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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 8, 1997

Mr. J. W. Hampton
Vice President
Duke Power Company
Oconee Nuclear Plant
P.O. Box 1439
Seneca, SC 27679

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - NRC BULLETIN NO. 96-04, "CHEMICAL, GALVANIC, OR OTHER REACTIONS IN SPENT FUEL STORAGE AND TRANSPORTATION CASKS"

Dear Mr. Hampton:

This refers to your response dated August 19, 1996, to Nuclear Regulatory Commission Bulletin No. 96-04, "Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transportation Casks." Your submittal incorporated information prepared by VECTRA Technologies, Inc. (VECTRA) in response to the bulletin. By letter dated March 24, 1997, NRC notified VECTRA that their response to the bulletin lacked sufficient information for NRC to confirm VECTRA's conclusion that hydrogen generated during loading and unloading activities would not exceed the lower flammable limit. Therefore, we also believe that your submittal lacks the same information.

A notable concern is that VECTRA's August 16, 1996, submittal utilized a "transfer resistance factor," to adjust test data to account for: (1) the hydrogen retained in the dry shielded canister water column due to diffusion transport resistance, and (2) hydrogen lost through the open vent. This conversion factor was developed based on single samples taken during the loading of two different casks. The staff does not believe sufficient information was obtained to accurately determine a conversion factor of this type. This is of concern because your staff used VECTRA's unclear and incomplete information as the basis for implementing procedural enhancements to minimize potentially hazardous conditions during cask loading and unloading.

Additionally, your August 19, 1996, submittal lacked sufficient detail for the staff to determine if hydrogen concentrations could accurately be detected and whether adequate actions would be taken to minimize hazardous conditions.

Specifically, your submittal did not address monitoring hydrogen concentrations during welding and cutting evolutions nor provide the specific hydrogen concentration at which corrective actions, if necessary, would be implemented.

The staff acknowledges that approximately 60 NUHOMS canisters, at four different reactor sites, have been loaded and welded without any type of ignition indications or incidents. Thus, the staff does not have a safety issue, at this time, regarding the use of the NUHOMS system. However, the technical analyses and engineering work submitted in response to NRC Bulletin No. 96-04 lacked a sufficient technical basis to support your conclusion that the hydrogen generated would not exceed the lower flammable limit.

Enclosed is a request for additional information related to your submittal. If you have questions regarding this matter, please contact me at (301) 415-8538.

Sincerely,

Original signed by /s/

Timothy J. Kobetz, Project Manager
Spent Fuel Licensing Section
Spent Fuel Project Office
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Dockets 72-4, 50-269/270/287

Enclosure: Request for Additional Information

cc: NUHOM's Owners Group
Nuclear Energy Institute
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REQUEST FOR ADDITIONAL INFORMATION (RAI) ON
THE OCONEE NUCLEAR PLANT RESPONSE TO
NUCLEAR REGULATORY BULLETIN NO. 96-04

1. Provide justification that sufficient data was obtained from field experience and testing to support the methodology and calculations used in the computer simulation. The justification should support your conclusions for pressurized water reactor (PWR) fuel storage. In addition, provide the methodology and calculations used in the computer simulation.

   This request is based on, but not limited to, the following information:

   - VECTRA used data from only four canisters (Oconee dry shielded canisters (DSCs) Nos. 37 through 40), loaded with PWR fuel, to justify that hydrogen concentrations will not reach the flammability limit. In addition, the hydrogen samples were not taken by continuously monitoring the levels during the loading of DSCs 37 through 40. Therefore, they may not be representative of the highest hydrogen concentrations obtained during cask loading.

   - In the VECTRA August 16, 1996, submittal, a "transfer resistance factor" was used to calculate the amount of hydrogen generated in the DSC air space. However, this conversion factor was developed based on single samples taken during the loading of two different casks. The staff does not believe sufficient information was obtained to accurately determine a conversion factor of this type. Furthermore, when the transfer resistance factor is not used to adjust test data, the hydrogen levels produced exceed the lower flammability limit. It appears that the conversion factor was also used by the computer simulation discussed in VECTRA's October 18, 1996, submittal.

   - The test methods and computer modeling used to obtain and evaluate data are vague and not presented in a manner that supports the final conclusions.

     - Some tests are terminated at approximately 165°F even though the hydrogen production rate appears to still be increasing. The computer simulations were performed at temperatures below 160°F. Therefore, the tests and computer simulations may not bound all conditions.

     - There is no discussion of the maximum achievable hydrogen concentrations derived from the tests or computer simulations. All that is stated is that "H_2 concentrations remain below the 4% flammability limit for water temperatures below 160°F."

2. Provide justification that a sufficient safety margin exists between the amount of hydrogen generated prior to welding and the lower flammability limit.

   Data taken during the loading of the four Oconee casks indicated that, in a flame sprayed aluminum and boric acid environment, hydrogen levels could be generated in excess of 50% of the lower flammable limit. However, there is no discussion of the recommended margin of safety that should exist between the amount of hydrogen produced and the lower flammability limit. The staff has previously accepted a 0.4% limit of hydrogen generation, which is 10% of the lower flammability limit.

3. Describe the methods used to monitor and control hydrogen during welding, grinding, or cutting operations associated with loading or unloading activities.

4. Provide the specific hydrogen concentration at which time the procedural steps would implement corrective actions to minimize hazardous conditions.

   As stated in RAI Question No. 2, VECTRA's responses to NRC Bulletin No. 96-04 did not contain a discussion of the recommended margin of safety that should exist between the amount of hydrogen produced and the flammability limit. The staff has previously accepted a 0.4% limit of hydrogen generation, which is 10% of the lower flammability limit.