North Atlantic

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The Northeast Utilities System

June 28, 2002

Docket No. 50-443
NYN-02062

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Seabrook Station
"Response to Questions Regarding
License Amendment Request 01-12"

Reference: North Atlantic letter NYN-02024, Seabrook Station License Amendment Request 01-12 "Changes to Spent Fuel Assembly Storage Technical Specification 3/4.9.13," dated March 22, 2002.

North Atlantic Energy Service Corporation (North Atlantic) was requested by the Nuclear Regulatory Commission (NRC) to provide additional clarifying information regarding License Amendment Request (LAR) 01-12 "Changes to Spent Fuel Assembly Storage Technical Specification 3/4.9.13" during a telephone conference conducted on June 6, 2002. Specifically, the NRC requested additional technical information concerning the use of BORAL® and of BORAFLEX® fuel assembly storage racks. The North Atlantic responses to the subject requests are enclosed.

Should you have any questions concerning this response, please contact Mr. James M. Peschel, Manager - Regulatory Programs, at (603) 773-7194.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.

Joe M. Vargas
Director of Engineering

A001

cc: H. J. Miller, NRC Region I Administrator
R. D. Starkey, NRC Project Manager, Project Directorate I-2
G. T. Dentel, NRC Senior Resident Inspector

STATE OF NEW HAMPSHIRE

Rockingham, ss. DATE 6/28/02

Then personally appeared before me, the above-named Joe M. Vargas, being duly sworn, did state that he is the Director of Engineering of the North Atlantic Energy Service Corporation, that he is duly authorized to execute and file the foregoing information in the name and on the behalf of North Atlantic Energy Service Corporation and that the statements therein are true and accurate to the best of his knowledge and belief.

Marilyn R. Sullivan

Marilyn R. Sullivan, Notary Public
My Commission Expires: April 17, 2007

MARILYN R. SULLIVAN MY COMMISSION EXPIRES APR. 17, 2007 NOTARY PUBLIC NEW HAMPSHIRE

Enclosure to NYN-02062

Response to Questions Regarding Seabrook Station License Amendment Request 01-12 "Changes to Spent Fuel Assembly Storage Technical Specification 3/4.9.13"

Request Number 1:

The submittal does not discuss the interface between BORAL® and BORAFLEX® regions of the pool and potential interaction of the highly reactive assemblies in the BORAL® region with those in the BORAFLEX®. Please discuss the k_{eff} values at the interface.

Response:

The maximum fresh fuel enrichment to yield a k_{eff} of 0.95 with uncertainty was determined from 2D KENO-V.a infinite array models of the BORAL® and BORAFLEX® regions of the pool. For the BORAL® racks, the maximum fresh fuel enrichment is 3.66 w/o and for the BORAFLEX® racks, the maximum fresh fuel enrichment is 1.58 w/o. Due to the issues associated with BORAFLEX® degradation, the analysis of the BORAFLEX® racks assumed no neutron absorbing material (B10) in the BORAFLEX®. To perform the Seabrook accident analysis, a 2D KENO-V.a model was generated of the complete fuel pool loaded with fresh fuel at the maximum allowable enrichment without burnup credit. The 2D KENO-V.a model of the completely filled spent fuel pool yielded a k_{eff} of 0.92686 without uncertainties which is consistent with the infinite array KENO-V.a models of the BORAL® and BORAFLEX® regions. Thus, in the complete pool model, the interface is treated explicitly.

Request Number 2:

Please describe how the 2D, 3D penalty was determined.

Response:

Since axial leakage has a negative effect on reactivity, 2D analysis is usually conservative. However, both the axial assembly burnup and the moderator density history effects have a complicated nonlinear effect on the reactivity in a storage array. The Seabrook analysis used the 3D code, SIMULATE-3, to determine the effects of both axial assembly burnup and moderator history relative to the 2D analysis. The calculations were performed using 5.0 w/o fuel at 68 °F in the rack geometry. The 2D analysis used assembly average exposure and the 3D analysis included the axial burnup effects and the moderator characteristics of burned fuel. The calculations for the Seabrook spent fuel racks showed a nearly linear 2D to 3D reactivity penalty as a function of burnup. For example, at 5.0 w/o and 40 GWD/MTU, the Seabrook penalty is 0.024 ΔK.

Request Number 3:

How were the KENO-V.a cross sections derived?

Response:

The Seabrook calculations utilize the SCALE CSAS25 criticality sequence methodology which includes the Material Information Processor, BONAMI, NITAWL-II and KENO-V.a. The Material Information Processor generates number densities for each material, generates resonance self-shielding geometry data and creates data input files for the cross section processing codes BONAMI and NITAWL-II. BONAMI and NITAWL-II generate a resonance corrected cross section library in AMPEX working format for input into KENO-V.a. The ENDF/B-V 44-group neutron library was used in all the CSAS25 calculations.

Request Number 4:

How were the rack k_{eff} calculations benchmarked? Are the KENO-V.a results considered not to require benchmarking?

Response:

The CSAS25 criticality sequence was benchmarked against the 21 B&W critical experiments described in B&W-1484-7, "Critical Experiments Supporting Close Proximity Water Storage of Power Reactor Fuel," N. M. Baldwin, G. S. Hoovler, R. L. Eng and F. G. Welfare, July 1979. The benchmarking of KENO-V.a is needed to determine the calculational bias for use in the 95% probability, 95% confidence k_{eff} calculation.