

February 6, 2006

Mr. James H. Lash
Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
P. O. Box 4
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2) -
ISSUANCE OF AMENDMENT RE: APPLICABILITY OF WESTINGHOUSE
TOPICAL REPORT WCAP-12945-O-A, "VOLUME 1 (REVISION 2) 1996 AND
VOLUME 2-5 (REVISION 1), 'CODE QUALIFICATION DOCUMENT FOR BEST
ESTIMATE LOCA [BELOCA] ANALYSIS' MARCH 1998" (TAC NOS. MC4647
AND MC4648)

Dear Mr. Lash:

The Commission has issued the enclosed Amendment No. 272 to Facility Operating License No. DPR-66 and Amendment No. 154 to Facility Operating License No. NPF-73 for BVPS-1 and 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated October 4, 2004, as supplemented July 8, and November 14, 2005.

These amendments approve application of the Westinghouse best-estimate loss-of-coolant accident (BELOCA) analysis methodology to BVPS-1 and 2 large-break LOCA analyses.

A copy of our safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Timothy G. Colburn, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures: 1. Amendment No. 272 to DPR-66
2. Amendment No. 154 to NPF-73
3. Safety Evaluation

cc w/encls: See next page

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ACCESSION NO. ML060120145

*SE input provided. No substantive changes made.

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FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

DOCKET NO. 50-334

BEAVER VALLEY POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 272
License No. DPR-66

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by FirstEnergy Nuclear Operating Company, et al. (the licensee), dated October 4, 2004, as supplemented July 8, and November 14, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-66 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 272, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to Mode 4 entry during startup from 1R17 which begins on or about February 10, 2006.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Richard J. Laufer, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: February 6, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 272

FACILITY OPERATING LICENSE NO. DPR-66

DOCKET NO. 50-334

Replace the following page of Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove

6-19

Insert

6-19

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

THE TOLEDO EDISON COMPANY

DOCKET NO. 50-412

BEAVER VALLEY POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 154
License No. NPF-73

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by FirstEnergy Nuclear Operating Company, et al. (the licensee), dated October 4, 2004, as supplemented July 8, and November 14, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-73 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 154, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto are hereby incorporated in the license. FENOC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to Mode 4 entry during startup from 2R12 which begins October 2006.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Richard J. Laufer, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: February 6, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 154

FACILITY OPERATING LICENSE NO. NPF-73

DOCKET NO. 50-412

Replace the following page of Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove

6-20

Insert

6-20

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 272 AND 154 TO FACILITY OPERATING
LICENSE NOS. DPR-66 AND NPF-73
FIRSTENERGY NUCLEAR OPERATING COMPANY
FIRSTENERGY NUCLEAR GENERATION CORP.
OHIO EDISON COMPANY
THE TOLEDO EDISON COMPANY
BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2)
DOCKET NOS. 50-334 AND 50-412

1.0 INTRODUCTION

By application dated October 4, 2004, as supplemented July 8, and November 14, 2005, Agencywide Document Access and Management System (ADAMS) Accession Nos. ML042920300, ML051940575, ML051940582, ML051940583, and ML053220241, the FirstEnergy Nuclear Operating Company (FENOC, the licensee), requested changes to the Technical Specifications (TSs) for BVPS-1 and 2. The supplements dated July 8, and November 14, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on December 7, 2004 (69 FR 70718).

The proposed changes requested application of the NRC-approved Westinghouse best-estimate large-break loss-of-coolant accident (BELOCA) analysis methodology described in Topical Report WCAP-12945-P-A, Volume 1 (Revision 2) 1996 and Volumes 2 through 5 (Revision 1), "Code Qualification Document for Best Estimate LOCA Analysis, March 1998" (CQD methodology) to BVPS-1 and 2. The NRC has approved the CQD for performing licensing basis large-break LOCA (LBLOCA) analyses for all Westinghouse 3- and 4-loop nuclear plants of Westinghouse design.

The NRC staff reviewed the licensee's emergency core cooling system (ECCS) performance analyses for BVPS-1 and 2 done in accordance with the CQD methodology, operating at about 108 percent of its current licensed power of 2697 MWt (the analyses were conducted at the uprated power of 2900 MWt plus 0.6 percent measurement uncertainty or 2917.4 MWt). For both BVPS-1 and 2, the BELOCA analyses were conducted assuming the units used Westinghouse 17 x 17 Robust Fuel Assemblies (RFAs). The analyses were performed at the

higher power level in order to support the pending license amendment requests for approval of BVPS-1 and 2 operation at extended power uprate (EPU) conditions. Further, the licensee's analyses supporting the BELOCA amendment requests assumed NRC approval of the pending license amendment requests for conversion of the BVPS-1 and 2 containments from subatmospheric to atmospheric operating conditions. The analyses were also done to support NRC approval of the pending BVPS-1 steam generator (SG) replacement amendment request scheduled to be completed to support the February 2006 refueling outage.

2.0 REGULATORY ANALYSIS

The BELOCA analyses were performed to demonstrate that the system design would provide sufficient ECCS flow to transfer the heat from the reactor core following an LBLOCA at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling would be prevented, and (2) the clad metal-water reaction would be limited to negligible amounts. The NRC staff reviewed the analyses to assure they reflected suitable redundancy in components and features; and suitable interconnections, leak detection, isolation, and containment capabilities were available such that the safety functions could be accomplished, assuming a single failure, for LBLOCAs considering the availability of onsite and offsite electric power (assuming offsite electric power is not available, with onsite electric power available; or assuming onsite electric power is not available, with offsite electric power available). The acceptance criteria for ECCS performance are provided in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46 and were used by the NRC staff in assessing the acceptability of the Westinghouse CQD methodology for BVPS-1 and 2.

The NRC staff considered that both BVPS-1 and 2 are 3-loop nuclear plants of Westinghouse design. The NRC staff also reviewed the limitations and conditions stated in its safety evaluation (SE) supporting approval of the Westinghouse CQD methodology and considered the range of parameters described in the CQD topical report in its assessment of the acceptability of the methodology for BVPS-1 and 2.

3.0 TECHNICAL ANALYSIS

In its submittal, dated October 4, 2004, the licensee stated, "[b]oth FENOC and its analysis vendor Westinghouse have ongoing processes in place that assure that analysis input values for peak cladding temperature-sensitive parameters bound their as-operated plant values." In response to an NRC staff's request for additional information (RAI), the licensee further stated, ". . . Beaver Valley plant-specific LOCA analyses are based on Beaver Valley specific models." These statements, together with the NRC staff's review of the results of the BELOCA analyses, as discussed further in this SE, provided reasonable assurance that the licensee implements appropriate processes to support proper application of the CQD methodology, and that the methodology is acceptable for use at BVPS-1 and 2.

In its submittal, the licensee provided the results for the BVPS-1 and 2 BELOCA analyses at 2917.4 MWt (about 108 percent of the current licensed power of 2697 MWt) performed in accordance with the CQD methodology. The licensee's results for the calculated peak cladding temperatures (PCTs), the maximum cladding oxidation (local), and the maximum core-wide cladding oxidation are provided in the following table along with the acceptance criteria of 10 CFR 50.46(b).

TABLE 1: LBLOCA ANALYSIS RESULTS

Parameters	CQD Results		10 CFR 50.46 Limits
	BVPS-1	BVPS-2	
Limiting Break Size/Location	DEG/PD	DEG/PD	N/A
Cladding Material	Zircaloy	Zircaloy	Zircaloy
Peak Clad Temperature	2144 °F	1976 °F	2200 °F (10 CFR 50.46(b)(1))
Maximum Local Oxidation	8.77%	6.70%	17.0% (10 CFR 50.46(b)(2))
Maximum Total Core-Wide Oxidation (All Fuel)	0.985%	0.91%	1.0% (10 CFR 50.46(b)(3))

DEG/PD is a double-ended guillotine break at the pump discharge.

In its analyses, the licensee also addressed the concern that zircaloy fuel may have pre-existing oxidation that must be considered in its LOCA analyses. In its response to an NRC staff's request for additional information, the licensee indicated that it considered that the zircaloy clad fuel has both pre-existing oxidation and oxidation resulting from the LOCA (pre- and post-LOCA oxidation both on the inside and outside cladding surfaces). The licensee also noted that the fuel with the highest LOCA oxidation will likely not be the same fuel that has the highest pre-LOCA oxidation. The licensee indicated that when the calculated pre-LOCA oxidation was factored into the licensee's BELOCA analyses for the zircaloy clad fuel, consistent with the Westinghouse CQD methodology, that even during a fuel pin's final cycle in the core, the sum of the calculated pre- and post-LOCA oxidation was sufficiently small that the total local oxidation remained less than the 17% acceptance criterion of 10 CFR 50.46(b)(2) as noted above. The NRC staff finds this acceptably addressed the issue with pre-LOCA oxidation.

The concern with core-wide oxidation relates to the amount of hydrogen generated during a LOCA. Because hydrogen that may have been generated pre-LOCA (during normal operation) will be removed from the reactor coolant system throughout the operating cycle, the NRC staff noted that pre-existing oxidation does not contribute to the amount of hydrogen generated post-LOCA and therefore it does not need to be addressed when determining whether the calculated total core-wide oxidation meets the 1.0% criterion of 10 CFR 50.46(b)(3).

As discussed previously, FENOC had Westinghouse conduct the BELOCA analyses for BVPS-1 and 2 at about 108 percent of the current licensed power level of 2697 MWt using an NRC-approved Westinghouse methodology (CQD methodology). In part, because of the significant margin provided by the assumed power level (2917.4 MWt), the NRC staff concluded that the results of these analyses (see Table 1) demonstrated compliance with 10 CFR 50.46(b)(1) through (b)(3) for the current licensed power level of 2697 MWt. Meeting these criteria provides reasonable assurance that at the current licensed power level the BVPS-1 and 2 cores will be amenable to cooling as required by 10 CFR 50.46(b)(4). The capability of BVPS-1 and 2 to satisfy the long-term cooling requirements of 10 CFR 50.46(b)(5) were reviewed as part of FENOC's license amendment request to convert the containments from sub-atmospheric to atmospheric operating conditions. The BELOCA license amendments

request cannot be approved as currently submitted unless and until the containment conversion amendments request is approved because of the analysis assumptions previously discussed.

Based on its review as discussed above, the NRC staff concluded that the Westinghouse CQD methodology, as described in WCAP-12945-P-A, is acceptable for use for BVPS-1 and 2 in demonstrating compliance with the requirements of 10 CFR 50.46(b) with atmospheric containments. In part, the NRC staff's conclusion was based on the assumed thermal power (2917.4 MWt) used in the BELOCA analyses conservatively bounded the current licensed power level (2697 MWt) of BVPS-1 and 2.

The licensee submitted license amendment requests for the SG replacement at BVPS-1, and conversion to atmospheric containments and EPU conditions for both BVPS-1 and 2. The NRC-approved Westinghouse CQD methodology was found acceptable for performing LBLOCA analyses for BVPS-1 and 2 and can be used to support the requested BELOCA license amendment requests. However, the NRC staff's review of the acceptability of the CQD methodology for BVPS-1 and 2 focused on assuring that the BVPS-1 and 2 specific input parameters or bounding values and ranges were used to conduct the analyses, that the analyses were conducted within the conditions and limitations of the NRC-approved Westinghouse CQD methodology, and that the results satisfied the requirements of 10 CFR 50.46(b), based on the current licensed power level of 2697 MWt. With regard to the SG replacement, the NRC staff will assure that the analyses appropriately considered the resulting plant changes as part of its review of the SG replacement license amendment request. While the NRC staff considers that the BVPS-1 and 2 BELOCA analyses conducted with the Westinghouse CQD methodology likely bound the licensee's request to increase the licensed power level to 2900 MWt, the NRC staff will confirm that these analyses support the operation at the EPU conditions as part of its review of those license amendment requests.

This SE addresses only the acceptability of the Westinghouse BELOCA methodology for analyzing LBLOCAs at BVPS-1 and 2 with atmospheric containments, BVPS-1 with replacement SGs, and EPU conditions for both units. This review also has confirmed the specific application of the Westinghouse BELOCA methodology for analyzing LBLOCAs at BVPS-1 and 2 with atmospheric containments, and BVPS-1 with replacement SGs. This methodology does not apply to small-break (SB) LOCAs. However, there may be issues identified in the NRC staff's review of the SBLOCA that may affect the findings and conclusions reached in this SE. The specific application of the Westinghouse BELOCA methodology to EPU conditions for both units will be included in a review dedicated to the EPU amendment requests. Should issues be identified during the review of the SBLOCA analyses performed by the licensee for the EPU that may affect the NRC staff's findings and conclusions in this SE, the NRC staff will address the issues within the EPU SE.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (69 FR 70718). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: F. Orr

Date: February 6, 2005