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RAI's associated with MY Thermal Amendment to Increase Vacuum/ Transfer Operation Times

4-1 Explain why the maximum cladding temperature of the design basis heat load is not utilized as an upper bound temperature limit for the cladding temperatures associated with calculating the vacuum drying times for reduced heat loads.

The design basis heat load should result in the most severe temperatures within the canister. Instead, the method utilized to calculate the vacuum drying times for reduced heat loads, produces cladding temperatures during the vacuum drying and transfer operations, well above the cladding temperatures associated with the design basis heat load (i.e 80°F for PWR and 143°F for BWR), just to arbitrarily lengthen the times associated with these operations. The design basis heat load should result in the highest temperatures in the canister, not the lesser heat loadings. 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 [10CFR72.24(c)(2)], and the design bases are satisfied with an adequate margin of safety [10CFR72.24(c)(3)].

4-2 Explain how the design of the NAC-UMS for Maine Yankee preserves an adequate margin of safety for reduced heat load vacuum drying operations. Note that these operations result in higher basket temperatures, since the time in vacuum conditions has significantly increased. The explanation should include consideration of a postulated misloaded of one fuel assembly at a heat load of .958 kW located in the worst location.

Previously the staff had approved a vacuum drying time associated with the maximum heat load in the basket. For this amendment the vacuum drying times have been increased to account not only for reduced heat loads but also as a result of letting the maximum cladding temperatures increase as much as 80°F for PWR and 143°F for BWR beyond the design basis heat load case. Since the population of assemblies which could result in a postulated misloading has also increased, the staff feels that consideration of this event is warranted. 10CFR72.24 (d) (2) requires that sufficient information shall be provided in the SAR to evaluate the adequacy of SSCs important to safety to mitigate the consequences of accidents, including manmade events.

4-3 Revise Figures 4.4.3-5 and 4.4.4-5, "History of Maximum Component Temperature (°F) for Transfer Conditions of PWR and BWR Fuels", respectively, to account for the higher temperatures associated with reduced heat loads.

Since these figures are suppose to represent the "maximum" temperatures of various components during transfer operations, the higher temperatures associated with the lower heat loads should be represented or noted. For the PWR curves the vacuum drying cladding temperature can be significantly higher by 80°F 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°F and the final temperature would be 31°F higher for the 20 kW loading with helium. 10CFR72.11(a) requires that the SAR 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

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evaluations are performed for heat loads of 20,17,14,11 & 8 kW, and Tables 4.4.3-5 & 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 & 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. 10CFR72.11(a) requires that the SAR 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 & 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. 10CFR72.11(a) requires that the SAR 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 & 4.4.3-6 and include an explanation in SAR 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 just states that the heat load is applied as a volumetric heat generation in the active fuel region. No explanation is provided in the current 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. 10CFR72.11(a) requires that the SAR 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 Tables 4.4.3-5 & 4.4.3-6 .

The second sentence states that the maximum temperature reached by a component is less than the design basis heat load. Contrary this statement Tables 4.4.3-5 & 4.4.3-6 clearly show that the reduced heat load cladding temperatures exceed the design basis heat load temperatures.10CFR72.11(a) requires that the SAR be complete and accurate in all material respects.

4-8 Submit for the staff's review 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, that there is no time limit on the duration at which they can stay in these conditions.

Per 10CFR 72.24(c), 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.

4-9 (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 dry 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 is concerned 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. The staff is not opposed to the request, but 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.