

**Unresolved Issues Related to  
the Request to Revise the Certificate of Compliance for  
the Model No. NAC-STC  
dated November 26, 2013**

**Public Version**

**1. APPLICANTS' PROPOSED LICENSING APPROACH**

NAC International Inc. (NAC or the applicant) proposed to directly transport uncanistered high-burnup fuel from the pool in the Model No. NAC-STC (referred in the application as STC-HBU) package. The applicant's proposed licensing approach relies on demonstrating that the cladding will maintain its structural integrity for the directly-loaded transport configuration.

**2. SUMMARY OF UNRESOLVED ISSUES**

The staff found unacceptable the methodology and corresponding justification proposed for evaluating directly-loaded uncanistered high-burnup fuel as authorized contents for the Model No. NAC-STC (NAC-STC). The staff recognizes that the issues related to the evaluation of high-burnup fuel are interdisciplinary. The majority of the issues are related to the materials evaluation and thermal evaluation. The following is a brief summary of the main issues associated with this review:

a. Thermal Evaluation

- i. The applicant needs to demonstrate that the codes used for the temperature calculations, especially for the lower bound temperatures, provide accurate predictions of the cladding temperatures during transport.
- ii. To assure adequate fuel cladding performance during transport, the applicant must predict realistic maximum and minimum fuel cladding temperatures.

b. Materials Evaluation

- i. The applicant does not adequately justify that the mechanical properties of the cladding for peak temperatures up to the proposed transition are unaffected. Given the approach proposed by the applicant for evaluating the safe transport of high-burnup fuel, the applicant needs to provide technical information to demonstrate that there would be no significant degradation of the cladding ductility (for all cladding alloys in the proposed content).

ii. The applicant has not adequately addressed the uncertainty of the data provided for justifying the proposed approach.

c. Criticality

If the applicant decides to change its approach and assume that the fuel would fail and reconfigure, the applicant would need to provide a package-specific criticality safety analysis to evaluate the criticality effects of fuel reconfiguration. Analyses used to demonstrate the margins in the analysis for which credit is taken to offset the effects of reconfiguration (e.g., burnup credit) should be adequately described and include the necessary rigor for the analysis's purpose (e.g., as a defense-in-depth or as a licensing basis).

d. Shielding

If the applicant decides to revise its approach and assume that the fuel would fail and reconfigure, the applicant would need to provide a reconfiguration analysis as referenced in U.S. Nuclear Regulatory Commission's (NRC's) draft Regulatory Issue Summary 2015-XX, "Considerations in Licensing High-burnup Spent Fuel in Dry Storage and Transportation." (ADAMS Accession Number: ML14175A203)

e. Containment

The applicant needs to revise information related to the feasibility of the containment boundary elastomeric O-rings to provide and be leak tested to the leaktight criterion. This information includes: closure bolt performance, the permeation rate of helium over the O-ring(s) predicted temperature range(s) and associated references, and how the test item will be thoroughly dried. Alternatively, metallic seals that can be tested to the leaktight criterion have been approved for the Model No. NAC-STC.