

72-9255



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

March 24, 1997

Mr. Vincent Franceschi
Vice President and General Manager
VECTRA Fuel Services
VECTRA Technologies, Inc.
6203 San Ignacio Ave., Suite 100
San Jose, CA 95119

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - NRC BULLETIN 96-04,
"CHEMICAL, GALVANIC, OR OTHER REACTIONS IN SPENT FUEL STORAGE AND
TRANSPORTATION CASKS"

Dear Mr. Franceschi:

This refers to your responses dated August 16, and October 18, 1996, to Nuclear Regulatory Commission Bulletin 96-04, "Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transportation Casks." Your submittals lacked sufficient information, with regard to the design and use of both the NUHOMS system and the MP-187 system, for the NRC to confirm your conclusion that hydrogen generated during loading and unloading activities would not exceed the lower flammable limit.

A notable concern is that your 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.

The staff acknowledges that approximately 60 NUHOMS canisters, at 4 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 96-04 lacked a sufficient technical basis to support VECTRA's conclusion that the hydrogen generated would not exceed the lower flammable limit.

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REQUEST FOR ADDITIONAL INFORMATION ON
THE VECTRA TECHNOLOGY INC., RESPONSE TO
NUCLEAR REGULATORY COMMISSION
BULLETIN 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) and boiling water reactor (BWR) 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 (Ocone dry shielded canisters (DSCs) Nos. 37 through 40), loaded with PWR fuel, to justify that hydrogen concentrations will not reach the flammability limit for either PWR or BWR fuels. 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 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 to by the computer simulation discussed in your 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 "H₂ concentrations remain below the 4% flammability limit for water temperatures below 160 degrees 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 referenced 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. Provide clarification of the statement in Section 2.4.2 that NRC Inspection Report No. 72-1007/96-204, dated July 9, 1996, concluded that Carbo Zinc 11 SG was "superior to other species of Carbo Zinc 11 for immersion in a spent fuel pool."

The statement implies the conclusion that since Carbo Zinc 11 SG is superior, it is, therefore, an acceptable coating. Staff review of the inspection report only identified that the coatings had "different characteristics." Carbo Zinc 11 SG was not ranked as superior to Carbo Zinc 11. In addition, in a December 3, 1996, letter to Entergy Operations, Inc., the staff concluded "that the properties, behavior, and durability of Carbo Zinc 11, Carbo Zinc 11 HS, and Carbo Zinc 11 SG are equivalent with respect to the coating's intended function."

4. Provide justification for selecting flame-sprayed aluminum for use with the MP-187 cask.

Any cask coatings or materials selected must be in compliance with 10 CFR 71.43(d). The staff has calculated potential hydrogen levels reaching greater than 10%. Staff would be interested in what alternative coatings the applicant considered and why flame-sprayed aluminum was selected. The response to this question will also be used during the review of the application for Docket 71-9255.

Mr. V. Franceschi

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Enclosed is a request for additional information related to your submittals. 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
Office of Nuclear Material Safety
and Safeguards

Dockets 71-9255, 72-1004

Enclosure: Request for Additional Information

cc: NUHOM's Owners Group
Nuclear Energy Institute

Distribution: w/encl.

Docket 71-9255
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