



FirstEnergy Nuclear Operating Company

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January 21, 2002  
L-02-005

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

**Subject: Beaver Valley Power Station, Unit No. 2**  
**BV-2 Docket No. 50-412, License No. NPF-73**  
**Supplemental Information In Support of LAR No. 168**

This letter provides the FirstEnergy Nuclear Operating Company (FENOC) response to a verbal NRC request for supplemental information on January 7, 2002, pertaining to FENOC letters L-01-089, dated June 28, 2001, and L-01-112, dated September 13, 2001, and L-01-146, dated December 19, 2001.

FENOC letter L-01-089 submitted License Amendment Requests (LAR) No. 168 that proposed changes to the Beaver Valley Power Station (BVPS), Unit No. 2, to allow operation of the reactor core with a positive moderator temperature coefficient (PMTC) for NRC review and approval. Letter L-01-112 provided the FENOC response to a NRC Request for Additional Information (RAI), dated August 2, 2001, related to the PMTC LAR submittal. Letter L-01-146 provided the FENOC response to an additional NRC RAI, dated November 16, 2001, related to the PMTC LAR submittal.

The supplemental information provided by this letter consists of BVPS-specific analyses for the Loss of Flow event at 70 percent of rated thermal power and using a PMTC of +2.0 percent mille rho [reactivity change] per degree Fahrenheit (pcm/°F). These analyses are provided to demonstrate that the Loss of Flow analyses at hot full power with a zero moderator temperature coefficient (MTC) bounds analyses at part power with a PMTC.

The supplemental information is provided in Attachment A of this letter.

FENOC requests NRC approval of License Amendment Request No. 168 by February 1, 2002, to support unit startup from the BVPS, Unit No. 2, ninth refueling outage (2R09).

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This information does not change the evaluations or conclusions presented in FENOC letter L-01-089. If there are any questions concerning this matter, please contact Mr. Larry R. Freeland, Manager Regulatory Affairs/Corrective Actions, at 724-682-5284.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 21, 2002.

Sincerely,



Lew W. Myers

Attachment

- 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)

## Letter L-02-005 - Attachment A

SUPPLEMENTAL INFORMATION IN SUPPORT OF  
POSITIVE MODERATOR TEMPERATURE COEFFICIENT  
FOR BEAVER VALLEY POWER STATION, UNIT NO. 2  
DATED JANUARY 7, 2002  
(LICENSE AMENDMENT REQUEST NO. 168)

### NRC Supplemental Information Request

Provide analyses specific to Beaver Valley Power Station (BVPS) for the Loss of Flow event at hot full power with a zero moderator temperature coefficient (MTC) bounds analyses at part power with a positive moderator temperature coefficient (PMTTC).

### FirstEnergy Nuclear Operating Company (FENOC) Response

The BVPS, Unit No. 2, license amendment request (LAR) No. 168 proposes to allow FENOC to revise the BVPS, Unit No. 2, MTC limit to allow a maximum MTC of +2 percent mille rho [reactivity change] per degree Fahrenheit (pcm/°F) for power levels less than or equal to 70 percent of rated thermal power (RTP). The proposed MTC limit decreases linearly from +2 pcm/°F at 70 percent of RTP to zero at full power. The analysis has been done at 70 percent of RTP with a +2 pcm/°F. Because certain other plants designed by Westinghouse Electric Company have been licensed to a higher MTC limit, another case was analyzed with a +7 pcm/°F MTC for informational purposes. The results of the BVPS, Unit No. 2, current licensing basis (CLB) case, the case incorporating the +2 pcm/°F MTC proposed in LAR No. 168, and the +7 pcm/°F MTC case provided for information are summarized in the following table.

Loss of Flow Event	CLB Case	+2 pcm/°F Case	+7 pcm/°F Case
Initial Power Level	100%	70%	70%
MTC	0.0 pcm/°F	+2 pcm/°F	+7 pcm/°F
Initial Core Average Heat Flux	184317.6 Btu/ht-ft <sup>2</sup>	129022.3 Btu/ht-ft <sup>2</sup>	129022.3 Btu/ht-ft <sup>2</sup>
Initial Volumetric Flow	266800 gpm	266800 gpm	266800 gpm
Core Inlet Temperature	547.15°F	547.79°F	547.79°F
Pressurizer Pressure	2242.5 psia	2242.5 psia	2242.5 psia
Time of Rod Motion	2.706 seconds	2.714 seconds	2.714 seconds
Peak Power-to-Flow Ratio	1.508	1.065	1.083
Time of Peak Power-to-Flow Ratio	4.8 seconds	4.8 seconds	4.8 seconds
Flow Fraction @ 4.8 sec.	0.6144	0.6151	0.6150
Heat Flux Fraction @ 4.8 seconds	0.9268	0.6550	0.6661
Minimum DNBR	1.3347	3.588	3.505
Time of Minimum DNBR	4.5 seconds	4.6 seconds	4.6 seconds
DNBR Limit	1.33	1.33	1.33

As shown in the table above, the part power PMTC cases are considerably less limiting than the full power with a zero MTC case. This is due to the much lower power fraction. No credit is taken for the increasing reactor coolant system (RCS) pressure so the RCS pressures used in the departure from nucleate boiling ratio (DNBR) calculation is the same for all cases. Minimum Measured Flow is used for all cases. The inlet temperatures are essentially the same for each case. Thus, the only differences are the fractional power and the nuclear enthalpy hot channel factor ( $F_{\Delta H}$ ) (note that  $F_{\Delta H}$  increases as power decreases, which is consistent with BVPS, Unit No. 2, Technical Specification 3.2.3, "Nuclear Enthalpy Hot Channel Factor"). The approximately 30 percent decrease in fractional power results in a very large departure from nucleate boiling (DNB) benefit and the  $F_{\Delta H}$  penalty is very small such that the resulting minimum DNBR values for the 70 percent RTP PMTC cases are considerably higher than the 100 percent RTP with a zero MTC case.