June 29, 2000

Mr. Thomas C. Thompson, Director
Licensing & Competitive Assessment
NAC International, Inc.
655 Engineering Drive
Norcross, GA 30092

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE UMS UNIVERSAL STORAGE SYSTEM (TAC NO. L22979)

Dear Mr. Thompson:

By application dated July 16, 1999, as supplemented, NAC International, Inc. (NAC) requested approval of an amendment, under the provisions of 10 CFR Part 72, Subpart K, to the proposed Certificate of Compliance for the UMS Universal Storage System. By letter dated June 16, 2000, NAC requested that the Nuclear Regulatory Commission (NRC) continue its review of the Maine Yankee amendment, including NAC's April 18, 2000, revised application to accommodate longer allowable time limits during loading operations. Enclosed is the staff's request for additional information (RAI) for the continued review of the amendment request.

Your full and complete response to the enclosed RAI is necessary for the staff to complete its review. Upon receipt of your RAI responses, we will perform an acceptance review to determine if sufficient information has been provided to allow completion of the review and inform you the NRC's revised schedule to complete the anticipated rulemaking.

If you have any comments or questions concerning this request, you may contact me at (301) 415-8580. Please refer to Docket No. 72-1015 and TAC No. L22979 in future correspondence related to this request.

Sincerely,
/S/
Timothy J. McGinty, Project Manager
Spent Fuel Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1015

Enclosure: RAI on NAC-UMS Storage System

cc: Mr. David C. Jones
Duke Power

Mr. George Zinke
Maine Yankee Atomic Power Company

Mr. Scott Bauer
Arizona Public Service Company

Mr. Paul Bemis
Stone and Webster Eng. & Construction

Mr. Thomas C. Thompson, Director
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NAC UMS UNIVERSAL STORAGE SYSTEM
DOCKET NO. 72-1015
TAC NO. L22979

REQUEST FOR ADDITIONAL INFORMATION

This document titled Request for Additional Information (RAI), contains a compilation of additional information requirements identified to-date by the U.S. Nuclear Regulatory Commission (NRC) staff, during its review of NAC International's revised application for approval of an amendment to the proposed Certificate of Compliance (CoC) for the NAC UMS Universal Storage System (NAC-UMS) under 10 CFR Part 72. This RAI follows the same format as NAC's Safety Analysis Report (SAR).

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

ENCLOSURE

CHAPTER 4 THERMAL

4-1 Establish the design basis in the SAR, for reduced heat loads under transfer conditions (water, vacuum and helium backfill), for spent fuel cladding and components important to safety.

For each reduced heat load category, provide a discussion and graphical representation of the peak cladding and component temperatures as a function of time. Provide tables that summarize the transfer condition, reduced heat load, time duration, and maximum calculated temperatures with respect to the associated component temperature limit. The regulations require that sufficient information be provided in the SAR to support a finding that the design bases are related to the design criteria [10 CFR 72.24(c)(2)] and are satisfied with an adequate margin of safety [10 CFR 72.24(c)(3)].

4-2 Provide a detailed explanation of the administrative and operational controls that assure that the canister loading is within the analyzed constraints of the SAR. The controls discussed should be sufficient to preclude the possibility of a single human error leading to a mis-loading. Alternatively, demonstrate by analysis that fuel cladding and component temperature limits will not be exceeded in the event of mis-loading one 0.958 kW fuel assembly in the worst location.

The staff seeks assurance that the design and operation of the NAC-UMS preserves an adequate margin of safety for the proposed reduced heat load vacuum drying operations. Extensive canister loading options exist for preferential loading, reduced heat loads, and Maine Yankee site-specific fuel. With the reduced heat load option, the population of assemblies which could result in a postulated mis-loading has also increased. Due to the complexity of the various loading options, administrative and operational controls are increasingly relied upon to ensure that a loading pattern outside of the analyzed design basis envelope does not occur. Compared to the design basis heat load, higher component temperatures are reached under vacuum drying conditions, thus the staff is not assured that the temperature limits will not be exceeded if a mis-loading occurs. Section 72.24(d)(2) requires that sufficient information be provided in the SAR to evaluate the adequacy of structures, systems, and components (SSCs) important to safety to mitigate the consequences of accidents, including manmade events.

4-3 Revise Figures 4.4.3-5 and 4.4.3-6 to account for the higher temperatures associated with reduced heat loads.

Since these figures represent the “maximum” temperatures of various components during transfer operations, the higher temperatures associated with the lower heat loads should be represented or noted (See related RAI 4-1). For the PWR curves, the vacuum drying cladding temperature can be significantly higher by 80^0F even though the final temperature is about the same for the 20 kW loading with helium. For the BWR curves, the vacuum drying cladding temperature can be significantly higher by 143^0F and the final temperature would be 31^0F higher for the 20 kW loading with helium. Section 10 CFR 72.11(a) requires the SAR to be complete and accurate in all material respects.

4-4 Explain the apparent inconsistency between Section 4.4.3.1 which states that steady-state evaluations are performed for heat loads of 20, 17, 14, 11 and 8 kW and Tables 4.4.3-5 and 4.4.3-6. These tables state, via Note 2, that steady-state conditions are for only heat loads with no time duration.

Specifically, Tables 4.4.3-5 and 4.4.3-6 only identify steady-state conditions for the vacuum heat load of 8kW and for the helium heat load of 17, 14, 11 and 8 kW. Section 72.11(a) requires the SAR to be complete and accurate in all material respects.

4-5 State in the SAR that the maximum temperature values listed in Tables 4.4.3-5 and 4.4.3-6 are indeed the maximum calculated values or identify the higher peak temperatures calculated from the design basis analyses.

As written, Note 2 at the bottom of these tables implies that, for conditions prior to reaching steady-state, the temperature may be higher than the listed values. If the temperatures listed for the “Not Limited” time duration are indeed the maximum, then Note 2 can be eliminated since it would be redundant. Section 72.11(a) requires the SAR to be complete and accurate in all material respects.

4-6 Explain how preferential loading arrangements are bounded by the values shown in Tables 4.4.3-5 and 4.4.3-6 and include an explanation in Section 4.4.3.1, “Maximum Temperatures at Reduced Heat Loads.”

As stated in Section 4.4.3.1, the configuration and model used to analyze the reduced heat load is referenced to be in accordance with Section 4.4.1.3, “Two Dimensional Axisymmetric Transfer Cask Models,” which states that the heat load is applied as a volumetric heat generation in the active fuel region. No explanation is provided in the SAR which explains how preferential loading for a given basket heat load with hotter fuel in the center was considered in the calculation of reduced heat load temperatures. From the current description, it is implied that a uniform heat distribution was used, and it is not apparent to the staff how this would be a bounding configuration for a preferential loading with higher than average heat load at the center of the basket. For completeness, describe other permissible preferential loading arrangements and how they are bounded by the reduced heat load values shown in the subject tables. Section 72.11(a) requires the SAR to be complete and accurate in all material respects.

4-7 Correct the first sentence in the second paragraph of Section 4.4.3.1, “Maximum Temperatures at Reduced Heat Loads,” to reflect the data in Table 4.4.3-6 .

The sentence states that the maximum temperatures reached by components are less than those resulting from design basis heat load in the helium backfill condition. Contrary to this statement, Table 4.4.3-6 clearly shows that the BWR 20 kW reduced heat load cladding temperature exceeds the design basis heat load temperature. Section 72.11(a) requires the SAR to be complete and accurate in all material respects.

4-8 Submit the calculations which demonstrate that for PWR heat loads below 8 kW (for vacuum conditions) and PWR heat loads below 17kW (for helium filled canister conditions) that there is no time limit on the duration at which they can remain in these conditions.

Section 72.24(c)(3) states the application must provide information on the design in sufficient detail to support staff findings that the Independent Spent Fuel Storage Installation will satisfy the design bases with an adequate margin of safety.

4-9 Provide an explanation in the SAR of how assemblies with a variable radial enrichment, as described in Section 4.5.1.1.6, determine the assembly enrichment for use in Technical Specification Tables 12B2-8 and 12B2-9.

The aforementioned technical specification tables are used to determine the spent fuel cooling time requirements and loading arrangements. Enrichment is used as an input for this determination. For thermal considerations regarding variable radial enrichments, the lower enrichment should be used for the cooling time determination, rather than an average enrichment, to ensure enough cooling time for the larger decay heat values associated with lower enrichments. Section 72.24(c)(3) states the application must provide information on the design in sufficient detail to support staff findings that the ISFSI will satisfy the design bases with an adequate margin of safety.

4-10 Add a statement to Section 4.5.1.1.9, “Standard Fuel Assemblies With Damaged Lattices,” to the effect that the damaged fuel assemblies have been analyzed to retain their configuration for all design basis events.

The thermal analysis assumes that the fuel assemblies remain in their as built configuration, except for those that are canned. Since these lattices are damaged and are not canned, it is important to explain their impact in the thermal section where damaged lattices are being discussed. Section 72.11(a) requires the SAR to be complete and accurate in all material respects.

CHAPTER 12 TECHNICAL SPECIFICATIONS

12-1 (a) Provide the design basis information on the type of water cooling suggested in Action Statement A.2.1 in LCO 3.1.1.

(b) State and justify the maximum water temperature necessary to adequately cool the canister for 24 hours such that vacuum drying operations can resume.

(c) State the maximum temperature of the spent fuel cladding and heat transfer disk after 24 hours of in-pool cooling and the proposed water cooling, prior to the resumption of vacuum drying operations, using the worst case preferential loading arrangement.

The staff considers that insufficient information has been provided to describe the alternative to in-pool cooling. Spent fuel pools are maintained in a specific temperature range, whereas the proposed alternative appears not to be limited in either temperature, coolant quantity or configuration. No details have been provided which describe how this water cooling would be accomplished or reasonable assurance that it would be controlled in accordance with the design basis. Section 72.24(c) states the application must provide information on the design in sufficient detail to support staff findings that the ISFSI will satisfy the design bases with an adequate margin of safety.