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August 19, 2005
L-05-143

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

Subject: Beaver Valley Power Station, Unit Nos. 1 and 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
Response to Request for Additional Information in Support of LAR Nos. 309 and 181 to Increase Surveillance Test Interval for Reactor Trip System and Engineered Safety Features Actuation System Instrumentation

This letter provides the FirstEnergy Nuclear Operating Company (FENOC) response to Question 3 of an NRC request for additional information (RAI) dated December 14, 2004, relating to FENOC letter L-04-077 dated June 2, 2004. The response to RAI Question 3 forwarded with this letter supercedes the original response to Question 3 provided in FENOC letter L-05-010 dated February 23, 2005.

FENOC letter L-04-077 submitted License Amendment Request (LAR) No. 309 for Beaver Valley Power Station (BVPS) Unit No. 1 and LAR No. 181 for BVPS Unit No. 2. This amendment request proposed changes to the BVPS Unit Nos. 1 and 2 Technical Specifications that would increase the surveillance test interval from monthly to quarterly for certain Reactor Trip System (RTS) and Engineered Safety Features Actuation System (ESFAS) instrumentation.

On July 19, 2005 a conference call was held between the NRC and the BVPS staff listed in Enclosure 1. During this call the NRC staff requested clarification of the FENOC response provided in FENOC Letter L-05-010. The NRC staff requested that FENOC 1) Indicate if the submittal was intended to be risk-informed or not, and 2) Provide information in response to RAI Question 3 describing how the method of evaluation for plant-specific instruments compared to the methodology and acceptance criteria of WCAP-10271.

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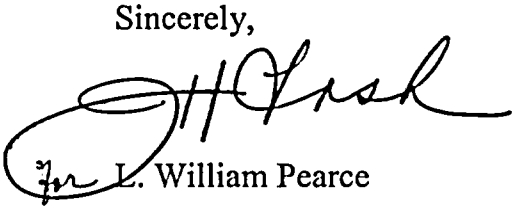
The revised FENOC response to RAI Question 3, provided in Enclosure 2, does not present risk-informed arguments but describes the method used to evaluate the proposed surveillance interval changes and the impact of the changes on signal unavailability similar to the NRC approved methodology of WCAP-10271. The responses to Questions 1 and 2 of the December 14, 2004 RAI are provided in our February 23, 2005 letter and have not changed.

The information provided with this submittal does not change the evaluations or conclusions of the No Significant Hazards Consideration presented in FENOC letter L-04-077. No new regulatory commitments are included in this submittal. If there are any questions concerning this matter, please contact Mr. Henry L. Hegrat, Supervisor - Licensing, at 330-315-6944.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 19, 2005.

Sincerely,



for L. William Pearce

Enclosures:

1. July 19, 2005 Telephone Conference Participants
2. FENOC Response to Question 3 of the Request for Additional Information

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
Mr. D. A. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

L-05-143 ENCLOSURE 1

July 19, 2005 Telephone Conference Participants

NRC

T. G. Colburn

C. K. Doutt

FENOC

C. P. Keller

F. W. Etzel

S. J. Sarver

K. A. McMullen

L-05-143 ENCLOSURE 2

**BEAVER VALLEY POWER STATION, UNIT NO. 1 AND NO. 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI)
QUESTION 3, RELATED TO INCREASE SURVEILLANCE TEST INTERVAL
FOR SELECTED REACTOR TRIP SYSTEM AND
ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION**

By letter dated June 2, 2004, FirstEnergy Nuclear Operating Company (the licensee) requested an amendment to the BVPS-1 and BVPS-2 Technical Specifications (TSs) to increase the surveillance test interval for selected reactor trip system and engineered safety features actuation system instrumentation. The Nuclear Regulatory Commission (NRC) staff has determined that the additional information below is needed to complete its review of the licensee's application.

3. **Regarding applicability of the generic analysis to BVPS-1 and 2, the licensee stated that the remaining changes have been analyzed by Westinghouse using the methodology employed by WCAP-10271. The NRC staff requests the licensee discuss in greater detail the applicability of WCAP-10271 to its facilities.**

Response:

The generic applicability of WCAP-10271 to Beaver Valley Power Station Units 1 and 2 (BVPS-1 and -2) was addressed in License Amendment Requests (LARs) 309 and 181. These LARs extend the Technical Specification changes to several signals not explicitly evaluated in the WCAP. The approach used to demonstrate the applicability of these changes to the additional signals follows the approach used in WCAP-10271, which was reviewed and approved by the NRC. This includes an assessment of the impact of the Technical Specification changes on the signal unavailabilities. This unavailability impact was evaluated for most reactor trip and engineering safety feature actuation signals common to Westinghouse NSSS plants. The Staff approved the changes requested in WCAP-10271 based on the Westinghouse Owners Group (WOG) analysis documented in WCAP-10271 with Supplements 1 and 2 (References 1, 2, 3), supplemented by the Brookhaven National Laboratory (BNL) review and accompanying assessments documented in the BNL Technical Evaluation Report (TER).

In Section 3.0 of the NRC's Safety Evaluation (SE) on WCAP-10271 with Supplement 1 (contained in WCAP-10271-P-A) the staff concluded that the WOG methodology employed was acceptable and that the proposed change in Reactor Trip System (RTS) unavailability is very small, and therefore, also acceptable. In Section 3.0 it is also stated, "The results from the unavailability estimates for each function all show the same trend which is an increase of about a factor of 2-8 in failure probability per demand for the modified case over the base case."

In Section 5 of the NRC's SE on WCAP-10271, Supplement 2 (contained in WCAP-10271-P-A, Supplement 2, Revision 1) it is stated, "The staff therefore concludes that the analysis presented in WCAP-10271 Supplement 2 and WCAP-10271 Supplement 2, Revision 1, augmented by the [BNL] TER, form an acceptable basis for increasing the STI for ESFAS analog channels from 1 month to 3 months."

Some signals were not specifically included in the generic work documented in WCAP-10271 with Supplements 1 and 2. These include Refueling Water Storage Tank (RWST) functional units and Loss of Power functional units, which were subsequently evaluated to demonstrate that the WCAP-10271 (plus Supplements 1 and 2) methodology is applicable to these plant-specific signals. This subsequent evaluation, discussed in the paragraphs below, demonstrates that the proposed changes have an acceptably small impact on the unavailability of these additional signals similar to the signals analyzed in WCAP-10271 with Supplements 1 and 2.

The evaluation assumed extended Allowable Outage Time (AOT) and bypass test times greater than those assumed in WCAP-10271, in addition to increasing the analog channel Surveillance Test Interval (STI) to 3 months. Therefore, the subsequent evaluation is conservative in that it overestimates the impact on signal unavailability compared to the WCAP-10271 evaluated changes.

REFUELING WATER STORAGE TANK LEVEL FUNCTIONAL UNITS
1.1.c (BVPS-1) and 1.1.b (BVPS-2)

Evaluation of the RWST functional units was required because WCAP-10271 and supplements did not evaluate this function.

The RWST functional units were evaluated using similarity arguments. Similarity arguments compared the type of logic cabinet, the type of channel logic, number of slave relays and number of master relays for the configurations being analyzed for BVPS to the configurations that were analyzed and approved by the NRC in WCAP-10271. For the RWST signals, consistent with the Staff's review and acceptance of WCAP-10271, the acceptance criteria is based on a signal unavailability impact similar to the signals included in WCAP-10271 with Supplements 1 and 2.

The impact of the RWST transfer to recirculation signal unavailability was analyzed by comparison of the BVPS signal logic and parameters to those of the Auxiliary Feedwater Pump Start w/Common Cause Failures (AFWPS) case as analyzed in WCAP-10271.

A comparison of the BVPS RWST signal with the AFWPS signal on steam generator low-low signal with a 2/4 signal logic and with Solid State Protection System logic cabinets concluded that the two signals share enough similarity to be acceptable for comparison. Because the channel that produces the BVPS-2 RWST signal, as compared to the channel that produces the BVPS-1 RWST signal, contains an extra slave relay, the BVPS-2 RWST channel was used as the basis for the assessment since it will produce a more conservative result with a higher signal unavailability. In addition, because BVPS Technical Specifications allow an RWST channel to be placed in bypass for an unlimited length of time, the analysis was performed assuming one channel in bypass and a 2/3 logic for the entire fuel cycle. The resulting signal unavailability results are conservative since the channel is not expected to be out of service for the entire fuel cycle.

Analysis of the RWST signal resulted in an increase in signal unavailability of 1.4E-03. The signal unavailability increases provided in WCAP-10271, Supplement 2 range from 2E-03 to 5E-03. This demonstrates that the RWST signal unavailability impact is small and adequately represented by the signal unavailabilities evaluated in WCAP-10271, Supplement 2 and approved by the NRC.

LOSS OF POWER FUNCTIONAL UNITS
6.a (BVPS-1), 6.b (BVPS-1), 6.a.1 (BVPS-2), 6.a.2 (BVPS-2), 6.b (BVPS-2), and 6.c (BVPS-2)

Evaluation of the Loss of Power functional units was required because WCAP-10271 and supplements did not evaluate these signals.

Loss of power functional units were evaluated using a fault tree analysis. Fault trees were developed and quantified using the failure probabilities provided for both the pre-Technical Specification Optimization Program (Pre-TOP) and Proposed cases. The same fault tree logic was used for both the Pre-TOP and Proposed cases, but quantified with different failure probabilities due to the increase in the surveillance test interval, and changes in AOTs and bypass test times. The analyses considered operator action as a backup to the automatic signals. The increase in signal failure probability resulting from the proposed Technical Specification changes was compared with the failure probability of the component being actuated. The general guidance used was that the impact on the signal failure probability should be at least two orders of magnitude lower than the failure probability of the actuated component. A change this small in magnitude, when compared to the signal unavailabilities evaluated in WCAP-10271, Supplement 2, will have a negligible impact on the reliability of the associated mitigation component and system.

<u>BVPS-1: 4kV Emergency Bus Undervoltage- Loss of Voltage (trip feed and start DG)-functional unit 6.a.</u>

The signals for both the "trip of the normal electrical power to the emergency bus" and "start the diesel on the emergency bus" functions were evaluated by fault tree analysis. The increase in the signal unavailability was obtained by calculating the difference between the pre-Technical Specification Optimization Program (TOP) case and the Proposed case. Signal unavailability results are as follows:

Trip the normal electrical power	Pre-TOP case is 5.274E-03 Proposed case is 5.281E-03 Increase in signal to start (automatic or operator action) = 7E-06
Start the diesel	Pre-TOP case is 3.703E-03 Proposed case is 3.710E-03 Increase in signal to start (automatic or operator action) = 7E-06

The diesel generator failure to start probability for BVPS-1 is 9.92E-03/demand. The impact of the changes on the signal unavailability is 7E-06. The small increase in failure probability due to the proposed changes is acceptable based on the negligible impact on the probability of the diesel generator failing to start, and is consistent with the WCAP-10271 acceptance criteria of a small increase in signal unavailability.

BVPS-1: 4kV and 480V Emergency Bus Undervoltage- Degraded Voltage- functional unit 6.b.

The signals for the 4kV and 480V degraded voltage functions were evaluated by fault tree analysis. The increase in the signal unavailability was obtained by calculating the difference between the pre-TOP case and the Proposed case. Signal unavailability results are as follows:

Start the diesel	Pre-TOP case is 3.606E-03 Proposed case is 3.616E-03 Increase in signal to start (automatic or operator action) = 1.0E-05

The diesel generator failure to start probability for BVPS-1 is 9.92E-03/demand. The impact of the changes on the signal unavailability is 1.0E-05. This represents a very small impact on the reliability of successfully starting the diesel generator; therefore, it is concluded that this change will have a negligible impact on probability of the diesel generator failing to start, and is consistent with the WCAP-10271 acceptance criteria of a small increase in signal unavailability.

BVPS-2: 4kV Emergency Bus- Undervoltage (trip feed) – functional unit 6.a.1.

The signals for the "trip of the normal electrical power to the emergency bus" functions were evaluated by fault tree analysis. The increase in the signal unavailability was obtained by calculating the difference between the pre-TOP case and the Proposed case. Signal unavailability results are as follows:

Trip the normal electrical power	Pre-TOP case is 4.700E-03 Proposed case is 4.714E-03 Increase in signal to start (automatic or operator action) = 1.4E-05

The diesel generator failure to start probability for BVPS-2 is 2.78E-03/demand. The impact of the changes on the signal unavailability is 1.4E-05. The small increase in failure probability due to the proposed changes is acceptable based on the negligible increase in the probability of the diesel generator failing to start, and is consistent with the WCAP-10271 acceptance criteria of a small increase in signal unavailability.

BVPS-2: 4kV Emergency Bus- Undervoltage (start diesel) – functional unit 6.a.2.

The signals for the "start the diesel" functions were evaluated by fault tree analysis. The increase in the signal unavailability was obtained by calculating the difference between the pre-TOP case and the Proposed case. Signal unavailability results are as follows:

Start the diesel	Pre-TOP case is 7.600E-04 Proposed case is 7.672E-04 Increase in signal to start (automatic or operator action) = 7.2E-06

The diesel generator to start probability for BVPS-2 is 2.78E-03/demand. The impact of the changes on the signal unavailability is 7.2E-06. The small increase in failure probability due to the proposed changes is acceptable based on the negligible impact on the probability of the diesel generator failing to start, and is consistent with the WCAP-10271 acceptance criteria of a small increase in signal unavailability.

BVPS-2: 4kV and 480V Emergency Bus- Degraded Voltage- functional units 6.b and 6.c.

The signals for the 4kV and 480V degraded voltage signal were evaluated by fault tree analysis. The increase in the signal unavailability was obtained by calculating the difference between the pre-TOP case and the Proposed case. Signal unavailability results are as follows:

Start the diesel	Pre-TOP case is 7.643E-03 Proposed case is 7.652E-03 Increase in signal to start (automatic or operator action) = 9E-06

The diesel generator failure to start probability for BVPS-2 is 2.78E-03/demand. The impact of the changes on the signal unavailability is 9E-06. This represents a very small impact on the probability of the diesel generator failing to start; therefore, it is concluded that this change will have a negligible impact on diesel start. The small increase in signal unavailability is consistent with the WCAP-10271 acceptance criteria of a small increase in signal unavailability.

REFERENCES

1. WCAP-10271-P-A, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," May 1986.
2. WCAP-10271, Supplement 1-P-A, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System, Supplement 1," May 1986.
3. WCAP-10271-P-A, Supplement 2, Revision 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Feature Actuation System," May 1989.