72-8

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

April 8, 1997

Mr. Charles H. Cruse
Vice President - Nuclear Energy
Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

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

Dear Mr. Cruse:

This refers to your responses dated August 19 and November 4, 1996, to Nuclear Regulatory Commission Bulletin 96-04, "Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transportation Casks." Your submittals incorporated information prepared by VECTRA Technologies, Inc. (VECTRA) in response to the bulletin. By letter dated March 24, 1997, NRC notified VECTRA that its 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 submittals lack the same information.

A notable concern is that VECTRA's August 16, 1995, 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. Your submittal also did not provide enough information to support using 50 percent of the lower hydrogen flammability limit as the point at which you would implement actions to reduce the hydrogen concentration.

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 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 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 72-8, 50-317, 50-318

Enclosure: As stated

cc: NUHOM's Owners Group
Nuclear Energy Institute
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Nuhoms Owners Group (72-1004)

Mr. John P. Stetz
Vice President - Nuclear,
Davis Besse
Centierior Service Company
c/o Toledo Edison Company
5501 North State Route 2
Oak Harbor, OH 43449

GPU Nuclear Corporation
Mr Michael B. Roche
Vice President and Director
Oyster Creek Nuclear Station
P. O. Box 388
Route 9 South
Forked River, NJ 08731-0388

Mr. Robert G. Byram
Senior Vice President - Nuclear
Pennsylvania Power and Light
Company
2 North Ninth Street
Allentown, PA 19101

Mr. William S. Orser
Executive Vice President
Nuclear Generation [Brunswick]
Carolina Power and Light Company
P. O. Box 10429
Southport, NC 28461

Mr. Charles H. Cruse
Vice President - Nuclear Energy
Calvert Cliffs Nuclear Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

Mr. William B. Orser
Executive Vice President
Nuclear Generation
H. B. Robinson 2
P. O. Box 1551
Raleigh, NC 27602

Mr. J. W. Hampton
Vice President
Duke Power Company
Oconee Nuclear Site
P. O. Box 1439
Seneca, SC 29679

Mr. James R. Shetler
Deputy Assistant General Manager
- Nuclear
Sacramento Municipal Utility
District
6201 S Street
P. O. Box 15830
Sacramento, CA 95813

Mr. Jan Hagers
DEPARTMENT OF ENERGY
TMI/FSV Licensing Project Manager
Idaho Operations Office
785 Doe Place
Idaho Falls, ID 83403

Mr. Charles H. Cruse
Calvert Cliffs Nuclear Power Plant

cc:

President
Calvert County Board of
Commissioners
175 Main Street
Prince Frederick, MD 20678

D. A. Brune, Esquire
General Counsel
Baltimore Gas and Electric Company
P.O. Box 1475
Baltimore, MD 21203

Jay E. Silberg, Esquire
Shaw, Pittman, Potts and Trowbridge
2300 N Street, NW
Washington, DC 20037

Mr. Terrence J. Camilleri, Director,
NRM
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-47027

Resident Inspector
c/o U.S. Nuclear Regulatory
Commission
P.O. Box 287
St. Leonard, MD 20685

Mr. Richard I. McLean
Administrator - Radioecology
Department of Natural Resources
580 Taylor Avenue
Tawes State Office Building
B3
Annapolis, MD 21401

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

Mr. Joseph H. Walter, Chief Engineer
Public Service Commission of
Maryland
Engineering Division
6 St. Paul Centre
Baltimore, MD 21202-6806

Kristen A. Burger, Esquire
Maryland People's Counsel
6 St. Paul Centre
Suite 2102
Baltimore, MD 21202-1631

Patricia T. Birnie, Esquire
Co-Director
Maryland Safe Energy Coalition
P.O. Box 33111
Baltimore, MD 21218

Mr. Larry Bell
NRC Technical Training Center
5700 Brainerd Road
Chattanooga, TN 37411-4017

REQUEST FOR ADDITIONAL INFORMATION (RAI) ON
THE CALVERT CLIFFS NUCLEAR PLANT RESPONSE TO
NUCLEAR REGULATORY 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) 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. Provide information on any site-specific lubricants, cleaning agents, or other materials that may react with the DSC contents and environment, during the loading and unloading activities.

   The responses submitted by VECTRA focused only on the NUHOMS system and did not take into account any site-specific differences.

4. Describe the methods used to vent the DSC and monitor hydrogen before and during welding, grinding, or cutting operations associated with loading or unloading activities.

5. Justify the precautionary measure that would allow the H_2 levels to reach 50% of the lower flammability limit prior to stopping welding or grinding activities.

   As stated in RAI Question No. 2, VECTRA's responses to Bulletin 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.