April 25, 2006

Mr. Anthony Patko
Director, Licensing Engineering
NAC International, Inc.
3930 East Jones Bridge Road, Suite 200
Norcross, GA 30092

SUBJECT: CERTIFICATE OF COMPLIANCE NO. 9235 FOR THE MODEL NO. NAC-STC PACKAGE

Dear Mr. Patko:

As requested by your application dated August 4, 2005, as supplemented on November 1, 2005, and March 1, 2006, enclosed is Certificate of Compliance No. 9235, Revision No. 9, for the Model No. NAC-STC package. Changes made to the enclosed certificate are indicated by vertical lines in the margin. The staff's Safety Evaluation Report is also enclosed.

NAC International, Inc., is registered as the certificate holder for this package. The approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471.

If you have any questions regarding this certificate, please contact me or Mr. Jose R. Cuadrado of my staff at (301) 415-8500.

Sincerely,

/RA/

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9235
TAC No. L23885

Enclosures:
1. Certificate of Compliance No. 9235, Rev. No. 9
2. Safety Evaluation Report

cc: R. Boyle, Department of Transportation
J. Shuler, Department of Energy
RAMCERTS

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SAFETY EVALUATION REPORT

Docket No. 71-9235
Model No. NAC-STC Package
Certificate of Compliance No. 9235
Revision No. 9

SUMMARY

By application dated August 4, 2005, as supplemented on November 1, 2005, and March 1, 2006, NAC International, Inc. (NAC) requested an amendment to Certificate of Compliance No. 9235, for the Model No. NAC-STC package. NAC requested that the package identification number of the package be revised to include the "-96" designation. NAC provided amendment pages and made editorial, administrative, and technical changes throughout the document and drawings.

Based on the statements and representations in the application, as supplemented, and for the reasons stated in this Safety Evaluation Report, the staff agrees that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

1.0 GENERAL INFORMATION

NAC requested an amendment to Certificate of Compliance No. 9235 for its Model No. NAC-STC package to include the designation "-96" in the identification number, as specified in 10 CFR 71.19(e). To support its request for the "-96" designation, NAC provided a table addressing the changes to 10 CFR Part 71 (69 FR 3698), and a discussion of how each change has been addressed. The staff evaluated the applicant's request, as described below.

- Issue 1, Changing Part 71 to the International Systems of Units (SI) only.

  This proposal was not adopted into the final rule, and therefore no changes are needed in the package application or the Certificate of Compliance to conform to the new rule.

- Issue 2, Radionuclide Exemption Values.

  The final rule adopted radionuclide activity concentration values and consignment activity limits in TS-R-1 for the exemption from regulatory requirements for the shipment or carriage of certain radioactive low-level materials. In addition, the final rule adopted an exemption from regulatory requirements for certain natural material and ores containing naturally occurring radionuclides. The applicant indicated that this revision was not applicable to the Model No. NAC-STC package. The staff agrees based on the design purpose of the Model No. NAC-STC package and the allowed contents specified in the certificate. Thus, no changes are needed to conform to the new rule.

- Issue 3, Revision of A_1 and A_2.

  The final rule adopted changes in the A_1 and A_2 values from TS-R-1, with the exception of two radionuclides. The A_1 and A_2 values were modified in TS-R-1 based on refined modeling of possible doses from radionuclides, and the NRC agreed that incorporating the latest in dosimetric modeling would improve transportation regulations. The applicant revised all SAR sections affected by this change to incorporate these new values. As discussed in Section/Chapter 4 of this SER, the revised A_1 and A_2 values do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

- Issue 4, Uranium Hexafluoride (UF_6) Package Requirements.

  The final rule allows uranium hexafluoride packages to be evaluated for criticality safety without considering the in-leakage of water into the containment system provided certain conditions are met, including that the uranium is enriched to not more than 5 weight percent uranium-235. The Model No. NAC-STC package is not authorized for the transport of uranium hexafluoride. Therefore, no changes are needed to conform to the new rule.

- Issue 5, Criticality Safety Index (CSI).

  The final rule adopted the CSI requirement from IAEA Transportation Safety Standards (TS-R-1). The applicant revised Chapters 1, 5, and 6 of the application to incorporate the CSI nomenclature.

- Issue 6, Type C Packages and Low Dispersible Material.

  This proposal was not adopted for the final rule. Thus, no change is needed to conform to the new rule.

- Issue 7, Deep Immersion Test.

  The final rule adopted an extension of the previous version of 10 CFR 71.61 from packages for irradiated fuel to any Type B package containing activity greater than 10^5 A_2. The Model No. NAC-STC package is a Type B(U)-85 package and had been previously shown to meet the deep immersion requirements of 10 CFR 71.61. The extension of this requirement to any package containing an activity higher than 10^5 A_2 does not exclude or prevent the NAC-STC package from meeting this requirement. Therefore, no changes are needed to conform to the new rule.

- Issue 8, Grandfathering Previously Approved Packages.

  The final rule adopted a process for allowing continued use, for specific periods of time, of previously approved packaging designs without demonstrating compliance to the final rule. In accordance with 10 CFR 71.19(e), the applicant submitted this information demonstrating compliance with the final rule. Thus, grandfathering of the Model No. NAC-STC package is not necessary.

- Issue 9, Changes to Various Definitions.

  The final rule adopted several revised and new definitions. These changes were adopted to provide clarity to Part 71. A definition of “Criticality Safety Index” (CSI) has been added and “Criticality Safety Index” has been substituted for “Transportation Index for nuclear criticality control” throughout the application.

- Issue 10, Crush Test for Fissile Material Packages.

  The revised 10 CFR 71.73 expanded the applicability of the crush test to fissile material packages. The crush test is required for packages with a mass not greater than 500 kilograms (1100 pounds). The mass of the Model No. NAC-STC package (260,000 pounds) is greater than 500 kilograms. Therefore, the requirement to perform a crush test is not applicable to the Model No. NAC-STC package.

- Issue 11, Fissile Material Package Design for Transport by Aircraft.

  The final rule adopted a new section, Section 71.55(f), which addresses packaging design requirements for packages transporting fissile material by air. The applicant stated that this new rule is not applicable to the Model No. NAC-STC package. Therefore, the staff has revised the Certificate of Compliance to specify that air transport is not authorized.

- Issue 12, Special Package Authorizations.

  The final rule adopted provisions for special package authorization that will apply only in limited circumstances and only to one-time shipments of large components. This provision is not applicable to the Model No. NAC-STC package. Thus, no change is necessary to conform to the new rule.

- Issue 13, Expansion of Part 71 Quality Assurance (QA) Requirements to Certificate Holders.

  The final rule expanded the scope of Part 71 to apply to any person holding or applying for a Certificate of Compliance. QA requirements apply to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of components of packaging that are important to safety. The applicant has a QA program meeting the requirements, as required for the Certificate Holder. The QA program has been approved by the NRC. Therefore, no change is necessary to conform to the new rule.

- Issue 14, Adoption of the American Society of Mechanical Engineers (ASME) code.

  This proposal was not adopted for the final rule. Thus, no change is needed to conform to the new rule.

- Issue 15, Change Authority for Dual-Purpose Package Certificate Holders.

  This proposal was not adopted for the final rule. Thus, no change is needed to conform to the new rule.

- Issue 16, Fissile Material Exemptions and General License Provisions.

  The final rule adopted various revisions to the fissile material exemptions and the general license provisions in Part 71 to facilitate effective and efficient regulations of the transport of small quantities of fissile material. The criticality safety of the NAC-STC package does not rely on limiting fissile materials to exempt or generally licensed quantities. Chapter 6 of the application demonstrates criticality safety of the package with the authorized fissile contents. Therefore, no change is necessary to conform to the new rule.

- Issue 17, Double Containment of Plutonium.

  The final rule removed the requirement that packages with plutonium in excess of 0.74 TBq (20 Curies) have a second separate inner container. The applicant revised the SAR to remove any text referring to double containment of plutonium for the Model No. NAC-STC package.

- Issue 18, Contamination Limits as Applied to Spent Fuel and High Level Waste Packages.

  This proposal was not adopted for the final rule. Thus, no change is needed to conform to the new rule.

- Issue 19, Modification of Events Reporting Requirements.

  The final rule adopted modified reporting requirements. The applicant indicated that no revisions to the application were required to address this change.

Based on the statements and representations in the application, the staff concluded that the design has been adequately described and meets the requirements of 10 CFR 71.19(e) for a “-96" package designation.

For the CY vacuum drying enhancements, the applicant revised Chapter 1 of the NAC-STC package safety analysis report (SAR) to incorporate the definition of the CY fuel inserts and intact fuel assembly, and the option of inserting solid stainless steel rods into CY intact and damaged fuel assembly reactor control cluster assembly (RCCA) guide tubes not containing RCCAs. As stated by the applicant, the changes are based on the previously approved MPC-03A and MPC-03 amendments, and are, therefore, acceptable.

2.0 STRUCTURAL

Evaluation

Attachment 2 to the August 4, 2005, letter lists the changes and their justifications for the 17 licensing drawings. The staff reviewed these changes and determined that they are generally administrative and editorial in nature in that minor revisions of non-safety related design/fabrication features were incorporated in the drawing updates. However, in Drawings 414-872 and 414-889 for the spent fuel and greater than Class C (GTCC) waste, respectively, the applicant changes the size of the structural lid-to-shell closure weld from 7/8" to 3/4" for the CY multiple purpose canister (CY-MPC). Similarly, the shield lid-to-shell weld is reduced from 1/2" to 3/8". To evaluate effects of the weld size changes on structural performance, the applicant used new weld dimensions in a finite element re-analysis of the canister. As reported in the revised stress summary tables, all calculated stresses remain to be below the allowables for the normal conditions of transport and hypothetical accident conditions.

In Drawings 423-800, 802, 803, 807, and 875 for the NAC-STC cask assembly, port cover assembly, and neutron absorber material, the applicant changed the material specifications on various parts and components (e.g., plug, relief valve, recess tubing, etc.). The applicant changed some components from ASTM/ASME specification to commercial, changed some to a different category within the same code, such as Parker designation, others from SS-304 to SS-316, and non-metallic O-ring materials to PTFE (polytetrafluoroethylene). Another example is changing the material of the stainless steel drain tube from ASTM code to commercial. In Drawing 423-811, the neutron shielding material is changed to solid synthetic polymer, NS-4-FR containing 0.6 wt.% B_4C. The staff reviewed these changes and determined that they are acceptable.

Conclusion

On the basis of the review above, the staff concludes that the changes requested do not affect the ability of the Model No. NAC-STC package to meet the requirements of 10 CFR Part 71.

3.0 THERMAL

The applicant's proposed change to allow the insertion of solid stainless steel rods into Connecticut Yankee intact and damaged fuel assembly RCCA guide tubes that do not contain an RCCA for spent fuel assemblies in the NAC-STC will have essentially no effect on the thermal performance of the cask. The applicant demonstrated that there would be no significant thermal impact from the insertion of as many as 20 rods into all fuel assemblies for any given cask loading. The assemblies that have stainless steel rods inserted in RCCA guide tubes are still bounded by the same parameters as the Approved Contents outlined in the original application (SAR, Revision 15, March 2004). The applicant has provided assurances in the SAR that the thermal models utilized in the original application bound the thermal response of Connecticut Yankee fuel with stainless steel rods inserted. Therefore all original thermal calculations and results apply.

The staff reviewed the applicant's evaluation and agrees with the conclusion that there are essentially no thermal effects from the addition of stainless steel rods to the Connecticut

Yankee fuel. The staff finds that the package meets the requirements of 10 CFR Part 71 for thermal performance.

4.0 CONTAINMENT

The applicant revised the containment analysis to calculate a new allowable leakage rate for the Model No. NAC-STC configuration with Viton O-rings, for use when the package is directly loaded for transport without interim storage. All other package configurations will continue to be tested according to the "leak-tight" definition of ANSI N14.5-1997, "Leakage Tests on Packages for Shipment."

The revised allowable leakage rate calculation was necessary to incorporate updated A_2 values in the latest revision of 10 CFR Part 71. None of the allowable contents changed, and the bounding assumptions used in the revised analysis are identical to those of the previously approved analysis. The resulting allowable leakage rate calculated for direct loading of the NAC-STC with Viton O-rings is 7.5×10^{-5} ref cm^3/sec, which corresponds to 9.3×10^{-5} cm^3/sec (helium).

The applicant has shown and the staff agrees that the Model No. NAC-STC, with the changes discussed above and in the SAR, continues to meet the containment requirements of 10 CFR Part 71.51(a).

5.0 SHIELDING

The applicant did not submit a revised shielding analysis for the changes requested in their amendment request. Changes to the shielding section of the SAR focused on removing all references to IAEA Safety Standard Series No. ST-1. The changes to the SAR also corrected the Transport Index from 20 to 21 in one location that is consistent with the previously approved revision. These changes were editorial in nature and do not affect the safety of the NAC-STC package.

The applicant also requested an addition to the contents of the NAC-STC cask system. This would allow the option of placing unirradiated stainless steel rods into the RCCA guide tubes for both intact and damaged fuel assemblies. The addition of these rods would tend to provide additional shielding in the lower regions of the cask and are therefore bounded by the previously approved analysis.

The staff reviewed the proposed changes and concluded that they do not affect the ability of the NAC-STC cask system to meet the radiation protection requirements of 10 CFR Part 71.

6.0 CRITICALITY

The applicant did not submit a revised criticality safety analysis for the changes requested in their amendment request. Changes to the criticality safety section of the SAR focused on removing all references to IAEA Safety Series No. 6. The changes to the SAR also changed the term, "nuclear criticality control transport index" to "Criticality Safety Index (CSI)" in several locations of the Criticality Safety section to comply with the requirements of 10 CFR 71.59.

These changes were editorial in nature and do not affect the criticality safety of the NAC-STC package.

The applicant also requested an addition to the contents of the NAC-STC cask system. This would allow the option of placing unirradiated stainless steel rods into the RCCA guide tubes for both intact and damaged fuel assemblies. A revised criticality safety analysis is unnecessary since the addition of these rods would be to reduce the effective multiplication factor due to both the water displacement and the additional neutron absorption from the added stainless steel rods and are therefore bounded by the previously approved analysis.

The staff reviewed the proposed changes and concluded that they do not affect the ability of the NAC-STC cask system to meet the criticality safety requirements of 10 CFR Part 71.

7.0 OPERATING PROCEDURES

The applicant revised the Operating Procedures for the Model No. NAC-STC package to change the vacuum drying procedure employed prior to sealing directly loaded fuel in the package for transport. This procedure was modified to increase the vacuum drying pressure from 3 mbar to 4 mbar. The applicant also revised the Operating Procedures to restrict the use of air during bulk water removal and cask drying operations.

The applicant also changed the Operating Procedures to incorporate the revised Viton O-ring leakage rate testing values for directly loaded fuel. These values were calculated in Section 4 of the SAR and confirmed by NRC staff as discussed in Section 4.0 of this SER.

The staff agrees that neither of these changes will significantly affect the ability of the Model No. NAC-STC package to meet the requirements of 10 CFR Part 71.

CONDITIONS

The following conditions in CoC No. 9235, Revision No. 9, have been revised as follows:

– Item No. 3(a) of the certificate was revised to correct the certificate holder's address.

– Item No. 3(b) of the certificate was revised to reference the supplements to the application.

– Condition No. 5(a)(3) of the certificate was revised to reference the updated packaging drawings.

– Condition No. 5(b)(1)(iii) of the certificate was revised to remove the reference to the fissile exemption limits of the previous version of 10 CFR Part 71.

– Condition No. 5(b)(1)(iv) of the certificate was revised to include stainless steel rods inside reactor control cluster assemblies (RCCA) guide tubes as authorized contents.

- Condition No. 5(c) was revised to replace the wording “Minimum criticality safety index to be shown on label for nuclear criticality control” with “Criticality Safety Index (CSI),” as defined in 10 CFR 71.4.

- Conditions 9(a) and (b) were revised to remove references to previous revisions of the NAC-STC SAR, which have been incorporated into the consolidated application.

- Condition No. 12 of the certificate was added to specify that air transport is not authorized.

- Condition No. 13 of the certificate allows a package to be marked with the previous package identification number, USA/9235/B(U)F-85 until April 30, 2007. This condition allows time to replace the packaging nameplate that shows the revised package identification number, USA/9235/B(U)F-96.

- Condition No. 14 of the certificate authorizes use of the previous revision of the certificate for a period of approximately one year.

- Condition No. 15 of the certificate was changed to clarify that the package is approved for use under the general license provisions of 10 CFR 71.17. This change is due to a revision in the numbering of the sections in 10 CFR Part 71, that became effective on October 1, 2004.

CONCLUSION

Based upon the staff’s review, the statements and representations in the application, as supplemented, for the reasons stated in this Safety Evaluation Report, and with the conditions listed above, we conclude that these changes will not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9235, Revision No. 9,
on April 25, 2006 .