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May 1, 2002

U.S. Nuclear Regulatory Commission
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Attn: Document Control Desk

Subject: Alternatives to Codes and Standards for the NAC-UMS[®] Universal Storage System
 (Docket No. 72-1015)

- References:
1. Certificate of Compliance (CoC) for the NAC-UMS[®] Universal Storage System, Certificate No. 1015, Amendment No. 2, Effective Date: 12/31/01, U.S. Nuclear Regulatory Commission (NRC), January 23, 2002
 2. Final Safety Analysis Report for the NAC-UMS[®] Universal Storage System, Amendment 2, NAC International (NAC), January 9, 2002
 3. Code Case N-595-2, Requirements for Spent Fuel Storage Canisters, ASME Boiler and Pressure Vessel Code, Section III, Division 1, approved December 8, 2000

In accordance with the provisions of Section B 3.3.2 of Appendix B of the NAC-UMS[®] System Certificate of Compliance (CoC), NAC International (NAC) requests the U.S. Nuclear Regulatory Commission (NRC) approval of several revised alternatives to the ASME Code for the design and fabrication of the components of the NAC-UMS[®] System. This request is based on NAC's detailed reviews of the NAC-UMS[®] design and fabrication documents, on actual fabrication experience and on dry run operational lessons learned. The proposed list of Code Alternatives, as revised, is provided as Attachment 1. The revisions to the previously approved Code Alternatives are presented in ~~strikeout~~/*italic* format in the table for clarity (~~strikeout~~ signifies deleted text; *italics* shows added text).

The proposed revisions of the Code Alternatives clarify the implementation of specific Code requirements for the NAC-UMS[®] System. The proposed revisions of the Code Alternatives are applicable to all NAC-UMS[®] Systems. The design, fabrication and operation of the NAC-UMS[®] System components continue to provide acceptable quality and safety levels based on implementation of the proposed Code Alternatives. None of the proposed revisions of the Code Alternatives require significant changes to the license drawings or the Final Safety Analysis Report (FSAR); only administrative/editorial changes are proposed.

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The proposed revised Alternatives to the ASME Code for the design and fabrication of the components of the NAC-UMS[®] System are:

- FSAR Page 12B3-2, Section B 3.3.1 and Section B 3.3.2: change the word “Exceptions” to “Alternatives” in a total of 5 places. BASIS: Corrects the terminology to be consistent with ISG-10 and the SRP (NUREG-1536).
- FSAR Pages 12B3-3 through 12B3-6: change the word “Exceptions” to “Alternatives” in the title of Table 12B3-1, change the first line of the sub-heading to “ASME Code Alternatives” (was “Design Features”) and change the second line of the sub-heading to “Table 12B3-1.” BASIS: Corrects the terminology to be consistent with ISG-10 and the SRP (NUREG-1536).
- Table 12B3-1, Page 12B3-3: in the third (1 place) and fourth (2 places) columns of the fourth row change the word “backing” to “spacer” to eliminate confusion with the ASME Code definition for a “backing ring.” BASIS: The ASME Code definition requires that a “backing ring” be continuous as the base for the associated weld. Since the “ring” that is part of the NAC-UMS[®] structural lid assembly is not continuous (has a gap to permit installation on the structural lid), it cannot properly be called a “backing ring.” However, the “spacer ring” is intended to perform the function for the structural lid to canister shell weld that is similar to that of an ASME Code “backing ring.”
- Table 12B3-1, Page 12B3-3: in the fourth column of the fifth row add the following sentence, “If the weld is completed in a single weld-pass, only a final surface liquid penetrant examination is performed.” BASIS: For a single weld-pass, the final weld surface is the only one available for examination.
- Table 12B3-1, Page 12B3-4: in the fourth column change the third sentence to read, “...root and final layers and each approximately ½ -inch of weld depth, i.e. ≤ 0.5 inch.” BASIS: ASME Code Case N-595-2 (Reference 3) defines a progressive PT (or MT) examination - i.e. root, mid and final pass weld surfaces - of the structural lid to canister closure weld as an acceptable alternative to ASME Code Section III, Subsection NB-5320, which requires RT examination. For the approximately 1.12-inch depth of the structural lid to canister closure weld, the proposed criteria exceeds the Code Case requirement. Very conservative critical flaw size analyses for the structural lid to canister closure weld that are presented in NAC-UMS[®] FSAR Section 11.2.14 for accident conditions, determine that the critical flaw size is 0.52 inch for a flaw that extends 360 degrees around the circumference of the canister. In accordance with ASME Code Case N-595-2, a stress reduction factor of 0.8 was used in the structural analysis of the structural lid weld. Implementation of this proposed change will

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result in a reduction of the number of PT examinations from 5 to 3 with commensurate savings in operator exposure estimated to be 100 man-mrem per PT (ALARA) and a reduction in total welding and inspection time estimated to be 6 hours per canister.

- Table 12B3-1, Page 12B3-5: in the second sentence in the fourth column of the first row, delete “(air over water)”. BASIS: The pneumatic pressure test may be performed with a gas other than air and the current NAC-UMS[®] users prefer to use nitrogen gas.
- Table 12B3-1, Page 12B3-5: delete the fourth sentence, which requires a PT reexamination
- Table 12B3-1, Page 12B3-5: delete the word “examination” at the end of the fifth sentence, placing the period after PT. Then, insert the following sentence, “If the weld is completed in a single weld-pass, only a final surface liquid penetrant examination is performed.” Add a new paragraph as follows, “If a canister is to be ASME Code N-stamped, the canister is hydrostatically tested in accordance with the requirements of ASME Code Subsection NB-6220 and Code Case N-595-2 following fabrication of the canister, insertion of the basket and welding of the lid support ring, and prior to fuel loading. The post-loading pressure test is also performed. ASME Code Case N-595-2, Requirements for Spent Fuel Storage Canisters Section III, Division 1, is invoked for all ASME Code N-stamped canister components and assemblies. BASIS: For a single weld-pass, the final weld surface is the only one available for examination. ASME Code Case N-595-2 defines the approved Code requirements for spent fuel storage canisters.

Approval of these Code Alternatives is necessary to support the upcoming fuel loading campaign at the Maine Yankee site, which is scheduled to begin in mid-June 2002. Therefore, we respectfully request review and approval of these proposed Code Alternatives by June 15, 2002.

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

Sincerely,



Thomas C. Thompson
Director, Licensing
Engineering Design Services

ATTACHMENT 1

B 3.3.1 ~~Exceptions~~ Alternatives to Codes, Standards, and Criteria

Table 12B3-1 lists ~~exceptions~~ *alternatives* to the ASME Code for the design of the NAC-UMS® SYSTEM.

B 3.3.2 Construction/Fabrication ~~Exceptions~~ Alternatives to Codes, Standards, and Criteria

Proposed alternatives to ASME Code, Section III, 1995 Edition with Addenda, through 1995, including ~~exceptions~~ *alternatives* listed in Specification B 3.3.1, may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The request for such alternatives should demonstrate that:

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

Requests for ~~exceptions~~ *alternatives* shall be submitted in accordance with 10 CFR 72.4.

~~Design Features~~ ASME Code Alternatives
B-3.0 Table 12B3-1

Table 12B3-1 List of ASME Code ~~Exceptions~~ Alternatives for the NAC-UMS® SYSTEM

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	NB-2000	Requirements to be supplied by ASME-approved material supplier.	Materials will be supplied by NAC-approved suppliers with Certified Material Test Reports (CMTRs) in accordance to NB-2000 requirements.
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-spacer ring.	Structural lid to CANISTER shell weld uses a backing-spacer ring that is not removed. The backing-spacer ring permits completion of the groove weld; it is not considered in any analyses; and 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 ASME Code, Section III, NB-5350. <i>If the weld pass is completed in a single weld-pass, only a final surface liquid penetrant examination is performed.</i>

~~Design Features~~ ASME Code Alternatives
B-3.0 Table 12B3-1

Table 12B3-1 List of ASME Code ~~Exceptions~~ Alternatives for the NAC-UMS® SYSTEM
(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 must include the root and final layers and each approximately 3/8 inch of weld depth, <i>i.e.</i> , ≤ 0.5 inch. 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 Code, 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-5332 (UT) per 1997 Addenda, and NB-5350 for (PT).

~~Design Features~~ ASME Code Alternatives
~~B-3.0~~ Table 12B3-1

Table 12B3-1 List of ASME Code ~~Exceptions~~ Alternatives for the NAC-UMS® SYSTEM
(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.	<p>The CANISTER shield lid to shell weld is performed in the field following fuel assembly loading. The CANISTER 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 also leak tested to the leak-tight criteria of ANSI N14.5. The vent port and drain port cover welds are examined by root and final PT examination. <i>If the weld is completed in a single weld-pass, only a final surface liquid penetrant examination is performed.</i> The structural lid enclosure weld is examined by progressive PT or UT and final surface PT.</p> <p><i>If a canister is to be ASME Code N-stamped, the canister is hydrostatically tested in accordance with the requirements of ASME Code Subsection NB-6220 and Code Case N-595-2 following fabrication of the canister, insertion of the basket and welding of the lid support ring, and prior to fuel loading. The post-loading pressure test is also performed. ASME Code Case N-595-2, Requirements for Spent Fuel Storage Canisters Section III, Division 1, is invoked for all ASME Code N-stamped canister components and assemblies.</i></p>

~~Design Features~~ ASME Code Alternatives
B-3.0 Table 12B3-1

Table 12B3-1 List of ASME Code ~~Exceptions~~ Alternatives for the NAC-UMS® SYSTEM
(continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
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.
CANISTER Vessel	NB-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-UMS® 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-2000	Requires materials to be supplied by ASME approved material supplier.	Materials to be supplied by NAC-approved suppliers with CMTRs in accordance with NG-2000 requirements.
CANISTER Basket Assembly	NG-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-UMS® 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 accordance with NAC's approved QA program.
CANISTER Vessel and Basket Assembly Material	NB-2130/ NG-2130	States requirements for certification of material organizations and materials to NCA-3861 and NCA-3862, respectively.	The NAC-UMS® CANISTER and Basket Assembly component materials are procured in accordance with the specifications for materials in ASME Code Section II with Certified Material Test Reports. The component materials will be obtained from NAC approved Suppliers in accordance with NAC's approved QA program.