

**NON-PROPRIETARY
NAC INTERNATIONAL, INC.
DOCKET NO. 72-1031
CERTIFICATE OF COMPLIANCE NO. 1031
MAGNASTOR AMENDMENT NO. 3 (TAC NO. L24470)**

SECOND REQUEST FOR ADDITIONAL INFORMATION (RAI)

Editorial Comment

In the original submittal, SAR Revision 10B, 10 CFR 72.48 changes were identified using bold italics text. In SAR Revision 11B this same text was replaced with regular text which indicated that the previously identified text was no longer considered 10 CFR 72.48 changes. In addition, new 10 CFR 72.48 changes were introduced in the 11B submittal. Throughout the SAR change bars were removed; text was removed, and in some instances, text was moved to another section in the document and, in other instances, the text was removed completely; then, in the process of moving the text around in the document, orphan sentences were left. These changes made reconciling the two documents, SAR Revisions 10B and 11B, nearly impossible and added complexity to the technical reviewer's ability to make an evaluation finding/safety determination.

Please provide a corrected SAR, as needed.

Complete and accurate information must be provided for staff review, per 10 CFR 72.11.

Confinement Evaluation

Provide documentation on the procedure and/or demonstration of the helium leakage testing or the alternative approach as part of the Acceptance Criteria and Maintenance Program in Chapter 10 of the application. The information to be provided should address inspection and appropriate tests, or other means to ensure the closure lid component(s) of the spent fuel storage cask are free of defects and will reasonably maintain confinement of radioactive material under normal, off-normal and credible accident conditions.

Staff reviewed the RAI response submitted on October 3, 2011. The applicant provided the following reasons why the SAR acceptance test program for the confinement boundary does not specify helium leakage testing of the base metal (plate or forging) of the closure lid either at the shop or in the field:

1. The transportable storage cask (TSC) closure lid utilizes a four to nine inch thick stainless steel plate/forging (SA240/SA336) for the closure lid, procured in accordance with ASME Code Sec. III, NB-2000 requirements, including the test specified in NB-2500 and ultrasonic examination (UT) of the plate/forging. Therefore, the closure lid materials are in full compliance with the regulatory guidance per ISG-15, and
2. NAC utility client's experiences in base material and closure weld helium leakage testing of UMS and NAC-MPC systems indicates that over 250 UMS and NAC-MPC shield lids (5-to-7-inch stainless steel plate/forgings) have been helium leakage tested in accordance with ANSI N14.5-1997 methods using an evacuated envelope test. As a result, the helium leakage testing has been successfully completed without the detection of a single leakage

through the shield lid base material to a minimum leakage test sensitivity of $<1 \times 10^{-7}$ cm³/sec (helium).

MAGNASTOR TSCs have four configurations designated TSC1 through TSC4. TSC1 and TSC2 include a 9-inch thick solid stainless steel closure lid assembly with six 2.35-inch-long lid plugs. TSC3 and TSC4 include a composite closure lid assembly consisting of a 4-inch stainless closure lid defined as the confinement boundary and a 5-inch thick carbon steel shield plate, which is not recognized as the confinement boundary.

Based on the Drawing 584 Sheet 2, the closure lid of TSC3 and TSC4 are joined to the shield plate by 10 bolts which penetrate the entire thickness of the lid. The closure lid of TSC3 and TSC4 is also plugged with six 2.25-inch-long lid plugs which locally reduce the thickness of the lid from 4 inch to 1.75 inch. Because of the differences in material thickness, the UMS and NAC-MPC shield lid (with 5-to-7-inch stainless steel plate/forging) leakage test results are not sufficient to demonstrate that the results from helium leakage testing would be the same for the MAGNASTOR design.

The acceptance criteria for materials which meet the ASME B&PV Code are not designed to prevent the microscopic defects that, if present, would allow the leakage of the helium from the closure lid. In addition to specifying the Code requirements, additional information that the applicant may consider providing for the MAGNASTOR closure lid (from 1.75 to 9.0 inch), could include:

- material characteristics, quality, and microscopic/submicroscopic flaws in SA240/SA336 stainless steel,
- NDE testing or other supporting analysis/testing/examinations,
- previous industry and laboratory experiences,
- lid material/casting processing, fabrication/forging process and forming methods,
- potential fabrication flaws (inclusions, non-uniform concentration, stringers, etc.),
- design features (lid configuration, lid thickness, and etc.),
- prevention of potential leak path caused by entire penetration of bolts and partial penetration of lid-plugs (into the lid),
- mechanisms that will prevent development of leak path,
- consistency of quality of received material (from different suppliers) and quality assurance principles in the QA program (e.g., rejecting base material),
- resistance of lid base material against defects (e.g., lamination, underbead, hydrogen cracking, porosity, etc.) caused by the lid-to-shell welding or improper welding process/technique,
- resistance of lid base material (adjacent to the weld site) to an atmosphere that potentially results in corrosion or fatigue during many years of service, and the initial defect is not detected by initial leakage testing, and
- other supporting evidence in structure configuration and material qualification.

This information is needed to determine compliance with 10 CFR 72.236(j) and 72.236(l).