71-9225

NAC INTERNATIONAL

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March 30, 2005

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

Attn: Document Control Desk

Subject: Submittal of a Request for an Amendment of Certificate of Compliance (CoC) No. 9225 for the NAC-LWT Cask to Incorporate Optional Dunnage in the TPBAR Consolidation Canister for Shipments of Fewer than 300 TPBARs

Docket No. 71-9225

Reference:
1. Model No. NAC-LWT Package, CoC No. 9225, Revision 38, U.S. Nuclear Regulatory Commission (NRC), January 25, 2005
2. Safety Analysis Report (SAR) for the NAC Legal Weight Truck Cask, Revision 36, NAC International, December 2004

NAC International (NAC) herewith submits a request for approval of an amendment to Reference 1 to incorporate optional dunnage in the TPBAR consolidation canister containing fewer than 300 TPBARs. Dunnage, in the form of stainless steel protective hardware of various geometries, may be utilized in TPBAR consolidation canisters to protect the individual TPBARs during transit. The total volume and weight of the reduced contents and dunnage in the canister are maintained less than, or equal to, the weight and volume of the 300 TPBARs currently authorized.

Since the total weight and volume of the contents of the TPBAR consolidation canister are unchanged, the reduced number of TPBARs and the replacement volume and weight of the dunnage have no effect on the currently approved contents.

The effect of adding dunnage under the above conditions has been reviewed relative to the structural, thermal, containment, shielding and criticality evaluations contained in Reference 2. It has been determined there is no impact on the system structural evaluation, since there is no increase in the weight and/or volume of the contents of the consolidation canister. With a reduced heat load (due to a fewer number of TPBARs) and insignificant change of the effective conductivity inside the canister (TPBARs replaced by stainless steel spacers), this configuration will have no adverse effect on the thermal performance of the system.

By limiting the total volume of dunnage and TPBAR payload to that of 300 TPBARs, the pressure evaluations in Chapter 3 of Reference 2 remain valid for the reduced payload with dunnage added. Containment evaluations are based on a leaktight containment boundary, and

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tritium permeation calculations are performed for a payload of 300 TPBARs. A reduced payload will provide both less activity and less tritium to permeate through the cask seals.

The shielding evaluation documented in Chapter 5 of Reference 2 is based on a payload of 300 TPBARs. While reducing the number of TPBARs will serve to decrease self-shielding, there will be a corresponding reduction in source, thereby reducing the calculated dose rates.

Since there is no fissile material in the TPBAR payload, a reduction in the number of rods shipped and added dunnage will not affect cask criticality.

The addition of dunnage to the consolidation canister is described on the LWT-05D changed pages for Reference 2 in Section 1.2.3.6 and Section 7.1.9, which contains the operational procedures for loading TPBARs in the NAC-LWT cask.

In addition, a review of Figure 2.10.14-4 in Reference 2 revealed that sections 1-1 and 4-4 were inadvertently left off the figure. The missing information has been added to the figure and the revised figure is being submitted as part of the attached LWT-05D changed SAR pages. This change only completes the information presented; it does not alter it in any way.

Included are four copies of this transmittal letter and Revision LWT-05D changed pages for Reference 2. The changed SAR pages incorporate the requested amendment. A current List of Effective Pages and revised Master Table of Contents are provided with each copy.

Consistent with NAC administrative practice, this proposed revision is numbered to uniquely identify the applicable changed pages. Revision bars mark the SAR text changes (on Revision LWT-05D pages) that are proposed in this submittal. Upon final approval, the changed pages will be reformatted, assigned the next appropriate revision number, and incorporated into the NAC-LWT SAR.

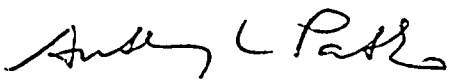
In consideration of the currently ongoing licensing activity on the NAC-LWT cask (PULSTAR Fuel Amendment Request and Screened Can Amendment Request), authorization for the use of optional dunnage in the TPBAR consolidation canister containing fewer than 300 TPBARs is being requested via incorporation into the CoC along with the above two amendment requests.

To incorporate this amendment request, NAC recommends adding the following two sentences to 5.(b)(2)(xiii) of the CoC:

"*Consolidation canisters with fewer than 300 TPBARs may also contain stainless steel spacers of various geometries. Total weight and volume of the reduced TPBAR contents and the spacers must be less than, or equal to, the weight and volume of 300 TPBARs.*"

If you have any comments or questions, please contact me on my direct line at 678-328-1274.

Sincerely,



Anthony L. Patko
Director, Licensing
Engineering

Enclosure

March 2005

Revision LWT-05D

NAC-LWT

Legal Weight Truck Cask System

SAFETY ANALYSIS REPORT

Docket No. 71-9225

NAC INTERNATIONAL

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Chapter 1

1.2.3.6 TPBARs

The NAC-LWT cask is analyzed for shipment of up to 300 TPBARs (of which two can be damaged) with the characteristics listed in Table 1.2-7. TPBARs do not contain any fissile material and are placed loosely into an open top consolidation canister prior to shipment in the NAC-LWT. A typical TPBAR consists of a welded closed Type 316 stainless steel clad rod. An aluminum coating is applied to the steel cladding to prevent tritium diffusion through the cladding. Internal configurations differ for various TPBAR designs (See Section 1.5.1) with all the designs limited to the characteristics specified in Table 1.2-8. The internal components of a typical TPBAR are a plenum spacer tube (getter tube), a spring clip or a plenum (compression) spring, pellet stack assemblies (pencils), and a bottom spacer tube. A pencil consists of a zirconium alloy liner around which are stacked lithium aluminate absorber pellets that are confined in a getter tube, as shown in Figure 1.2-7. A single pencil is typically 9 to 16 inches in length. The Zircaloy getter is nickel plated to prevent oxidation of the Zircaloy-4.

Both the spring clip and the plenum spring function as an axial restraint of the pencil stack during handling or loading operations. The top plenum spacer tube is designed to interface with the spring clip or the plenum spring and the top pencil.

Depleted lithium aluminate spacers may be replaced with nickel-plated zirconium (NPZ) alloy spacer tubes, which also absorb tritium. Using the NPZ alloy spacer tubes eliminates the need for the upper and lower getter discs.

All typical TPBAR components are mechanically compatible with each other.

Up to two damaged prior to loading (prefailed) TPBARs may be transported. Damaged rods are enveloped in the licensing evaluation since rods with cladding damage release helium pressurizing gas prior to shipment. The tritium inventory released from a damaged rod during transport (up to 0.4 moles) is lower than the 0.42 moles helium release evaluated from intact rods. (See Section 1.5.2)

TPBARs are shipped in a stainless steel consolidation canister that is considered part of the payload. The canister configuration is illustrated in Figure 1.2-10. The interface between the cask lid, spacer, TPBAR consolidation canister, and TPBARs is shown in Figure 1.2-9. Proper seating of the spacer over the canister bail is assured by the chamfer in the spacer plate and the use of the guide pins during lid insertion.

For shipments of fewer than 300 TPBARs, stainless steel spacers of various geometries, i.e., dunnage, may be utilized in the consolidation canister in order to protect the individual TPBARs during transport. Total weight and volume of the dunnage and the reduced TPBAR contents of the consolidation canister must be less than, or equal to, the weight and volume of 300 TPBARs.

1.2.3.7 Cladding for PWR/BWR Fuel

The PWR and BWR fuel rod cladding is of Zirconium alloy type (Zircaloy-2, Zircaloy-4, Zirlo, M-5, etc.). Minor variations of alloy composition have no impact on performance of cladding material.

Chapter 2

Figure 2.10.14-4 Location of Sections of the NAC-LWT Cask Body Model

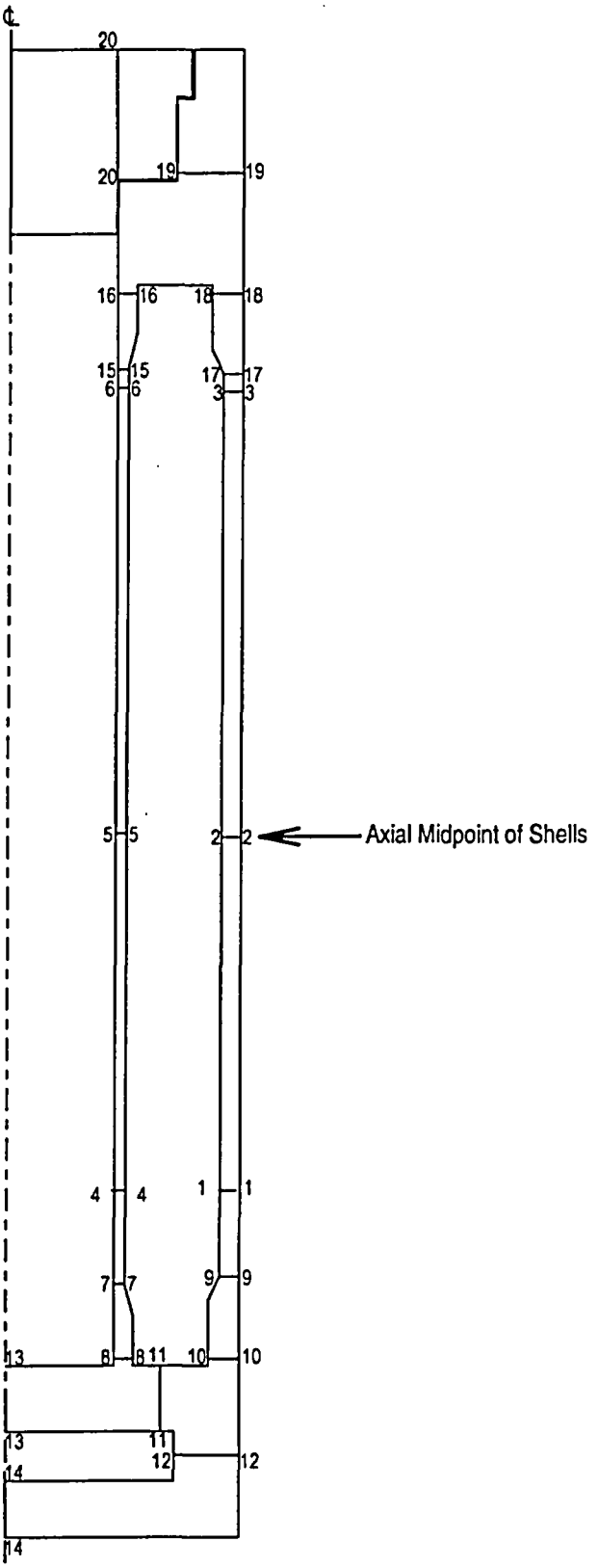

Table 2.10.14-1 Material Designations for Sections

Location	Material	Sections[1]
Outer Shell	SA240 Type XM-19	1-3
Inner Shell	SA240 Type XM-19	4-6
Bottom Forging	SA182 Type 304	7-14
Top Forging	SA182 Type 304	15-19
Lid	SA182 Type 304	20

[1] Sections are shown on Figure 2.10.14-4

Chapter 7

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temperature of 70°F. (If the spent-fuel pool is at a different temperature, reduce the cask pressure to one half the vapor pressure of water at the pool temperature (1/2·p) and hold for a minimum of 15 minutes.) Stop the vacuum pump and monitor the transport canister cavity pressure for at least 10 minutes. If the pressure rise is less than 1/4 p, the transport canister is adequately dried for shipment. If not, perform steps 9 through 11.

11. Secure the vacuum pump and backfill the transport canister cavity with helium to 1 atm.

12. Disconnect the vent line from the transport canister.

13. The sealed transport canister is now ready for shipment and shall be loaded into the NAC-LWT cask in accordance with Section 7.1.1, Procedures for Wet Loading of LWR Fuel.

7.1.9 Procedure for Wet Loading of TPBAR Consolidation Canister into the NAC-LWT Cask

This section describes the procedures for loading the NAC-LWT with a TPBAR consolidation canister. The consolidation canister can contain up to 300 TPBARs, two of which may be damaged. Consolidation canisters filled with a reduced number of TPBARs may also contain internal dunnage (i.e., separator grids, protection tubes, etc.). Total weight and volume of the dunnage and the reduced TPBAR contents of the consolidation canister must be less than, or equal to, the weight and volume of 300 TPBARs. Prior to receipt of the cask at the facility where the TPBARs are to be loaded, it shall be confirmed that the cask is configured for TPBAR transport. The TPBAR transport configuration is shown on Drawing 315-40-128.

1. Perform a receiving survey of the empty cask and inspect for damage. Verify, by cask serial number, that the cask is approved for TPBAR shipment.

2. Position a trailer in the designated area. Set the trailer brakes and block the wheels against movement in either direction, unless site-specific conditions require the trailer to move as the cask is raised or lowered.

3. Remove the roof from the ISO container and open the front and rear ISO doors. Remove roof cross members, if installed.

   Note: Verify that the package type designation in the package identification number on the nameplate displays (U).

4. Perform a Health Physics survey of the cask and adjacent surfaces of the trailer.
   Note: A receiving survey of the cask and transporter must be performed as soon as practical after arrival at the site to assure compliance with 10 CFR 71.87(i), 10 CFR 71.47, and to assure timely reporting of any transportation noncompliance.

5. Remove the top and bottom impact limiters.

6. Remove the cask tiedown strap.

7. Using the cask lifting yoke without the lift yoke arm guides attached, engage the lifting trunnions at the top end of the cask. Raise the cask to a vertical position on the rear cask support moving the crane and/or trailer, as required, to keep the cask engaged in the trailer rear rotation supports. When the cask is vertical, block the trailer wheels and lift the cask from the trailer.

8. Place the cask in the decontamination pit or other designated area. Disengage the lifting yoke. Clean cask surfaces of road dirt as required for entry into the spent fuel pool.

9. Remove the Alternate B vent and drain valve port covers. Replace the metallic seal with an approved spare and inspect the Viton® O-ring seal for each port cover. If the Viton® O-ring shows any damage, replace it. Be certain that the replacement O-rings are properly installed and seated. Store the port covers to protect the seal surfaces. Visually inspect the valved quick disconnect nipples and replace them, if necessary.

10. Remove closure lid bolts in the reverse of the torque sequence stamped on the lid. Attach the lid lift slings to the closure lid. Remove the closure lid and set it on a support that is suitable for radiological control and for maintaining the cleanliness of the closure lid. Carefully inspect the Teflon O-ring seal in the underside of the closure lid. If the O-ring shows any damage, replace it. Remove the metallic O-ring and replace it with an approved spare. Be certain that the replacement O-rings are properly installed and seated. Inspect the lid bolts and replace any that are damaged. Ensure that the TPBAR spacer is installed on the bottom of the cask lid and not damaged when the lid is set down.

11. Visually inspect the inner cavity for foreign material or damage. Install or verify the presence of the standard drain tube and the TPBAR basket assembly.

12. Fill the cask cavity with clean water. Install lift yoke arm guides.

13. Engage the cask lifting yoke with the cask lifting trunnions and pick up the cask. Carefully lower the cask to the bottom of the cask loading area.

14. Disengage the lifting yoke from the cask and remove the yoke from the pool.

15. Identify the TPBAR consolidation canister to be loaded.

16. Pick up the consolidation canister using the required grapple system.

17. Position the container over the cask, then carefully lower it into the cask to avoid damage to the cask sealing surfaces. Orient the canister bail so that it is aligned with the drain tube location. Confirm that the container is fully seated, then release and raise the grapple to the full up position.

18. Position the cask lifting yoke over the cask closure lid. Attach the slings to the closure lid and cask lifting yoke. Lower the yoke over the cask.

19. Position the closure lid over the cask and slowly lower it into place allowing the consolidation canister bail to engage with the TPBAR spacer on the bottom of the lid. Use the cask and lid match marks as guides to properly align the lid. Visually confirm that the closure lid is seated.

20. Lower the cask handling yoke to slack the closure lid cables. Engage the cask lifting trunnions with the yoke and begin lifting.
    Note: At least two persons should verify the yoke engagement before lifting the cask.

21. Raise the cask until the lid is slightly above the surface of the pool, then install and hand tighten each of the 12 closure lid bolts.

22. Raise the cask clear of the pool, rinsing the yoke and cask with clean water.

23. Transfer the cask to the decontamination pit or other work area. Remove the yoke and lid lift slings.

24. Tighten all 12 closure lid bolts to 260 ± 20 ft-lb in three passes, using the torque sequence stamped on the closure lid.

25. Connect a valved clean water line to the drain valve and a valved drain line to the vent valve. Flush the cask with two cask volumes of clean water. Disconnect the water supply line.

26. Connect a gas supply line to the vent valve and the drain line to the drain valve.

27. Open the gas supply valve and pressurize the cask cavity to force out the water. Blow gas through the cask cavity for at least 5 minutes after the last visible traces of water disappear from the drain line. Remove the drain and gas supply lines and attach the vacuum pump to the cask vent valve.

28. Evacuate the cask cavity to one half the vapor pressure of water (p) (≤ 9 mm of mercury) and maintain for at least 15 minutes for a spent-fuel pool temperature of 70°F (If the spent-fuel pool is at a different temperature, reduce the cask pressure to one half the vapor pressure of water at the pool temperature (1/2 p) and hold for at least 15 minutes.).

29. Stop the vacuum pump and monitor the cask cavity pressure for at least 10 minutes. If the pressure rise is less than 1/4 p, the cask is adequately dried for shipment. If not, repeat Steps 28 and 29.

30. Perform the helium mass spectrometer maintenance leakage rate test on the cask lid to leaktight criteria in accordance with the requirements of Section 8.1.3.1, Steps 3 through 10.

31. Install Alternate B vent and drain port covers and torque to 280 ± 10 in-lb; then perform a helium leakage rate test to leaktight criteria in accordance with Section 8.1.3.3.

32. Decontaminate the cask. Survey the cask for surface contamination and radiation dose rates.
    Note: Ensure compliance with 10 CFR 71.87(i) and 10 CFR 71.47.

33. Remove lift yoke arm guides. Then, using the cask lifting yoke, transfer and lower the cask to the rear cask support on the trailer. Engage the trunnion pockets in the bottom end of the cask with the rotation trunnions. Lower the cask to rest on the front tiedown saddle, moving the crane, and/or trailer, as required, to keep the crane cables vertical. Disengage the cask lifting yoke from the cask lifting trunnions and set it aside.

34. Install the cask tiedown strap. Install the cask top and bottom impact limiters.

35. Install a tamper indicating seal on a top attachment point of the top impact limiter.

36. Install roof cross members, close ISO container doors, and replace ISO container roof.

37. Complete a Health Physics survey on the external surface of the package and record the radiological compliance data. Take dose rate measurements at the cask surface, at 1 meter from the cask surface, and at 2 meters from the plane of the transport conveyance. The maximum dose rate at 1 meter from the cask is the transport index (TI). Ensure compliance with 10 CFR 71.87 (i) and observe the following criteria.

- If the dose rate is less than 2 mSv/h (200 mrem/hr) at all accessible points on the external surface of the cask, and the TI is less than 10, the package must meet the requirements of 10 CFR 71.47 (a).

- If the dose rate is greater than 2 mSv/h (200 mrem/hr), but is less than 10 mSv/h (1000 mrem/hr) at any point on the external surface of the package, or the TI is greater than 10, the package must be shipped as "exclusive use" and meet the requirements of 10 CFR 71.47 (b), (c) and (d). If the dose rate and shipping requirements of 10 CFR 71.47 (b), (1), (2), (3) and (4) cannot be met, the package cannot be shipped.

  Note: The requirements of 10 CFR 71.47 (c) and (d) require the shipper to provide the carrier with written instructions for maintenance of the exclusive use shipment. The instructions must be included with the shipping paper information. The instructions must be sufficient so that, when followed, they cause the carrier to avoid actions that unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

- If the dose rate is > 10 mSv/h (1000 mrem/hr) at any point on the external surface of the cask, the cask exceeds the limits of 10 CFR 71.47 and cannot be shipped.

38. Complete the shipping document, carrier instructions (if required), and apply appropriate placards and labels.