FENOC
FirstEnergy Nuclear Operating Company

Beaver Valley Power Station
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May 18, 2001
L-01-067

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: **Beaver Valley Power Station, Unit No. 1**
Docket No. 50-334, License No. DPR-66
License Amendment Request No. 288, Supplemental Information

On March 28, 2001, pursuant to 10 CFR 50.90, FirstEnergy Nuclear Operating Company (FENOC) submitted License Amendment Request (LAR) No. 288 to the Nuclear Regulatory Commission (NRC) for review. The proposed Technical Specification change would modify the Technical Specification limits for boron concentration in the Refueling Water Storage Tank (RWST), Accumulators, Boron Injection Tank (BIT), and the Reactor Coolant System/Refueling Canal during Mode 6. FENOC requested the NRC to review and approve LAR No. 288 in sufficient time to support implementation during the Beaver Valley Unit 1 14th refueling outage (1R14) which is planned for the fall of 2001.

In response to a telephone request on May 3, 2001, additional information is provided in Attachment A to supplement License Amendment Request No. 288. This information does not affect the proposed changes provided in LAR No. 288 or the conditions of the no significant hazards evaluation.

If you have any questions regarding this matter, please contact Mr. Thomas S. Cosgrove, Manager, Regulatory Affairs at 724-682-5203.

Sincerely,

Lew W. Myers

c: Mr. L. J. Burkhart, Project Manager
Mr. D. M. Kern, Sr. Resident Inspector
Mr. H. J. Miller, NRC Region I Administrator
Mr. D. A. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

A001

Subject: **Beaver Valley Power Station, Unit No. 1**
BV-1 Docket No. 50-334, License No. DPR-66
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I, Lew W. Myers, being duly sworn, state that I am Senior Vice President of FirstEnergy Nuclear Operating Company (FENOC), that I am authorized to sign and file this submittal with the Nuclear Regulatory Commission on behalf of FENOC, and that the statements made and the matters set forth herein pertaining to FENOC are true and correct to the best of my knowledge and belief.

FirstEnergy Nuclear Operating Company

Lew W Myers

Lew W. Myers
Senior Vice President - FENOC

COMMONWEALTH OF PENNSYLVANIA

COUNTY OF BEAVER

Subscribed and sworn to me, a Notary Public, in and for the County and State above named, this 18 th day of May, 2001.

Tracey A Baczek

My Commission Expires:

Notarial Seal
Tracey A. Baczek, Notary Public
Shippingport Boro, Beaver County
My Commission Expires Aug. 16, 2001
Member, Pennsylvania Association of Notaries

Attachment A

Beaver Valley Power Station, Unit No. 1
License Amendment Request No. 288, Supplemental Information
Revised RWST/Accumulator/BIT Boron Concentration Limits

1. Describe why the Loss of Coolant Accident (LOCA) control room thyroid dose went from 5.5 Rem to 5.6 Rem.

   Response
   The dose increase results from an increase in the contribution from the iodine release due to the Engineering Safety Feature (ESF) Systems leakage that is assumed to occur into the Refueling Water Storage Tank (RWST) during the safety injection recirculation mode. The iodine released is a function of the pH of the water in the tank and sump. The higher boron concentration results in a lower pH and resulting lower iodine retention in the water volume.

2. Justify why 180°F is valid for the temperature of the injection in the hot leg switchover analysis.

   Response
   Calculation data indicates that the maximum containment sump temperature decreases to approximately 150°F two (2) hours after accident initiation, with a further gradual decline in temperature expected out to hot leg switchover time. While this behavior suggests that some amount of lower plenum subcooling could be credited in the hot leg switchover analysis, an exact value cannot be readily determined without additional analysis. In order to preclude this additional analysis from delaying the approval of License Amendment Request (LAR), the hot leg switchover calculation was redone with no credit for lower plenum subcooling. (Note: In the course of investigating this question, it was found that the lower plenum enthalpy was entered incorrectly in the original analysis which has since been reanalyzed.) In order to provide offsetting margin for this reanalysis, credit was taken for the power level and Reactor Coolant System (RCS) boron concentration corresponding to the upcoming operating cycle, as opposed to the large power uprate level and increased RCS boron concentration that were initially modeled to cover future cycles. The conclusion in LAR No. 288 for a hot leg switchover time of 8.0 hours remains valid.

3. What input changes were incorporated in the hot leg switchover reanalysis for Beaver Valley Power Station (BVPS) Unit 1 Cycle 15?

Response
The following Table summarizes the input changes that were incorporated in the hot leg switchover reanalysis for BVPS Unit 1 Cycle 15:

Parameter	**Initial Value**	**Final Value**
Initial Core Power Level, Including Uncertainty (MWt)	(2900 x 1.02)	(2689x1.006)[1]
Effective Vessel Mixing Volume (ft^3)	759	778
Lower Plenum Enthalpy (BTU/lbm)	148[2]	180
Initial Reactor Coolant System Boron Concentration (ppm)	2400	1850[3]

Notes:
1. Selected to reflect Cycle 15 operation.
2. Please see the response to Question #2 for related information.
3. Selected to bound Cycle 15 operation; will be verified as part of the Reload Safety Evaluation, as required by BVPS Unit 1 Technical Specification 6.9.5.

4. Describe the regions included in the effective vessel mixing volume. Does the model include allowances for the upper plenum, upper nozzles, etc.? Does the model include any leakage paths (such as between the downcomer and upper plenum)?

Response
As discussed in the response to Question #2, the hot leg switchover analysis was redone with no credit for lower plenum subcooling. In this analysis, the effective vessel mixing volume includes: volume inside the baffle plates from the top of the lower core plate to the bottom of the upper core plate; volume inside the holes in the upper core plate; and volume in the upper plenum from the top of the upper core plate to the inside bottom of the hot legs. No credit was taken for volume in the barrel-baffle region, and any flow that may occur through the hot leg nozzle gaps was conservatively neglected.

5. Justify why a minimum of 2400 ppm boron was chosen for License Amendment Request No. 288.

Response
Energy requirements for the reactor cores at both Beaver Valley units have been increasing due to improving capacity and shorter refueling outages. During the

design and evaluation performed for BVPS Unit 1 Cycle 14 core design (current operating core) two core design parameters were initially identified as not meeting acceptance criteria, based on the current Technical Specification required RWST, Accumulator, and BIT boron concentrations. However, acceptable results were able to be obtained in the core reload safety evaluation (performed via 10 CFR 50.59) by revising the input criteria to credit margin in other areas, while continuing to satisfy the core operating limits as required by Technical Specification 6.9.5.

Scoping analysis of the proposed BVPS Unit 1 Cycle 15 core loading pattern indicates that the Post-LOCA boron requirements are higher than those of Cycle 14, and that the available boron from the RWST is insufficient to provide adequate shutdown margin. To provide acceptable evaluation results for the BVPS Unit 1 Cycle 15 core design, a boron increase of at least 100 ppm is needed to ensure sufficient Post-LOCA shutdown margin with the increased energy being supplied in the core in order to satisfy license and regulatory requirements.

Since energy requirements at both Beaver Valley units are projected to continue to increase due to improved capacity factors and shorter refueling outages, it was appropriate to look ahead to future cycles to project what the boron requirements are likely to be. Reactor core scoping models of these future cycles were performed to evaluate the expected increases in energy loading and their associated required boron concentrations. The largest increase in reactor core boron requirements from the scoping models is approximately 270 ppm (which correlates to a slightly higher increase needed in the minimum RWST/Accumulators/BIT boron concentrations). Thus, LAR No. 288 requested the Technical Specification boron concentration minimum limit to be raised by 400 ppm from 2000 to 2400 ppm. This increase in the minimum RWST/Accumulator/BIT boron concentrations is reasonable since it addresses the immediate and near future core design requirements, and minimizes the use of NRC staff resources to review additional future LARs that would otherwise be necessary.

Larger increases (some plants have increased their minimum RWST boron concentrations to the 2700-2800 ppm range) were considered; however, this increased range results in larger costs associated with maintaining boric acid inventories and in operation of boron recovery and RCS cleanup systems, as well as potential post-accident consequences.