER Surface Contamination

BASES

BACKGROUND

A TRANSFER CASK containing an empty CANISTER is immersed in the spent fuel pool in order to load the spent fuel assemblies. The external surfaces of the CANISTER are maintained clean by the application of clean water to the annulus of the TRANSFER CASK. However, there is potential for the surface of the CANISTER to become contaminated with the radioactive material in the spent fuel pool water. This contamination is removed prior to moving the CONCRETE CASK containing the CANISTER to the ISFSI in order to minimize the radioactive contamination to personnel or the environment. This allows the ISFSI to be entered without additional radiological controls to prevent the spread of contamination and reduces personnel dose, due to the spread of loose contamination or airborne contamination. This is consistent with ALARA practices.

APPLICABLE SAFETY ANALYSIS

The radiation protection measures implemented at the ISFSI are based on the assumption that the exterior surfaces of the CANISTER have been decontaminated. Failure to decontaminate the surfaces of the CANISTER could lead to higher-than-projected occupational dose and potential site contamination.

LCO

Removable surface contamination on the CANISTER exterior surfaces is limited to 1000 dpm/100 cm^2 from beta and gamma sources and 20 dpm/100 cm^2 from alpha sources. These limits are taken from the guidance in IE Circular 81-07 (Ref. 2) and are based on the minimum level of activity that can be routinely detected under a surface contamination control program using direct survey methods. Only loose contamination is controlled, as fixed contamination will not result from the CANISTER loading process. Experience has shown that these limits are low enough to prevent the spread of contamination to clean areas and are significantly less than the levels, which would cause significant personnel skin dose.

LCO 3.2.2 requires removable contamination to be within the specified limits for the accessible exterior surfaces of the CANISTER. The location and number of CANISTER surface swipes used to verify compliance with this LCO are determined based on standard industry practice and the user's plant-specific contamination measurement program for objects of this size. Accessible portions of the CANISTER are the upper portion of the CANISTER external shell wall accessible after draining of the TRANSFER CASK annulus and the structural lid. The user shall determine a reasonable number and location of swipes for the accessible portion of the CANISTER. The objective is to determine a removable contamination value representative of the entire upper circumference of the CANISTER and the structural lid, while implementing sound ALARA practices.

Verification swipes and measurements of removable surface contamination levels on the inside surfaces of the TRANSFER CASK shall be performed following transfer of the CANISTER to the CONCRETE CASK. These measurements will provide indirect evidence that the inaccessible surfaces of the CANISTER do not have removable contamination levels exceeding the limit.

APPLICABILITY

Verification that the CANISTER accessible surface contamination is less than the LCO limit is performed during LOADING OPERATIONS. This occurs before TRANSPORT OPERATIONS and STORAGE OPERATIONS. Measurement of the CANISTER surface contamination is unnecessary during UNLOADING OPERATIONS as surface contamination would have been measured prior to moving the subject CANISTER to the ISFSI.

ACTIONS

A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each CANISTER. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the removable surface contamination of the CANISTER that has been loaded with spent fuel is not within the LCO limits, action must be initiated to decontaminate the CANISTER and bring the removable surface contamination within limits. The Completion Time of "Prior to TRANSPORT OPERATIONS" is appropriate, given that the time needed to complete the decontamination is indeterminate and surface contamination does not affect the safe storage of the spent fuel assemblies. The heat-up of the CANISTER and stored spent fuel, and the allowable time in the TRANSFER CASK shall be controlled by LCO 3.1.6.

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1

This SR verifies that the removable surface contamination on the accessible surface of the CANISTER is less than the limits in the LCO. The Surveillance is performed using smear surveys to detect removable surface contamination. The Frequency requires performing the verification prior to initiating TRANSPORT OPERATIONS in order to confirm that the CANISTER can be moved to the ISFSI without spreading loose contamination.

SR 3.2.2.2

This SR verifies that the removable surface contamination on the interior surfaces of the TRANSFER CASK is less than the limits, thereby providing indirect confirmation that the removable surface contamination on the inaccessible surfaces of the CANISTER are within the limits. It also confirms that the proper functioning of the annulus clean water fill system. The Surveillance is performed using smear surveys to detect removable surface contamination. The Frequency requires performing the verification prior to TRANSPORT OPERATIONS .

REFERENCES

1. SAR Section 8.1.
2. NRC IE Circular 81-07.

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