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Subject: RAI on Changes to Spent Fuel Loading Restrictions
Creation Date: 4/21/03 7:58AM
From: Veronica Klein

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From: Veronica Klein
To: DMILLAR@entergy.com; SBENNE2@entergy.com
Date: 4/21/03 7:58AM
Subject: RAI on Changes to Spent Fuel Loading Restrictions

Dana/Steve:

Please see the attached RAI from the Materials and Chemical Engineering Branch and the Plant Systems Branch.

Veronica

Veronica Klein
U. S. Nuclear Regulatory Commission
Division of Licensing and Project Management
Project Directorate IV-1
(301)415-1869

CC: Thomas Alexion

REQUEST FOR ADDITIONAL INFORMATION
MATERIALS AND CHEMICAL ENGINEERING BRANCH
REQUEST TO CHANGE THE SPENT FUEL POOL LOADING RESTRICTIONS
ARKANSAS NUCLEAR ONE, UNIT 2

1. The submittal references a topical report submitted to the staff on August 8, 2002 which describes the physical and chemical properties of Metamic® as well as the test results supporting the use of Metamic® in fuel pool applications. This topical report is currently under review and the staff notes the types of coupons tested and discussed in that report; i.e., 15 wt% or 31 wt% B_4C and mill-finished or anodized.

   Based on the information provided in the submittal, the staff requests the licensee to address the following:

   a. What is the B_4C content in the Metamic® poison inserts to be used in the ANO Unit 2 Spent Fuel Pool (SFP)? If the B_4C content is greater than the 31 wt% evaluated in the topical, discuss how this increase in B_4C content compares with the test results presented in the topical; e.g., physical properties, corrosion, and radiation damage.

   b. Are the Metamic® poison inserts to be used mill-finished or anodized?

      The topical concludes that corrosion on both mill-finished and anodized Metamic® coupons is due to inadequate cleaning of the surface. Discuss the cleaning technique to be used on the inserts prior to installation, its acceptability, and its expected effectiveness in controlling impurities.

      If anodized inserts are to be used, discuss the anodizing process used for these inserts and its effectiveness in reforming the protective oxide layer in the event the surface should be scratched. Discuss the process used to ensure that the protective oxide layer will be formed adequately during installation.

2. The Metamic® coupon sampling program is briefly discussed on page 5 of Attachment 1 of the submittal. The licensee commits to establishing this program to monitor the physical and chemical properties of Metamic® over time. Metamic® coupons will be suspended on a mounting tree and inserted into an empty fuel cell in a rack that is surrounded by spent fuel assemblies. A total of 10 coupons will be created from the same lots that will be used to manufacture the inserts.

   Metamic is a new material to be used in the SFP environment. While the staff agrees that a coupon sampling program is prudent and critical in verifying the assumptions used in the SFP criticality analysis, details of this program were not provided in the submittal. Therefore, the staff requests the licensee to discuss the following:

   a. size and types of coupons to be used; specifically, discuss similarities in fabrication and layout to the proposed insert including welds and proximity to stainless steel,

   b. technique for measuring the initial B_4C content of the coupons,

c. simulation of scratches on the coupons,

d. frequency of coupon sampling and its justification, and

e. tests to be performed on coupons; e.g., weight measurement, measurement of dimensions (length, width and thickness), and B_4C content.

REQUEST FOR ADDITIONAL INFORMATION
PLANT SYSTEMS BRANCH
REQUEST TO CHANGE THE SPENT FUEL POOL LOADING RESTRICTIONS
ARKANSAS NUCLEAR ONE, UNIT 2

In the staff safety evaluation for WCAP-14416-P, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology," the staff stated that all licensees proposing to credit soluble boron should identify potential events which could dilute the spent fuel pool soluble boron to the concentration required to maintain the 0.95 k_{eff} limit and should quantify the time span of these dilution events to show that sufficient time is available to enable adequate detection and suppression of any dilution event. The staff also stated that the effects of incomplete boron mixing, such as boron stratification, should be considered, and that the boron dilution analysis should also be used to justify the surveillance interval used for verification of technical specification minimum pool boron concentration. In order to complete our review, the NRC staff requests that Entergy Operations provide the following information regarding Section 4.9, "Soluble Boron Dilution Evaluation," of Attachment 4 to their letter dated January 29, 2003:

1. The dilution evaluation considered a long term loss of inventory at a rate of 2 gpm, but justification for this value as bounding for a short-term uncorrected condition was not adequate. The staff calculated that a loss of inventory at a rate of 7.1 gpm would dilute pool boron concentration from the proposed technical specification limit of 2000 ppm to the 400 ppm value associated with the 0.95 k_{eff} limit within the 31 day surveillance interval. Recognizing that evaporative losses may be very small at times of low pool temperature and some low-level of leakage may be accepted without corrective action, provide justification that a loss of inventory of this magnitude would be promptly corrected. This response should include expected alarms, the expected change in frequency of these alarms (e.g., from once per day normally to 4 times per day with 6 gpm loss to radioactive waste tanks), and specific steps from alarm response or off-normal procedures that would lead to corrective actions to stop the inventory loss.

2. Section 9.1.2 of the ANO Unit 2 Safety Analysis Report states that damage to the spent fuel pool floor resulting from light load drops would not cause a loss of coolant inventory in excess of the capacity of the normal makeup systems. Describe how this event and the potential dilution resulting from use of unborated makeup water sources would be detected and mitigated. This response should include expected alarms and specific steps from alarm response or off-normal procedures that would lead to corrective actions.

3. Section 9.1.3 of the ANO Unit 2 Safety Analysis Report states that service water makeup is piped to the pool, and the valves are located such that minimal operator action is required to initiate makeup from either or both service water headers. Describe how the boron dilution resulting from both a slow, steady makeup of 8 gpm or makeup at the maximum rate from this source would be detected and mitigated. Again, this response should include expected alarms and specific steps from alarm response or off-normal procedures that would lead to corrective actions.