October 31, 2008

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE CERTIFICATE OF COMPLIANCE NO. 9225, REVISION FOR THE MODEL NO. NAC-LWT PACKAGE

Dear Mr. Patko:

By letter dated August 12, 2008, as supplemented May 16 and August 11, 13, and 27, 2008, NAC International submitted an amendment request to the U.S. Nuclear Regulatory Commission for Certificate of Compliance No. 9225. You requested modification of the contents for the ANSTO research reactor fuel as authorized contents for this 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 Safety Analysis Report pages. To assist us in scheduling staff review of your response, we request that you provide this information by November 14, 2008. If you are unable to provide a response by that date, our review may be delayed.

Please reference Docket No. 71-9225 and TAC No. L24181 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions regarding this matter, I may be contacted at (301) 492-3339.

Sincerely,

/RA/

Kimberly J. Hardin, Senior Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9225
TAC No. L24181

Enclosure: Request for Additional Information

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

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Docket No. 71-9225
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Enclosure: Request for Additional Information
Distribution: CStaab ZLi JPiotter EThompson
Filename: G:\SFST\Hardin\NAC-LWT\71-9225 Rev 50 RAI.doc

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Request for Additional Information
NAC International
Docket No. 71-9225
Certificate of Compliance No. 9225
Model No. NAC-LWT Package

By letter dated August 12, 2008, as supplemented May 16 and August 11, 13, and 27, 2008, NAC International (the applicant) requested an amendment to Certificate of Compliance (CoC) No. 9225 for the Model No. NAC-LWT package. The applicant requested modification of the contents for the ANSTO research reactor fuel as authorized contents for this package. The existing Safety Analysis Report (SAR) and NAC License Drawings were revised to reflect inclusion of these additional contents.

This request for additional information (RAI) 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 SAR. NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," was used by the staff in its review of the application.

Each individual RAI 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.

Chapter 1 General Information Review

1-1 Provide a definition for degraded DIDO, spiral, and MOATA. The definition should include the maximum fuel meat exposure allowed and explain its difference from damaged fuel.

Three of the four requests are for transport of degraded fuel, but "degraded fuel" is never defined.

This information is needed to meet 10 CFR 71.55(d), 10 CFR 71.43(d,f), and 10 CFR 71.33(b)(3).

1-2 Provide calculations that show that the fuel elements (plates) will not creep under the maximum normal temperature for transport in air 338° F.

Creep deformation may affect the shielding and criticality calculations. It may also prevent the fuel from being removed from the basket after transport.

This information is needed to meet 10 CFR 71.55(d), 10 CFR 71.43(f), 10 CFR 71.47(a), and 10 CFR 71.33(a)(5)(ii).

Chapter 3 Thermal Review

3-1 Explain and justify how the degraded condition of the fuel affects is structural integrity and the likelihood of the degraded fuel to reconfigure by compaction within the damaged fuel container (DFC) during normal conditions of transport (NCT) and hypothetical accident conditions (HAC). Also, explain any resulting effect on the thermal evaluation.

This information is needed to meet 10 CFR 71.33, 10 CFR 71.71, and 10 CFR 71.73.

3-2 Explain and justify in the SAR the assumption of limiting the decay heat to 1W per fuel assembly for the disassembled MOATA plates loaded into a DFC and the assumption that this configuration is bounded by the current limit of 3W for intact MOATA fuel (plates separated). Also, describe any resulting impact on maximum calculated temperatures from this contact, as well as, the impact of adjacent heat loads of 15.7W or 18W per assembly, for ANSTO or DIDO fuel, respectively.

The original MOATA thermal analysis was performed by modeling intact fuel with fuel plate separation. This proposed shipping configuration allows for plate contact. It isn't apparent, even though the heat load is reduced from 3W to 1W, that this approach is conservative, especially for the fuel cladding temperature. Also, consideration of the heat load from the adjacent module that has either a 15.7W or 18W limit, which exceeds the original MOATA analysis fuel heat limit of 3W, makes this approach non-conservative and isn't considered by the 2-D analysis.

This information is needed to meet 10 CFR 71.7, 10 CFR 71.33, 10 CFR 71.35, and 10 CFR 71.71.

3-3 Remove the second sentence in the last paragraph on page 3.4-31 which reads: "Therefore, the analysis of the ANSTO basket components presented in Section 3.4.1.14 bounds the MOATA fuel in the DFC in the ANSTO-DIDO combination basket," since analysis of ANSTO basket components doesn't seem to be applicable to the MOATA fuel.

This information is needed to meet 10 CFR 71.7 and 10 CFR 71.71.

3-4 Clarify Section 3.4.1.15.6:

(a) to explain the difference between the DIDO fuel discussed herein (with a heat load limit of 18W) and Section 3.4.1.15.1 DIDO fuel (with a heat load limit of 10W),

(b) to add a clarification that this section applies only to intact fuel, and

(c) to remove reference to a DIDO "lower" heat load limit rather than just referring to it as just a DIDO heat load limit.

This information is needed to meet 10 CFR 71.7 and 10 CFR 71.71.

3-5 Add to each of the six sections in Section 3.4.1.15 the impact of the discussed fuel arrangement on the temperature limits of the important to safety components (e.g., fuel cladding, seals, etc.) and the relative margin of safety that exists.

The current SAR is limited to a discussion of the fuel configurations being bounded by the existing design basis, without any specific reference to estimated temperatures or relative margin of safety.

This information is needed to meet 10 CFR 71.7 and 10 CFR 71.71.

Chapter 4 Containment Review

4-1 Provide a technical basis for the release fractions used in the containment analysis.

- Calculate the retained gas for a one year duration at the maximum fuel temperature. Provide a justification of the diffusion constant used to determine if the 30% value used in the SAR is applicable.

- Provide a calculation of the cladding oxide thickness expected in the reactor, pool, and moist transport cask for the maximum temperature and duration in each location and justify the corrosion rate for the quality of water in each location.

The SAR gives DW Vinson, PS Blanton, RL Sindelar, and NC Iyer, "Bases for Containment Analysis for Transportation of Aluminum-Based Spent Nuclear Fuel," Oct 1998, WSRC-TR-98-00317 as the source of the release fractions. These are the same release fractions that were derived for UO_2 LWR fuel. There is no a priori reason to believe that the release fractions for both types of fuel will be the same, so justification of the use of the release fraction is needed.

The fission gas release fraction is based on a trap-detrap mechanism coupled with diffusion of the gas through the matrix and/or grain boundaries of the fuel. The trap-detrap part of the mechanism is difficult to model and evaluate and was assumed to contribute zero time to the gas release. The diffusion was modeled using the relative gas in a flat plate. A nominal value of 15% release was obtained in the reference (WSRC-TR-98-00317). This value will depend though on the temperature of the plate, duration of the diffusion, and the use of the proper diffusion constant, i.e. bulk, or grain boundary. None of these parameters are given in the reference.

The application should address the spallation of the oxide layer (termed "crud" in the application) that forms when the fuel was in the reactor and storage pool, and subsequently, in a moist atmosphere in the cask. The value of this term should be based on two fuel properties: 1) the thickness of the oxide layer that is formed and 2) the spallation of this oxide layer. The application should also address corrosion which is dependent on the quality of the reactor or pool water, temperature of the fuel exposed in these conditions, and exposure time to these conditions.

This information is needed to meet 10 CFR 71.43(f).

4-2 Reevaluate the leak rate associated with the DIDO fuel in conjunction with the release fractions justified in question 4-1 of this RAI.

The release fractions that were justified based on specific testing performed on behalf of the applicant are under materials review of this application. Any difference between what the applicant proposed and what the staff accepts needs to be reconciled with the containment leakage rate calculations.

This information is needed to meet 10 CFR 71.7 and 10 CFR 71.51.