

February 17, 2005

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Attn: Document Control Desk

Subject: Submittal of Revised Technical Specifications in Support of the Review of
Proposed Amendment No. 4 to the NAC-UMS Universal Storage System
(TAC No. L23760)

Docket No. 72-1015

- Reference:
1. Model No. NAC-UMS, Certificate of Compliance No. 1015, Amendment No. 3, U.S. Nuclear Regulatory Commission (NRC), March 31, 2004
 2. Request for an Amendment of Certificate of Compliance (CoC) No. 1015 for the NAC-UMS® Universal Storage System to Incorporate Changes to the Technical Specifications, NAC International, August 10, 2004
 3. Updated Final Safety Analysis Report for the UMS Universal Storage System, Revision 4, NAC International, November 19, 2004
 4. Request for Additional Information for the Review of Proposed Amendment No. 4 to the NAC-UMS® Universal Storage System, U.S. Nuclear Regulatory Commission, November 22, 2004
 5. Submittal of NAC International Responses to the U.S. Nuclear Regulatory Commission Request for Additional Information for the Review of Proposed Amendment No. 4 to the NAC-UMS Universal Storage System, NAC International, December 23, 2004
 6. Conference Calls on February 3, 9 and 14, 2005, NRC and NAC

In accordance with agreements reached during the Reference 6 conference calls, which addressed NRC questions on the Reference 5 Request for Additional Information (RAI) responses, NAC International (NAC) herewith submits five copies of the proposed revision of NAC-UMS Technical Specification pages, along with the associated changed pages for the Chapter 8 Operating Procedures and the Chapter 12 Technical Specification Bases in the Final Safety Analysis Report (FSAR) for the NAC-UMS Universal Storage System.

This submittal includes proposed revisions of NAC-UMS Technical Specifications Definitions and Limiting Conditions of Operation (LCO) A3.1.2 and A3.1.6 (Technical Specification Pages A1-4, A3-7, A3-13 and A3-14) and the associated changed pages for the FSAR for the UMS Universal Storage System, which are designated as Revision UMSS-05A. The enclosed FSAR changed pages (UMSS-05A) are to be inserted as replacement, or new additional pages, as applicable, into the Reference 2 amendment request. After replacement/insertion of the changed

UMSS01

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pages provided in this submittal, the current List of Effective Pages, included herein, should be used to ensure that the correct page revisions are included in the compiled amendment request package.

Consistent with NAC administrative practice, all FSAR pages changed in this submittal are uniquely identified as Revision UMSS-05A, and a revision bar marks each change on a page. Text flow changes are not marked with revision bars. Upon final approval, the changed pages will be reformatted, assigned the next appropriate revision number, and incorporated into the next revision of the FSAR.

Also, in accordance with a discussion during the Reference 6 conference calls, NAC notified the NRC that the second note on Step 28, Section 8.1.1, Chapter 8 of the NAC-UMS FSAR, Rev. 4, has been revised via the 10 CFR 72.48 change process to read as follows:

“The total time duration from the completion of draining the water from the canister (Step 28), or from completion of either in-pool or forced air cooling, through completion of dryness verification testing per LCO 3.1.2 (Step 31) and the completion of the helium backfill process per LCO 3.1.3 (Step 34) shall be controlled and monitored in accordance with the surveillance requirements and actions of LCO 3.1.1.”

A For Information Only-copy of the NAC 10 CFR 72.48 Determination No. NAC-04-UMS-56 prepared for the change is included with this submittal.

NAC is also proposing to revise/clarify the definition of OPERABLE on page A1-4 of the NAC-UMS Technical Specifications, consistent with the Reference 6 conference call discussions and the previously noted proposed Technical Specification changes.

Based on the discussions held during the referenced NRC/NAC conference calls, NAC has completed the preparation and submittal of these responses to support the NRC in expediting the issuance of the Proposed Amendment No. 4 to the CoC and the associated Preliminary Safety Evaluation Report. It is requested that the rulemaking process be completed so as to achieve an effective date for the requested amendment not later than June 1, 2005, in order to support the June 2005 NAC-UMS loading campaign at the Arizona Public Service Palo Verde Nuclear Generating Station and the ongoing loading campaign at Duke Energy's McGuire Nuclear Station.

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If you have any comments or questions, please contact me on my direct line at (678) 328-1321.

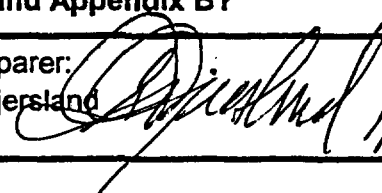
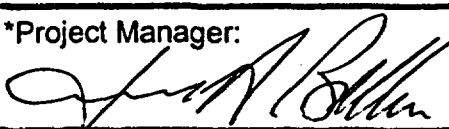
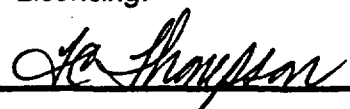
Sincerely,



Thomas C. Thompson
Licensing Specialist
Engineering

Enclosures

cc: John Niles (MY)
Glenn Michael (APS)
Keith Waldrop (Duke)

 NAC INTERNATIONAL	ONLY 10 CFR 72.48 Determination		
	ID No.: NAC-04-UMS-056	Page 1 of 4	Date: 1/5/05
Initiating Document and No.: DCR(L) 790-FSAR-4C		Licensing Basis: UMS FSAR Revision 4 with DCR(L)s approved as of 1/5/05.	
Project/Client: APS		Units Affected: All canisters loaded subsequent to approval date of DCR(L) 790-FSAR-4C	
Brief description of the proposed activity (change/deviation): The proposed changes to Chapter 8, Operating Procedures, Section 8.1.1 and Chapter 12, Appendix 12C, Section C 3.1.1 provide clarifying guidance on the time durations to be monitored and complied with during canister vacuum drying operations. Per the thermal analyses in the FSAR, the canister drying process evolution begins upon completion of canister draining, or end of in-pool or forced air cooling, through performance of the dryness verification per LCO 3.1.2 and the completion of the helium backfill process defined as the final helium pressure adjustment of the canister per LCO 3.1.3. The clarification is intended to assure that users of the UMS system properly implement the time durations and surveillance requirements of LCO 3.1.1, which identify the allowable duration to be through completion of vacuum dryness testing and the "introduction" of helium backfill.			
(1) Screening required? ☐ Yes ☒ No		(2) Evaluation Required? ☐ Yes ☒ No	
(3) Change in CoC, including Appendix A and Appendix B? ☐ Yes ☒ No		(4) NRC Approval Required? ☐ Yes ☒ No	
*Preparer: G. Tjersland  Date: 1/5/05		*Checker:  Date: 01-06-05	
Approvals			
*Project Manager:  Date: 1/6/05		**Licensing:  Date: 01-06-05	
*Vice President, Quality:  Date: 1/6/05			

* Must have received training (either required reading and/or classroom training) on QP 3-8 and should be cognizant of the design and function of the affected components.

**Must have received and satisfactorily completed formal classroom training on the 10 CFR 50.59/10 CFR 72.48 process and must be cognizant of the design and function of the affected components.

 NAC INTERNATIONAL	10 CFR 72.48 Determination		
	ID No.: NAC-04-UMS-056	Page 2 of 4	Date: 1/5/05
APPLICABILITY			

If the activity meets any of the applicability criteria below, a 10 CFR 72.48 screening is not required. The preparer should check the appropriate box(es) and proceed to Document Control Actions.

☒ The document change is editorial or administrative in nature.

Explain: The editorial clarifications do not introduce any new requirements, revise any operational steps or sequences, and do not change any of the safety analyses or methodologies in the approved FSAR. They provide users of the UMS system additional specificity to meet the current CoC, including Appendix A Technical Specifications and Appendix B Approved Contents and Design Features.

☐ An approved 10 CFR 72.48 Determination covering all aspects of this subject already exists.

Reference:

☐ The change brings the facility or cask system into conformance with licensing documents.

Explain:

☐ The change, in its entirety, has been approved by the NRC.

Reference:

☐ The change clarifies inconsistencies in the document, but does not change the meaning or substance of information presented.

Explain:

☐ The change makes minor corrections to drawings—e.g., correcting mislabeled components to resolve an inconsistency with other FSAR information (text, table or other drawing)—or a correction to information on the drawing that is incidental, not material, to the FSAR description related to the drawing.

Explain:

If no boxes above are applicable, a 10 CFR 72.48 Screening is required, and the preparer should check the following box ☐, then proceed to Screening. In either case, the appropriate box on page 1 should be checked.

 NAC INTERNATIONAL	10 CFR 72.48 Determination		
	ID No.: NAC-04-UMS-056	Page 3 of 4	Date: 1/5/05
DOCUMENT CONTROL ACTIONS			

- (1) Does this action cause any general revisions to tables, figures, drawings, etc., or render any wording in the FSAR wording incorrect or obsolete?

☒ Yes ☐ No

If yes, identify the general revisions to tables, figures, drawings, FSAR wording, etc. Specific changes will be identified on NAC Design Change Requests for licensing documents (DCR(L)s).

Provide the description of the revision to tables, figures, drawings, FSAR wording, etc., just as it is stated in the initiating DCR(L).

1. Revise Chapter 8 Operating, Section 8.1.1 procedures to revise the "Note" following Step 28 as follows: "The total time duration from the completion of draining the water from the canister (Step 28), or from completion of either in-pool or forced air cooling, through completion of dryness verification testing per LCO 3.1.2 (Step 31) and the completion of the helium backfill process per LCO 3.1.3 (Step 34) shall be controlled and monitored in accordance with the surveillance requirements and actions of LCO 3.1.1."
2. Revise Chapter 12, Appendix 12C, Section C 3.1.1, APPLICABLE SAFETY ANALYSIS, second paragraph to read as follows: "Analyses reported in the Safety Analysis Report...applied. Analyses show that the fuel cladding and CANISTER component temperatures are below the allowable temperatures for the time durations specified from the completion of CANISTER draining, or from the end of in-pool or forced air cooling, through the completion of vacuum drying, dryness verification testing per LCO 3.1.2 and the helium backfill process per LCO 3.1.3⁽¹⁾. Following completion of helium backfill, the fuel cladding and CANISTER temperatures are also maintained within allowable limits for the time(s) specified in LCO 3.1.4 for the helium filled CANISTER in the TRANSFER CASK through the completion of the transfer of the CANISTER to the CONCRETE CASK."
3. Revise Chapter 12, Appendix 12C, Section C 3.1.1, LCO, to read as follows: "Limiting the length of time for vacuum drying operations through completion of the helium backfill operations for the CANISTER ensures that the spent fuel cladding and CANISTER material temperatures remain below the short-term temperature limits for the NAC-UMS SYSTEM."
4. Revise Chapter 12, Appendix 12C, Section C 3.1.1, APPLICABILITY, to read as follows: "The elapsed time restrictions for vacuum drying operations on a loaded CANISTER apply during LOADING OPERATIONS from the completion of CANISTER draining operations through completion of dryness verification testing per LCO 3.1.2 and the completion of the helium backfill process per LCO 3.1.3⁽¹⁾. LCO 3.1.1 is not applicable to TRANSPORT OPERATIONS or STORAGE OPERATIONS."

DOCUMENT CONTROL ACTIONS (cont'd)
Description of requested changes (cont'd)

5. Revise Chapter 12, Appendix 12C, Section C 3.1.1, SURVEILLANCE REQUIREMENTS, SR 3.1.1.1, to read as follows: "The elapsed time shall be monitored from completion of CANISTER draining through completion of the vacuum dryness verification testing per LCO 3.1.2 and completion of the helium backfill process per LCO 3.1.3⁽¹⁾. Monitoring the elapsed time ensures that if the drying process is not completed in the prescribed time, the CANISTER can be backfilled with helium, and in-pool or forced air cooling operations initiated in a timely manner during LOADING OPERATIONS to prevent the fuel cladding and CANISTER materials from exceeding short-term temperature limits."
6. Revise Chapter 12, Appendix 12C, Section C 3.1.1, SURVEILLANCE REQUIREMENTS, SR 3.1.1.2, to read as follows: "The elapsed time shall be monitored from the end of in-pool or forced air cooling of the CANISTER through completion of vacuum dryness verification testing per LCO 3.1.2 and the completion of the helium backfill process per LCO 3.1.3⁽¹⁾. Monitoring the elapsed time ensures that if the drying process is not completed in the prescribed time, the CANISTER can be backfilled with helium and in-pool or forced air cooling initiated in a timely manner during LOADING OPERATIONS to prevent the fuel cladding and CANISTER materials from exceeding short-term temperature limits."
7. Revise Chapter 12, Appendix 12C, Section C 3.1.1, to add a Note following REFERENCES to read: "Note: ⁽¹⁾ LCO 3.1.1, SR 3.1.1.1 and SR 3.1.1.2 specify time limitations and monitoring requirements for the allowable duration(s) from completion of draining of the CANISTER, or from the completion of in-pool or forced air cooling of the CANISTER, through completion of vacuum drying testing and the "introduction" of helium. Clarifications have been added to the Bases of LCO 3.1.1 to highlight that the introduction and start of helium backfill defines the system configuration that is established following completion of final helium pressure adjustment of the CANISTER as specified in LCO 3.1.3."

- (2) If (1) above is answered "no," is this a component-specific deviation (e.g. NCR) from the FSAR wording or drawing that does not require an FSAR update?

☐ Yes ☐ No

Proceed to fill out and sign the cover page.

UMS Tech Specs – Appendix A

NAC-UMS® SYSTEM

NAC-UMS® SYSTEM includes the components approved for loading and storage of spent fuel assemblies at the ISFSI. The NAC-UMS® SYSTEM consists of a CONCRETE CASK, a TRANSFER CASK, and a CANISTER.

OPERABLE

An OPERABLE CONCRETE CASK heat removal system transfers sufficient heat away from the fuel assemblies such that the fuel cladding and CANISTER component temperatures do not exceed applicable limits. The CONCRETE CASK heat removal system is considered OPERABLE if the difference between the ISFSI ambient temperature and the average outlet air temperature is $\leq 102^{\circ}\text{F}$ for the PWR canister or $\leq 92^{\circ}\text{F}$ for the BWR canister, or if all four air inlet and outlet screens are visually verified to be unobstructed. Failing this, a CONCRETE CASK heat removal system may be declared OPERABLE if an engineering evaluation determines the CONCRETE CASK has adequate heat transfer capabilities to assure continued spent fuel and CANISTER integrity.

SITE SPECIFIC FUEL

Spent fuel configurations that are unique to a site or reactor due to the addition of other components or reconfiguration of the fuel assembly at the site. It includes fuel assemblies, which hold nonfuel-bearing components, such as a control element assembly, a burnable poison rod insert, a solid stainless steel rod insert, an in-core instrument thimble or a flow mixer, or which are modified as required by expediency in reactor operations, research and development or testing. Modification may consist of individual fuel rod removal, fuel rod replacement of similar or dissimilar material or enrichment, the installation, removal or replacement of burnable poison rods or solid stainless steel rods, or containerizing damaged fuel.

Site specific fuel includes irradiated fuel assemblies designed with variable enrichments and/or axial blankets, fuel that is consolidated and fuel that exceeds design basis fuel parameters.

(continued)

CANISTER Vacuum Drying Pressure
A 3.1.2

A 3.1 NAC-UMS® SYSTEM Integrity
A 3.1.2 CANISTER Vacuum Drying Pressure

LCO 3.1.2 The CANISTER vacuum drying pressure, ≤ 10 mm of mercury (Hg), shall be held for a minimum of 10 minutes with the vacuum pump isolated and turned off, with the pressure remaining ≤ 10 mm of Hg during the 10-minute period.

APPLICABILITY: During LOADING OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each NAC-UMS® 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-UMS® SYSTEM	5 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	Verify CANISTER cavity vacuum drying pressure is within limits	Prior to TRANSPORT OPERATIONS.

CONCRETE CASK Heat Removal System
A 3.1.6

A 3.1 NAC-UMS® SYSTEM
A 3.1.6 CONCRETE CASK Heat Removal System

LCO 3.1.6 The CONCRETE CASK Heat Removal System shall be OPERABLE.

APPLICABILITY: During STORAGE OPERATIONS

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each NAC-UMS® SYSTEM.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met	A.1 Ensure adequate heat removal to prevent exceeding short-term temperature limits	Immediately
	<u>AND</u> A.2 Verify fuel loading meets CoC approved contents requirements	7 days
	<u>AND</u> A.3 Restore CONCRETE CASK Heat Removal System to OPERABLE status	25 days
B. Required Actions A.1, A.2 or A.3 and associated Completion Times not met	B.1 Perform an engineering evaluation to determine that the CONCRETE CASK Heat Removal System is OPERABLE	5 days
	<u>OR</u> B.2 Place the NAC-UMS SYSTEM in a safe condition	5 days

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.6.1 Verify the difference between the ISFSI ambient temperature and the average outlet air temperature is $\leq 102^{\circ}\text{F}$ for the PWR canister or $\leq 92^{\circ}\text{F}$ for the BWR canister <u>OR</u>	24 hours
Visually verify all four air inlet and outlet screens are unobstructed	24 hours
SR 3.1.6.2 Verify the difference between the ISFSI ambient temperature and the average outlet air temperature is $\leq 102^{\circ}\text{F}$ for the PWR canister or $\leq 92^{\circ}\text{F}$ for the BWR canister	Once between 5 and 30 days after STORAGE OPERATIONS begin

UMS[®] FSAR Changed Pages

February 2005

Revision UMSS-05A

NAC-UMS

Universal MPC System

FINAL SAFETY ANALYSIS REPORT

for the UMS Universal Storage System

Docket No. 72-1015



Atlanta Corporate Headquarters: 3930 East Jones Bridge Road, Norcross, Georgia 30092 USA
Phone 770-447-1144, Fax 770-447-1797, www.nacintl.com

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Chapter 8

<u>Heat Load (kW)</u>	<u>Canister Water Temperature (°F)</u>	<u>Time to Start Temperature Measurement (hrs)</u>
$20 < L \leq 23$	180	18
$17.6 < L \leq 20$	180	21
$14 < L \leq 17.6$	180	25
$11 < L \leq 14$	170	28
$8 < L \leq 11$	160	33
$L \leq 8$	150	38

Note: As an alternative, some sites may choose to perform welding operations for closure of the canister in a cask loading pit with water around the canister (below the trunnions) and in the annulus. This alternative provides additional shielding during the closure operation. If this alternative is implemented, the start time for compliance with Table 8.1.1-3 limits, as defined in Step 12, begins when the top of the canister is above the pool water surface (i.e., no longer fully submerged).

13. As the cask is raised, spray the transfer cask outer surface with clean water to wash off any gross contamination.
14. When the transfer cask is clear of the pool surface, but still over the pool, turn off the clean water flow to the annulus, remove hoses and allow the annulus water to drain to the pool. Move the transfer 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 and centered.
16. Attach the suction pump to the suction pump fitting on the vent port. Operate the suction pump to remove free water from the shield lid surface. Disconnect the suction pump and suction pump fitting. Remove any free standing water from the shield lid surface and from the vent and drain ports.
17. 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.
18. Insert the drain tube assembly with a female quick-disconnect attached through the drain port of the shield lid into the basket drain tube sleeve. Remove the female quick-disconnect. Torque the drain tube assembly by hand until metal-to-metal contact is achieved; then torque to 135 ± 15 ft-lbs for Furon metal seals or 115 ± 5 ft-lbs for elastomer seals (EPDM or Viton). Install a quick-disconnect in the vent port.

19. Connect the suction pump to the drain port. Verify that the vent port is open. Remove approximately 70 gallons of water from the canister. Disconnect and remove the pump.

Caution: Radiation level may increase as water is removed from the canister.

20. Install the automatic welding equipment, including the supplemental shield plate.
21. 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%, connect and operate the vacuum system to remove gases from the underside of the shield lid and re-verify the hydrogen gas concentration. Disconnect and remove vacuum system.

22. Operate the welding equipment to complete the root weld joining the shield lid to the canister shell following approved procedures. Remove the hydrogen detector from the vent tube. Leave the connector and vent tube installed to vent the canister.
23. Examine the root weld using liquid penetrant and record the results.
24. Complete welding of the shield lid to the canister shell.
25. Liquid penetrant examine the final weld surface and record the results.
26. Attach a regulated air, nitrogen or helium supply line to the vent port. Install a fitting on the drain port. Pressurize the canister to 35 psia and hold the pressure. There must be no loss of pressure for a minimum of 10 minutes.

27. Release the pressure.

Note: As an option, an informational helium leak test may be conducted at this point using the following steps (the record leak test is performed at Step 49).

- 27a. Evacuate and backfill the canister with helium having a minimum purity of 99.9% to a pressure of 18.0 psia.
- 27b. Using a helium leak detector ("sniffer" detector) with a test sensitivity of 5×10^{-5} cm³/sec (helium), survey the weld joining the shield lid and canister shell.
- 27c. At the completion of the survey, vent the canister helium pressure to one atmosphere (0 psig).

28. Drain the canister.

Drain the remaining water from the canister cavity (typically, the process ranges from 1 to 2 hours). Draining of the canister may be performed by suction, by a blow-down gas pressure of 15-18 psig, or by a combination of suction and a blow-down gas pressure of 15-18 psig. After removal of the water from the canister, disconnect the equipment from the canister. Note the time that the last free water is removed from the canister cavity. If not already installed, install a quick-disconnect to the open vent port.

Caution: Radiation levels at the top and sides of the transfer cask will rise as water is removed.

Note: If the canister draining operation is interrupted or only partially completed, the canister shall be refilled with water prior to start of the auxiliary cooling operations (i.e., forced air or in-pool cooling), per the Note following Step 12.

Note: The time duration from completion of draining the canister through completion of LCO A 3.1.3 (Step 34) shall be monitored in accordance with LCO A 3.1.1.

29. Attach the vacuum equipment to the vent and drain ports. Dry any free standing water in the vent and drain port recesses.
30. Operate the vacuum equipment until a vacuum of ≤ 10 mm of mercury exists in the canister, isolate the vacuum pump and turn the pump off.
31. Verify that no water remains in the canister by holding the vacuum of ≤ 10 mm of mercury for a minimum of 10 minutes. If water is present in the cavity, the pressure will rise as the water vaporizes. Continue the vacuum/hold cycle until the conditions of LCO A 3.1.2 are met.

Precaution: If the spent fuel pool water temperature for canisters vacuum dried in the pool, or the cask preparation area ambient temperature for canisters vacuum dried outside the pool is below 65°F, the vacuum drying of the canister shall be extended below the standard pressure value of ≤ 10 mm Hg until a cavity pressure of ≤ 5 mm Hg is achieved. The dryness verification shall be performed and meet the acceptance criteria as specified in LCO A 3.1.2, but limiting any pressure rise during the 10-minute hold period to ≤ 5 mm Hg.

32. Evacuate the cavity until a vacuum of ≤ 3 mm of mercury exists and backfill the canister cavity with helium having a minimum purity of 99.9% to a pressure of one atmosphere (0 psig).
33. Restart the vacuum equipment and operate until a vacuum of 3 mm of mercury exists in the canister.
34. Backfill the canister with helium having a minimum purity of 99.9% to a pressure of one atmosphere (0 psig).

Note: Canister helium backfill pressure must conform to the requirements of LCO A 3.1.3.

Note: Monitor the time from this step (completion of helium backfill) until completion of canister transfer into and closure of the concrete cask in accordance with LCO A 3.1.4.

35. Disconnect the vacuum and helium supply lines from the vent and drain ports. Dry any residual water that may be present in the vent and drain port cavities.
36. Install the vent and drain port covers.
37. Complete the root pass weld of the drain port cover to the shield lid.

Note: If the drain port cover weld is completed in a single pass, the weld final surface is liquid penetrant inspected in accordance with Step 40.

38. Prepare the weld and perform a liquid penetrant examination of the root pass. Record the results.
39. Complete welding of the drain port cover to the shield lid.
40. Prepare the weld and perform a liquid penetrant examination of the drain port cover weld final pass. Record the results.
41. Complete the root pass weld of the vent port cover to the shield lid.
Note: If the drain port cover weld is completed in a single pass, the weld final surface is liquid penetrant inspected in accordance with Step 44.
42. Prepare the weld and perform a liquid penetrant examination of the root pass. Record the results.
43. Complete welding of the vent port cover to the shield lid.
44. Prepare the weld and perform a liquid penetrant examination of the weld final surface. Record the results.
45. Remove the welding machine and any supplemental shielding used during shield lid closure activities.
46. Install the helium leak test fixture.
47. Attach the vacuum line and leak detector to the leak test fixture fitting.
48. Operate the vacuum system to establish a vacuum in the leak test fixture.
49. Operate the helium leak detector to verify that there is no indication of a helium leak exceeding 2×10^{-7} cm³/second, at a minimum test sensitivity of 1×10^{-7} cm³/second helium, in accordance with the requirements of LCO 3.1.5.
50. Release the vacuum and disconnect the vacuum and leak detector lines from the fixture.
51. Remove the leak test fixture.
52. Attach a three-legged sling to the structural lid using the swivel hoist rings.
Caution: Ensure that the hoist rings are fully seated against the structural lid. Torque the hoist rings in accordance with Table 8.1.1-2. Verify that the spacer ring is in place on the structural lid.
Note: Verify that the structural lid is stamped or otherwise marked to provide traceability of the canister contents.
53. Using the cask handling crane or the auxiliary hook, install the structural lid in the top of the canister. Verify that the structural lid is flush with, or protrudes slightly above, the canister shell. Verify that the gap in the spacer ring is not aligned with the shield lid alignment key. Remove the hoist rings.
54. Install the automatic welding equipment on the structural lid including the supplemental shield plate.
55. Operate the welding equipment to complete the root weld joining the structural lid to the canister shell.

Chapter 12

CANISTER Vacuum Drying Pressure
C 3.1.2

C 3.1 NAC-UMS® SYSTEM Integrity

C 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 Approved Contents 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 weld is examined, pressure tested, and leak tested. The water is drained from the CANISTER, and CANISTER cavity vacuum drying is performed. The CANISTER cavity is then backfilled with helium. 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, the CONCRETE CASK is then moved to the ISFSI. Average CONCRETE CASK dose rates are measured at the ISFSI pad.

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 from the CANISTER and backfilling the cavity with helium. The thermal analysis assumes that the CANISTER cavity is dried and filled with helium.

(continued)

CANISTER Vacuum Drying Pressure
C 3.1.2

APPLICABLE
SAFETY ANALYSIS
(continued)

The heat-up of the CANISTER and contents will occur during CANISTER vacuum drying, but is controlled by LCO 3.1.1. Dryness of the CANISTER (e.g., no free water) is verified by holding a vacuum of ≤ 10 mm Hg for a period of not less than 10 minutes. The vapor pressure of water at 70°F is approximately 20 mm Hg. Selecting a pressure that is 1/2 of the vapor pressure at 70°F ensures that all of the free water in the CANISTER is removed without excursion to a low vacuum condition that could lead to icing. The actual temperature in the loaded CANISTER is expected to be above 70°F, which would result in a higher vapor pressure. Consequently, the vacuum pressure of 10 mm Hg is conservatively selected. Holding the vacuum pressure of ≤ 10 mm of mercury for 10 minutes, with the CANISTER isolated from the vacuum pump and the pump turned off, demonstrates that there is no free water in the CANISTER, since the presence of any significant free water would result in the vacuum pressure increasing in a short period of time to the vapor pressure corresponding to the average temperature of the CANISTER and contents.

LCO

A vacuum pressure of ≤ 10 mm of mercury, as specified in this LCO, indicates that liquid water has been vaporized and removed from the CANISTER cavity. Removing water from the CANISTER cavity helps to ensure the long-term maintenance of fuel cladding integrity.

APPLICABILITY

Cavity vacuum drying is performed during LOADING OPERATIONS before the TRANSFER CASK holding the CANISTER is moved to transfer the CANISTER into 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.

(continued)

CONCRETE CASK Heat Removal System
C 3.1.6

LCO (continued)	Operability of the heat removal system ensures that the decay heat generated by the stored fuel assemblies is transferred to the environment at a sufficient rate to maintain fuel cladding and CANISTER component temperatures within design limits.
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APPLICABILITY	The LCO is applicable during STORAGE OPERATIONS. Once a CONCRETE CASK containing a CANISTER loaded with spent fuel has been placed in storage, the heat removal system must be OPERABLE to ensure adequate heat transfer of the decay heat away from the fuel assemblies.
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ACTIONS	A note has been added to ACTIONS that states for this LCO, separate Condition entry is allowed for each 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 CONCRETE CASKs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.
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A.1

If the CONCRETE CASK heat removal system has been determined to not be OPERABLE, it must be restored to an analyzed safe status immediately, with adequate heat removal capability. Immediately, defined as the required action is to be pursued without delay and in a controlled manner, provides a reasonable period of time (typically, one operating shift) to take action to remove the obstructions in the air flow path.

In order to meet A.1, adequate heat removal capability must be verified to exist, either by visual observation of at least two unobstructed air inlet and outlet screens or by physically clearing any blockage from two air inlet and outlet screens, to prevent exceeding the short-term temperature limits.

Thermal analysis of a fully blocked CONCRETE CASK shows that without adequate heat removal, the fuel cladding accident temperature limit could be exceeded over time. As a result, requiring immediate verification of adequate heat removal capability will ensure that the CONCRETE CASK and CANISTER components and the fuel cladding do not exceed their short-term temperature limits.

The thermal analysis also shows that complete blockage of two air inlet and outlet screens results in no potential for exceeding accident fuel cladding, CONCRETE CASK or CANISTER component temperature limits. As a result, verifying that there are at least two unobstructed

(continued)

CONCRETE CASK Heat Removal System
C 3.1.6

ACTIONS
(continued)

air inlet and outlet screens will ensure that the accident temperature limits are not exceeded during the time that the remainder of the air inlet and outlet screens are returned to OPERABLE status.

AND

A.2

In addition to Required Action A.1, the fuel loading per the Approved Contents condition of the CoC is verified.

The Completion Time for this Required Action of 7 days will ensure that the CANISTER remains in a safe, analyzed condition.

AND

A.3

In addition to Required Actions A.1 and A.2 that ensure the adequate heat removal capability and verify the fuel loading, restoring the CONCRETE CASK Heat Removal System to OPERABLE is not an immediate concern. Therefore, restoring it within 25 days is considered a reasonable period of time.

B.1

If the Required Actions A.1, A.2 or A.3 cannot be met, an engineering evaluation is performed to verify that the CONCRETE CASK heat removal system is OPERABLE.

The Completion Time for this Required Action of 5 days will ensure that the CANISTER remains in a safe, analyzed condition.

OR

B.2

Place the affected NAC-UMS SYSTEM in a safe condition.

The Completion Time for this Required Action is 5 days. Requiring B.2 action completion within 5 days will ensure that the NAC-UMS SYSTEM is maintained in a safe condition.

(continued)