



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

February 8, 2018

Mr. Wren Fowler
Licensing Manager
NAC International
3930 East Jones Bridge Road, Suite 200
Norcross, GA 30092

**SUBJECT: APPLICATION FOR THE MODEL NO. NAC-STC – REQUEST FOR
ADDITIONAL INFORMATION**

Dear Mr. Fowler:

By application dated March 16, 2017 (see Agencywide Documents Access and Management System (ADAMS) Accession No. ML17079A512), as supplemented on July 17, 2017 (ADAMS Accession No. ML17200C956), and September 21, 2017 (ADAMS Accession No. ML17265A124), NAC International submitted an application for amendment to Certificate of Compliance No. 9235 for the Model No. NAC-STC package.

In connection with our review, we need the information identified in the enclosure to this letter. Additional information requested by this letter should be submitted in the form of revised pages. Please provide your response within 2 months from the date of this letter.

Please reference Docket No. 71-9235 and Enterprise Project Identifier No. L-2017-LLA-0066 (formerly Cost Accounting Code (CAC) No. L25204) in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions, I may be contacted at (301) 415-6577.

Sincerely,

/RA/

Bernard H. White IV, Senior Project Manager
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9235
EPID No. L-2017-LLA-0066

Enclosure:
Request for Additional Information

APPLICATION FOR THE MODEL NO. NAC-STC – REQUEST FOR ADDITIONAL
INFORMATION, DOCUMENT DATE: February 8, 2018

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Distribution: DSFM r/f,

ADAMS Accession No.: ML18039A072

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DATE	1/19/18	1/22/18	1/19/18	1/21/18	1/19/18
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Request for Additional Information
NAC International
Docket No. 71-9235
Certificate of Compliance No. 9235
Model No. NAC-STC Transportation Package

By application dated March 16, 2017 (see Agencywide Documents Access and Management System (ADAMS) Accession No. ML17079A512), as supplemented on July 17, 2017 (ADAMS Package Accession No. ML17200C956), and September 21, 2017 (ADAMS Package Accession No. ML17265A124), NAC International (NAC) submitted an application for amendment of Certificate of Compliance No. 9235, for the Model No. NAC-STC transportation package. This request for additional information identifies information needed by the U.S. Nuclear Regulatory Commission staff in connection with its review of the application. The requested information is listed by chapter number and title in the applicant's safety analysis report (SAR). The staff used guidance provided in NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," in its review of the application.

Each question describes information needed by the staff for it to complete its review of the application and to determine whether the applicant has demonstrated compliance with regulatory requirements.

1.0 General Information

1. Clarify callout to Note 2 in Drawing No. 423-870 Sheet 1 of 1 Revision 7 in Zone E1. Note 2 was deleted from the drawing but the callout "SEE NOTE 2" remains in the revised drawing.

This information is needed to determine compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 71.31(c).

2.0 Materials Evaluation

1. Clarify the operating temperatures for ASTM International (ASTM) A276 Type 304 SS which was added to the bill of materials for Item #2 in Drawing No. 423-859, Revision 1, Sheet 1 of 1. Note that ASTM A276 304 SS is not included in American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Section II Part D. Provide mechanical properties over the expected range of operating temperatures if the mechanical properties of this component are necessary at elevated temperatures.

This information is needed to determine compliance with 10 CFR 71.31(c) and 10 CFR 71.33(a)(5).

2. Update the specification for the forged stainless steel (SS). Table 2.3.2-2 identifies Type 304 SS under specification SA-336. The austenitic SS that were formerly listed under SA-336 have been moved to SA-965 in 2008. SA-336 Type 304 SS is called out in Drawing Nos. 423-802 sheet 1 of 7 and 423-804 Sheet 1 of 3.

This information is needed to determine compliance with 10 CFR 71.31(c) and 10 CFR 71.33(a)(5).

Enclosure

3. Revise Tables 2.3.2-2 and 2.3.2-3 footnotes to identify the correct sources of information from the ASME B&PV code. Except for fatigue design tables and figures, the mechanical property tables in Section III Appendix I have been moved to Section II Part D in the 1992 addenda.

This information is needed to determine compliance with 10 CFR 71.31(c) and 10 CFR 71.33(a)(5).

3.0 Thermal Evaluation

1. Provide justification and, if necessary, calculations to show how the thermal analysis in Section 3.4.1.1.1.3, "Radial Neutron Shield," of the application remains bounding for normal conditions of transport and hypothetical accident conditions calculated temperatures considering the change to note 7 on Drawing No. 423-802, Sheet 1.

No justification and calculations were provided to show how the normal conditions of transport and hypothetical accident conditions calculated temperatures remain bounding considering the change, "Alternate pre-bonded thickness of 8mm to 10mm for 304 SS and 6mm to 8mm for copper plates may be used.," to note 7 on Drawing No. 423 802, Sheet 1.

This information is necessary to demonstrate compliance with 10 CFR 71.71 and 10 CFR 71.73.

8.0 Acceptance Tests and Maintenance Program

1. Provide a justification for the position implied in the SAR that a visual inspection of the radial neutron shield shell, described in Sections 8.2.6 and 8.2.7 of the application, would provide the necessary information to detect deterioration of the heat transfer properties of the package. In addition, provide specific acceptance criteria for visual inspections of an NAC-STC packaging, include a demonstration that these criteria are adequate to verify the thermal performance of the packaging.

Sections 8.2.6, "Post-fabrication Thermal Test," and 8.2.7, "Miscellaneous," of the application do not provide a justification that the visual inspection of the radial neutron shield shell will be able to detect conditions that might lead to the deterioration of the heat transfer properties of the package, especially any deterioration of the fins that are internal to the radial neutron shield shell and not visible by inspecting the radial neutron shield shell. A specific acceptance criteria for the visual inspection, e.g. a more specific acceptance criteria than described in Section 8.2.7 of the application, "... any crack, gouge (assume "gouge" is meant), or gross deformation that could indicate damage of the heat transfer fins..." was not provided. Also, it has not been demonstrated that visual inspection is an effective method, with either general or specific acceptance criteria, in order to verify that the thermal performance of the package has not deteriorated.

Table 3.8-4, "Maximum Component Temperatures – Normal Transport Conditions, Maximum Decay Heat, Maximum Ambient Temperature, among Three Configurations – the STC-HBU," of the SAR dated April 11, 2017 (ADAMS Accession No. ML17116A075) shows that the radial neutron shield maximum temperature is 295°F, which is close to

the upper temperature limit for the radial neutron shield of 300°F as indicated in the SAR (Section 3.8.3.2, “Safe Operating Range”).

The heat transfer capabilities of the fabricated packaging will impact the overall thermal performance of the assembled package and in order for components, like the radial neutron shield, to remain below the allowable temperature limit, the package must be in a condition commensurate with its design at all times; therefore, it is important for all inspections to be able to determine if there could be any potential degradation in thermal performance.

This information is necessary to demonstrate compliance with 10 CFR 71.71.

2. Provide a description (in Section 8.2.6 of the application) of how the NAC-STC package will be monitored during handling and transportation operations for the normal conditions of transport described in 10 CFR 71.71(c).

Section 8.2.6, “Post-fabrication Thermal Test,” of the application does not demonstrate how the package will be monitored during handling and transportation operations to ensure compliance with each of the requirements in 10 CFR Part 71.71(c). For example, the heat condition (an ambient temperature of 100°F in still air with solar insolation) could potentially be exceeded during transportation operations, yet without monitoring, this would not be detected. In addition, monitoring of the 10 CFR 71.71(b) initial conditions may be necessary (see RAI 3, below).

This information is necessary to demonstrate compliance with 10 CFR 71.71(c).

3. Address the 10 CFR 71.71(b) initial conditions in Section 8.2.6 of the application and describe action(s) taken if those conditions are exceeded during transport operations.

Section 8.2.6, “Post-fabrication Thermal Test,” of the application describes that a thermal test will be performed on an operational NAC-STC packaging if the conditions or tests of 10 CFR 71.71 are exceeded during transportation operations. Section 8.2.6 of the application does not describe if any action is taken if the initial conditions in 10 CFR 71.71(b) are exceeded (see item 8-2, above to address monitoring of the 10 CFR 71.71(b) initial conditions during handling and transport operations), or describe why not taking any action(s) is justified.

This information is necessary to demonstrate compliance with 10 CFR 71.71(b).

4. Clarify the acceptance criteria for the outer closure lid and the outer bottom plate. The applicant stated: “The outer closure lid and the outer bottom plate will be UT [ultrasonic tested] to demonstrate their soundness as gamma shielding utilizing ASME Section V, Article 23, acceptance criteria. Plate shall be accepted per NB-2530 and forgings will be accepted per NB-2540. Each ASME specification provides requirements for testing equipment, test method, acceptance criteria, material traceability, and supporting documentation. SAR Section 8.1.5.1 has been revised to reflect these requirements.”

ASME B&PV Section V Article 23 is not referenced in Section III NB-2530 or NB-2540. It is only referenced in NB-2585 with respect to the examination of bolts. Note that NB 2532.1 references SA-578 which is included in Section V Article 23

NB-2540 references Section V Article 5. NB-2540 does not reference ASME B&PV Section V Article 23.

It appears that the appropriate examination and acceptance criteria would be as follows: The outer closure lid will be UT examined in accordance with ASME B&PV NB-2542.1 and the acceptance standards of Section NB-2542.2. The outer bottom plate shall be examined in accordance with NB-2532.1 with the acceptance standards of NB-2532.1(b).

This information is needed to determine compliance with 10 CFR 71.31(c) and 10 CFR 71.33(a)(5) and 10 CFR 71.51(a)(2).

5. Clarify the acceptance criteria for UT of the package outer bottom plate and package inner bottom forging welds to the package outer bottom forging. The applicant stated: "The package outer bottom forging will be UT to demonstrate its soundness as a gamma shield utilizing ASME B&PV Section V, Article 23, acceptance criteria. The forging will be accepted per NB-2540." The ASME B&PV specification provides requirements for testing equipment, test method, acceptance criteria, material traceability, and supporting documentation. SAR Section 8.1.5.1 has been revised to add the package outer bottom forging to the UT requirements."

NB-2540 references ASME B&PV Section V, Article 5. NB-2540 does not reference ASME B&PV Section V, Article 23.

This information is needed to determine compliance with 10 CFR 71.31(c).

6. Provide additional clarification for the alternate lead pour procedures.

Section 8.4.2.2 states that during the lead pour the bottom end of the filler-tube is kept below the surface of the molten lead to preclude the formation of voids in the lead. Clarify whether the same practice is necessary for the alternate procedure.

Section 8.4.3.2 states that the body weldment will be heated in a steady, uniform, and controlled manner. Provide the allowable heating rates.

Section 8.4.3.2 states that the temperature of the entire body weldment is maintained between 640°F (338°C) and 740°F (393°C) throughout the lead pour operations, approximately. Provide clarification on what "approximately" is referring to in this context.

Section 8.4.3.3 states that the cooldown rate is held steady, uniform and controlled manner. Provide maximum cooldown rate and the maximum allowable temperature differential between the inner and outer shell.

This information is needed to determine compliance with 10 CFR 71.31(c) and 71.33(a)(5).

7. Clarify acceptable testing methods for the transport impact limiter SS shell. Section 8.1.4.3 states that a leak test of the shell welds shall be performed to verify weld integrity. Three acceptable test methods are included but only the first two are actually leak tests. The third method listed is penetrant testing which is a non-destructive test

method. If penetrant testing is allowed in lieu of an actual leak test, provide the penetrant testing acceptance criteria and explain why the penetrant testing is a suitable method in lieu of a leak test.

This information is needed to determine compliance with 10 CFR 71.31(c).

8. Provide justification for replacing Viton O-rings at least once every 2 years, or revise Section 8.1.4.2 of the SAR to specify a replacement frequency of at least 1 year during transport operations or prior to transport if they have been installed longer than 1 year.

The applicant removed reference to PTFE O-rings in SAR Section 8.1.4.2. Due to this change, the third paragraph in the section now states: "Viton O-rings shall be replaced at least once every two years during cask transport operations, or prior to transport if they have been installed longer than two years." The SAR Section 8.1.4.2 revision 18 from March 2017 stated, "The Viton O-rings shall be replaced at least annually during cask transport operations, or prior to transport if they have been installed longer than one year (i.e., for extended cask out of service periods)." Replacing elastomeric seals at an interval not to exceed one year is consistent with Section 8.3.4.3, "Component Tests," of NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel."

This information is needed to determine compliance with 10 CFR 71.43(f) and 10 CFR 71.51(a).