

September 19, 2005

Mr. L. William Pearce  
Vice President  
FirstEnergy Nuclear Operating Company  
Beaver Valley Power Station  
Post Office Box 4  
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2) -  
ISSUANCE OF AMENDMENT RE: REACTOR TRIP SYSTEM (RTS) AND  
ENGINEERED SAFETY FEATURES ACTUATION SYSTEM (ESFAS)  
INSTRUMENTATION SURVEILLANCE EXTENSION (TAC NOS. MC3404 AND  
MC3405)

Dear Mr. Pearce:

The Commission has issued the enclosed Amendment No. 267 to Facility Operating License No. DPR-66 and Amendment No. 149 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 June 2, 2004, as supplemented February 23 and August 19, 2005.

These amendments increase the surveillance interval from monthly to quarterly for certain RTS and ESFAS channel functional tests.

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, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures: 1. Amendment No. 267 to DPR-66  
2. Amendment No. 149 to NPF-73  
3. Safety Evaluation

cc w/encls: See next page

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ACCESSION NO. ML052570153

\*SE input provided. No substantive changes made.

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PENNSYLVANIA POWER COMPANY

OHIO EDISON COMPANY

FIRSTENERGY NUCLEAR OPERATING COMPANY

DOCKET NO. 50-334

BEAVER VALLEY POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 267  
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 June 2, 2004, as supplemented February 23 and August 19, 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. 267, 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 within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Richard J. Laufer, Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: September 19, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 267

FACILITY OPERATING LICENSE NO. DPR-66

DOCKET NO. 50-334

Replace the following pages of Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

3/4 3-12  
3/4 3-29a  
3/4 3-31  
3/4 3-31a

Insert

3/4 3-12  
3/4 3-29a  
3/4 3-31  
3/4 3-31a

PENNSYLVANIA POWER COMPANY  
OHIO EDISON COMPANY  
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
THE TOLEDO EDISON COMPANY  
FIRSTENERGY NUCLEAR OPERATING COMPANY  
DOCKET NO. 50-412  
BEAVER VALLEY POWER STATION, UNIT NO. 2  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 149  
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 June 2, 2004, as supplemented February 23 and August 19, 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. 149, 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 within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Richard J. Laufer, Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: September 19, 2005



ATTACHMENT TO LICENSE AMENDMENT NO. 149

FACILITY OPERATING LICENSE NO. NPF-73

DOCKET NO. 50-412

Replace the following pages of Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

3/4 3-11  
3/4 3-33  
3/4 3-36  
3/4 3-37

Insert

3/4 3-11  
3/4 3-33  
3/4 3-36  
3/4 3-37

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NOS. 267 AND 149 TO FACILITY OPERATING  
LICENSE NOS. DPR-66 AND NPF-73  
PENNSYLVANIA POWER COMPANY  
OHIO EDISON COMPANY  
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
THE TOLEDO EDISON COMPANY  
FIRSTENERGY NUCLEAR OPERATING 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 June 2, 2004 (Agencywide Documents Access and Management System (ADAMS) Accession No. MI041610242), as supplemented February 23 (ADAMS Accession No. ML050590240) and August 19, 2005 (ADAMS Accession No. ML052350561), the FirstEnergy Nuclear Operating Company (FENOC, the licensee), requested changes to the Technical Specifications (TSs) for BVPS-1 and 2. The supplements dated February 23 and August 19, 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 July 6, 2004 (69 FR 40674).

The proposed changes would revise the TS 3/4 3.1, "Reactor Trip System [RTS] Instrument," and 3/4 3.2, "Engineered Safety Features Actuation System [ESFAS] Instrument," to increase the surveillance interval from monthly to quarterly for certain RTS and ESFAS instrument channel functional tests. The proposed changes are based on the methodology described in WCAP-10271, Supplement 2, and WCAP-10271, Supplement 2, Revision 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," and supplements thereto.

The proposed changes would increase the surveillance test interval (STI) to quarterly for (1) functional items 16 and 17, instrumentation channels listed in BVPS-1, Table 4.3-1, "Reactor Trip Instrumentation Surveillance Requirements," and functional items 1.1.c, 6.a, 6.b, and 7.b,

instrumentation channels listed in BVPS-1, Table 4.3-2, "Engineered Safety Feature Actuation System Instrumentation," and (2) functional items 16 and 17, instrumentation channels listed in BVPS-2, Table 4.3-1, "Reactor Trip Instrumentation Surveillance Requirements," and functional items 1.1.b, 6.a.1, 6.a.2, 6.b, 6.c, and 7.c, instrumentation channels listed in BVPS-2, Table 4.3-2, "Engineered Safety Featured Actuation System Instrumentation."

The proposed changes do not involve changes to actuation setpoints, setpoint tolerance, testing acceptance criteria, or channel response times. No hardware changes are proposed or required to implement these changes at the plant. The licensee stated that this relaxation will allow more time for maintenance and testing activities, enhance safety, provide additional operational flexibility, and reduce the potential for forced outages to comply with the current RTS/ESFAS instrumentation TSs. The licensee explained that industry information has shown that a significant number of reactor trips are related to instrumentation test and maintenance activities, indicating that the TSs should provide sufficient time to complete these activities in an orderly and efficient manner.

## 2.0 BACKGROUND

Since 1983, the NRC and industry representatives (e.g., the Westinghouse Owners Group (WOG)) have developed guidelines for improving nuclear power plant TS content and quality. The WOG initiated a program to develop a justification for revising generic and plant-specific instrumentation TSs as part of the Technical Specification Optimization Program (TOP). The results of the WOG studies and the recommended changes to the testing of reactor protection and engineered safeguards instrumentation were documented in WCAP-10271-P-A and WCAP-10271-P-A, Supplement 2, Revision 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation System." In February 1985, the NRC issued a safety evaluation report (SER) for WCAP-10271 and WCAP-10271, Supplement 1. The SER approved extending the surveillance testing frequency from monthly to quarterly for selected analog channels of the RTS. The quarterly testing had to be conducted on a staggered basis. The SER specifically stated that for analog channels shared by the RTS and the ESFAS, the approved relaxations applied only to the RTS function.

On March 20, 1986, the WOG submitted WCAP-10271, Supplement 2. On May 12, 1987, the WOG submitted WCAP-10271, Supplement 2, Revision 1. Supplement 2 and Supplement 2, Revision 1, demonstrated the applicability of the justification in WCAP-10271 to the ESFAS for two-, three-, and four-loop plants with either relay or solid-state protection systems. In February 1989, the NRC issued the SER for WCAP-10271, Supplement 2, and WCAP-10271, Supplement 2, Revision 1. The SER approved quarterly testing, 6 hours to place a failed channel in tripped mode, longer completion times (CTs) for testing and maintenance, and testing in bypass for analog channels of the ESFAS. Staggered testing was not required for ESFAS analog channels and the requirement was removed for the RTS analog channels. In April 1990, the NRC issued a supplement SER (SSER) for WCAP-10271, Supplement 2, to approve the same relaxations for the analog channels of the RTS and ESFAS. The CTs for testing and maintenance of the RTS and ESFAS actuation logic were also the same.

A 1992 NRC evaluation of surveillance testing at power indicated that testing could be reduced in many areas without significantly decreasing safety. This evaluation is documented in NUREG-1366, "Improvement to Technical Specifications Surveillance Requirements," and

Generic Letter 93-05, "Line-Item Technical Specifications Improvements to Reduce Surveillance Requirements for Testing During Power Operation." Both documents recommended reduced surveillance testing of the RPS and ESFAS analog instrumentation.

The approach used in this program is consistent with the NRC approach for using probabilistic risk assessment in risk-informed decisions on plant-specific changes to the current licensing basis, as described in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," and RG 1.177, "An Approach for Plant-Specific Risk-Informed Decisionmaking: Technical Specifications."

### 3.0 REGULATORY EVALUATION

Section 50.36(c)(3), "Technical specifications," of Title 10 of the *Code of Federal Regulations* (10 CFR), requires a licensee's TSs to have the surveillance requirements (SRs) for testing, calibration, and inspection to assure that the necessary quality of systems and components is maintained, that facility operations remain within safety limits, and that the limiting conditions for operation (LCOs) will be met. The SRs may include mode restrictions based on the safety aspects of conducting the surveillance in excluded modes. Although 10 CFR 50.36 does not specify specific TS requirements, the rule implies that required actions for failure to meet the STIs must be based on reasonable protection of the public health and safety. Therefore, the NRC staff must have reasonable assurance that the RTS and ESFAS functions affected by the proposed TS changes will perform their required safety functions in accordance with the design-basis accident analysis in Chapter 15 of the licensee's Updated Final Safety Analysis Report (UFSAR).

The NRC staff reviewed the licensee's discussion of applicable regulatory requirements in Section 5.2 of Enclosure 1 to the application. BVPS-1 and 2 was designed and constructed and is being operated to comply with General Design Criteria (GDC) 2, 4, 10, 13, 15, 17, 18, 20, and 21 of 10 CFR Part 50, Appendix A, which provide the following design criteria for nuclear power plants:

GDC 2 requires structures, systems, and components (SSCs) important to safety be designed to withstand natural phenomena. Components include RTS/ESFAS instrumentation.

GDC 4 requires SSCs important to safety be designed to accommodate environmental conditions associated with normal plant operation, maintenance, and accidents.

GDC 10 requires the reactor core and associated coolant, control, and protection system be designed with appropriate margin to assure that specified acceptable fuel design limits.

GDC 13 requires instrumentation and control be provided to monitor variables and systems over their anticipated ranges for normal operation, anticipated operational occurrences, and accidents.

GDC 15 requires the reactor coolant system and associated control and protection systems be designed with sufficient margin to assure that the design conditions are not exceeded.

GDC 17 requires the electrical power systems be provided sufficient capacity and capability to permit functioning of SSCs important to safety.

GDC 18 requires the electrical power systems important to safety be designed with a capability to permit appropriate periodic inspection and testing of important areas and features.

GDC 20 requires protection systems (which include RTS/ESFAS instrumentation) be designed to initiate automatic operation of appropriate systems to assure fuel safety limits are not exceeded.

GDC 21 requires protection systems be designed for high functionality and testability.

The licensee stated that no changes to the design of the RTS/ESFAS instrumentation affect compliance with any of the regulatory requirements and guidance documents mentioned above. The NRC staff has reviewed the amendment application. Because the only aspects of the RTS/ESFAS instrumentation being changed are the STIs, the NRC staff concludes that the RTS/ESFAS instrumentation will continue to meet the above-referenced GDCs.

On this basis, the NRC staff reviewed the proposed TS changes against the 10 CFR 50.36 requirement that there is reasonable assurance that the RTS/ESFAS instruments affected by the proposed changes will perform their required safety functions.

#### 4.0 TECHNICAL EVALUATION

The NRC approved WCAP-10271, Supplement 2 and Supplement 2, Revision 1, in February 1989. That SER identified three conditions applicable to RTS surveillance extensions: (1) identification of common cause failures, (2) installed hardware capability for bypass testing, and (3) setpoint drift. The NRC imposed one additional condition on the licensees extending ESFAS surveillance as a result of the review of WCAP-10271, Supplement 2 and Supplement 2, Revision 1. This condition was that the licensees confirm the applicability of the generic analysis to their plant.

#### 4.1 WCAP-10271, Supplement 2, and Supplement 2, Revision 1, SER Conditions

##### a. Identification of Common Cause Failures

This condition requires that plant procedures require a common cause evaluation for failure in the RTS channels changed to the quarterly test frequency and additional testing for plausible common cause failures. In accordance with the WOG guidance, this condition is also applied to the ESFAS functions. The licensee provided a copy of its maintenance procedure which includes provisions for an evaluation of an RPS/engineered safety feature (RPS/ESF) channel failure to consider whether the failure was caused by a condition which could also exist in redundant channels. In reviewing the licensee's discussion for identification of common cause failures, the NRC staff concludes that the licensee has satisfactorily addressed this condition required in the SER for WCAP-10271 so that WCAP-10271 may be implemented at BVPS-1 and 2.

b. Installed Hardware Capability for Testing in the Bypass Mode

This condition requires that testing of RTS channels in a bypassed condition be performed without the use of temporary jumpers or by lifting leads. In accordance with WOG guidance, this condition is also applied to the ESFAS functions. The licensee's testing procedures do not require the use of temporary jumpers or lifting leads for instrument channels that are tested in bypass. Based on the above discussion, the NRC staff concludes that the licensee has acceptably addressed SER conditions for WCAP-10271 so that WCAP-10271 may be implemented at BVPS-1 and 2.

c. Setpoint Drift

This condition requires that instrument drift methodology include sufficient adjustments to offset the drift anticipated as a result of less frequent surveillance. The licensee performed the setpoint drift calculation entitled "Beaver Valley Units 1 and 2 Drift Evaluation Results for Reactor Trip System/Engineered Safety Features Actuation System (RTS/ESFAS) Relay Instrumentation." This calculation used BVPS-1 and 2 drift data to calculate a new drift term for the affected relays in support of the proposed quarterly calibrations.

The licensee provided an "Evaluation for Extension of Selected Reactor Protection System and Engineered Safety Feature Actuation System (ESFAS) Technical Specification Channel Functional Test from Monthly to Quarterly." This report compared the existing drift terms for the affected relays from the existing setpoint calculation to the new drift terms from their setpoint drift calculation. In all cases but one, the newly calculated drift terms were less than the existing drift terms for the affected relays, or the effect on margin was negligible. The one exception was the drift term associated with the setpoint calculated for functional unit 6.b (4.16 kV Emergency Bus Degraded Voltage). The setpoint calculation for functional unit 6.b was revised to reallocate margin. The setpoint was not changed as a result of this calculation.

The licensee evaluated that sufficient margin exists to extend the technical specification SRs for the evaluated functions from monthly to quarterly. Evaluated functions included RTS undervoltage and underfrequency relays and ESFAS undervoltage and underfrequency relays. The licensee confirmed that the result of this evaluation are valid for all the affected relay functions to support a license amendment submittal requesting surveillance extensions. Based on the above discussion, the NRC staff concludes that the licensee has acceptably addressed this condition for WCAP-10271.

d. Applicability of the Generic Analysis to BVPS-1 and 2

The methodology of WCAP-10271 addresses two-loop, three-loop, and four-loop Westinghouse plants with relay or solid state systems. WCAP-10271 and supplements address changes to the STIs for TS 3/4.3.1, functional units 16 and 17 (Undervoltage/Underfrequency - RCPs) at both units and for TS 3/4.3.2, functional unit 7.b (Undervoltage - RCP) for BVPS-1 and TS 3/4.3.2, functional unit 7.c (Undervoltage - RCP) for BVPS-2. The licensee reviewed to assure that the functions used in the generic analysis and the employment of the solid state protection system or protective relay to perform ESFAS functions are applicable to the BVPS design. Based on their review, the licensee concluded that all changes proposed in this amendment are addressed by the generic analysis except for



the remaining changes. In reviewing the licensee's discussion, the NRC staff concludes that the licensee has acceptably addressed the SE condition of applicability for WCAP-10271 so that WCAP-10271 can be applied to STIs for TS 3/4.3.1 Functional Units 16 and 17 (Undervoltage/Underfrequency - RCPs) at both units and for TS 3/4.3.2 Functional Unit 7.b (Undervoltage - RCP) for Unit 1 and TS 3/4.3.2 Functional Unit 7.c (Undervoltage - RCP) for Unit 2.

The licensee evaluated the remaining changes as described below using the approach employed by WCAP-10271 and WCAP-14333, "Probabilistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times." The NRC staff issued an SER approving WCAP-14333 on July 15, 1998. The approach employed in WCAP-14333 is consistent with the approach established in WCAP-10271 (i.e., the use of fault tree models, signals, component reliability database, etc.). Signals associated with the remaining TS changes were not specifically included in the generic work documented in WCAP-10271, Supplements 1 and 2. The remaining changes, including refueling water storage tank (RWST) functional units and loss of power functional units, were evaluated by the licensee to demonstrate that the WCAP-10271 surveillance test intervals are applicable to these plant-specific signals.

d.1 Refueling Water Storage Tank Level (functional units 1.1.c (Unit 1) and 1.1.b (Unit 2)):

Evaluation of the RWST functional units was required because WCAP-10271 evaluated an RWST level coincident with a high containment sump and safety injection (SI) signal. The BVPS-1 and 2 configurations do not contain a signal input from the containment sump.

RWST functional units were evaluated by the licensee using similarity arguments of the generic analysis in WCAP-10271 and WCAP-14333. 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-1 and 2 to the configurations that were analyzed and approved by the NRC for WCAP-10271 and WCAP-14333.

The licensee analyzed the impact of the RWST transfer to re-circulation signal unavailability by comparison of the BVPS-1 and 2 signal logic and parameters to those of the auxiliary feedwater pump start (AFWPS) with the common cause failures case as analyzed in WCAP-14333. The licensee's comparison of the BVPS-1 and 2, RWST signals with the AFWPS signal on steam generator low-low signal with a 2/4 signal logic and with solid state protection system cabinets analyzed in WCAP-14333 concluded that the two channels shared enough similarity to be acceptable for comparison. Because BVPS-2 contains an extra slave relay, the BVPS-2 RWST signal was used as the basis for the assessment since it will produce a more conservative result with a higher failure probability. In addition, because BVPS-1 and 2 TSs 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.

Based on the above, NRC staff concludes that the increase in surveillance test intervals is acceptable for the RWST transfer to recirculation signal at BVPS-1 and 2.

d.2 Loss of Power (functional units 6.a (Unit 1), 6.b (Unit 1), 6.a.1 (Unit 2), 6.a.2 (Unit 2), 6.b (Unit 2), and 6.c (Unit 2)):

Evaluation of the loss of power functional units was required because WCAP-10271 evaluated the loss of power function relays for a 4-channels bus configuration, which is different from the BVPS-1 and 2 configurations.

Loss of power functional units were evaluated by the licensee using a fault tree analysis. The increase in the signal failure probability resulting from the increased surveillance test interval is compared with the failure probability of the component being actuated. The licensee's justification of the surveillance test interval changes are based on the failure probability evaluation for component being actuated. The licensee developed fault tree models consistent with the fault tree models developed in WCAP-10271 and WCAP-14333. Failure trees were developed and quantified using the failure probabilities provided for both pre-technical specification optimization program (Pre-TOP) and the proposed case. The same fault tree logic was used for the Pre-TOP, but quantified with different failure probabilities due to the increase in the surveillance test interval, and changes in allowed outage times (AOTs) and bypass test times. The licensee concluded that the increase in signal failure probability resulting from the increased surveillance test interval was insignificant and will have negligible impact on the reliability of the associated mitigation component and system, and essentially no impact on plant risk.

#### 4.2 Risk Insights

As part of the evaluation of the RTS and ESFAS license amendment request, the licensee provided signal unavailability risk insights based on plant-specific analysis for functional units not specifically evaluated by the referenced Topical Report WCAP-10271.

Accordingly, the NRC staff review scope was limited to the evaluation of the risk impact and potential risk implications of the licensee's TS amendment request. The review was based on NUREG-0800, Chapter 19, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking: General Guidance," Appendix D, "Use of Risk Information in Review of Non-Risk-Informed License Amendment Requests." Appendix D provides review and assessment guidance on whether a "special circumstance" exists such that the normal presumption of adequate protection is no longer met by compliance with existing regulatory requirements. The staff also utilized the risk-informed decisionmaking process in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and RG 1.177, "An Approach for Plant-Specific, Risk Informed Decisionmaking: Technical Specifications," in its review. The guidance in RG 1.177 states that the risk associated with the proposed change may be acceptable if (1) the current regulations are met, (2) operation is consistent with the defense-in-depth philosophy, (3) sufficient safety margin is maintained, (4) only a small increase in risk (e.g., core damage frequency (CDF)) results, and (5) the basis for the risk estimate is monitored using performance measurement strategies. The NRC staff review responsibility for risk insights is concerned with items 4 and 5. The conformance to current regulations, defense-in-depth, and adequate safety margins were considered part of the deterministic review scope discussed previously. In addition, in performing its evaluation of risk insights, the NRC staff did not specifically evaluate traditional engineering insights such as vendor maintenance



recommendations, surveillance or maintenance history, instrument loop analog circuitry/logic, or topical report recommendations (not specific to probabilistic risk assessment (PRA) analysis). Because the licensee's amendment request was not risk-informed, the NRC staff limited its review scope to the licensee's signal unavailability insights.

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

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-TOP case and the proposed case. Based on the licensee's analysis, the impact of the changes on the signal unavailability is  $7\text{E-}06$ . The DG failure to start probability for BVPS-1 is  $9.92\text{E-}03/\text{demand}$ . The licensee concluded that an increase in failure probability due to the proposed changes is acceptable based on the negligible impact on the probability of the DG failing to start.

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

The signals for the 4kV and 480 V 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. Based on the licensee's analysis, the impact of the changes on the signal unavailability is  $1.0\text{E-}05$ . The DG failure to start probability for BVPS-1 is  $9.92\text{E-}03/\text{demand}$ . This represents a very small impact on the reliability of successfully starting the DG; therefore, the licensee concluded that this change will have a negligible impact on probability of the DG failing to start and negligible impact on plant risk.

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

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. Based on the licensee's analysis, the impact of the changes on the signal unavailability is  $1.4\text{E-}05$ . The diesel generator failure to start probability for BVPS-2 is  $2.78\text{E-}03/\text{demand}$ . The licensee concluded that the small increase in failure probability due to the proposed change is acceptable based on the negligible increase in the probability of the DG failing to start, and therefore, the negligible impact on plant risk.

- d. 4kV Emergency Bus - Undervoltage (start diesel), (functional unit 6.a.2, (BVPS-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. Based on the licensee's analysis, the impact of the change on the signal unavailability is  $7.2\text{E-}06$ . The DG failure to start probability for BVPS-2 is  $2.78\text{E-}03/\text{demand}$ . The licensee concluded that the small increase in

failure probability due to the proposed change is acceptable on the negligible impact on the probability of the DG failing to start, and therefore, negligible impact on plant risk.

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

The signals for 4kV and 480V degraded voltage signal were evaluated by fault tree analysis. The increase in the signal unavailability was obtained by calculating the difference the pre-TOP case and the proposed case. Based on the licensee's analysis, the impact of the changes on the signal unavailability is  $9\text{E-}06$ . The DG failure to start probability for BVPS-2 is  $2.78\text{E-}03/\text{demand}$ . The licensee concluded that this represents a very small impact on the probability of the DG failing to start and, therefore, this change will have a negligible impact on diesel start reliability and a negligible impact on plant risk.

The primary purpose of surveillance testing is to assure that the components in a standby system (safety system) will be operable when needed. The risk contribution associated with the STI is mainly due to the possibility that the component will fail between consecutive tests. By testing these components, failures can be detected that may have occurred since the last surveillance and the risk due to undetected failures can be limited. However, increasing the time between surveillance tests may also have some benefits. Increased surveillance intervals may reduce test-induced transients, test-caused failures, equipment wear, and reduce required resources for testing. The disadvantage is the time a component will be subject to failure (the fault exposure time) will increase with an increased STI.

For this amendment request, the licensee evaluated the change in STI from the current 31 days to the proposed 92 days for the RWST and loss of power instrumentation functional units. The licensee evaluation was based on WCAP-10271 and its supplements. Increasing the STI for the RWST level and loss of power instrumentation was not specifically analyzed by WCAP-10271.

For the RWST instrumentation, the analysis compared the RWST signal unavailability to similar loop instrumentation analyzed by WCAP-10271. For the RWST, the licensee compared the RWST signal unavailability to those analyzed by the topical report. The licensee's unavailability results were small but representative of the results provided in WCAP-10271. The NRC staff, as a check, performed a confirmatory calculation using a simplified model for the licensee's plant. The NRC staff results support the licensee's findings that the proposed loss of power functional STI extension results in a minimal change in plant risk for the proposed RWST STI.

For the loss of power instrumentation, the licensee compared the pre-TOP signal failure probability with the proposed case. The general acceptance guidance, used by the licensee, was to screen signal failure probability if it was found to be at least two orders of magnitude lower than the failure probability of the actuated component. This is based on the small impact such a change would have on the mitigation capability of the actuated system and associated minimal impact on plant risk. The NRC staff, as a check, performed confirmatory calculations using a simplified model for the licensee's plant. The NRC staff's results support the licensee's findings that the proposed loss of power functional STI extension results in a minimal change in plant risk for the proposed increased STI.

Based on the licensee's analysis and the NRC staff's confirmatory calculation, the NRC staff concludes that the proposed RWST and loss of power instrumentation functional units STI increase should result in only a minimal impact on plant risk for BVPS-1 and 2.

The NRC staff finds that the licensee's increase in the STIs for the functional units not evaluated by WCAP-10271 does not reveal an unforeseen hazard or substantially greater potential for a known hazard to occur based on the minimal increase in reactor protection system and ESFAS unavailability. The NRC staff notes that the estimated risk impacts are small and should not significantly influence the overall results of the licensee's deterministic analysis. The NRC staff did not identify "special circumstances" that, if reviewed on risk-informed basis, would invalidate the assumption of adequate protection, warrant attaching additional conditions, or result in denial of the proposed license amendment. Although the NRC staff used RG 1.174 and RG 1.177 as guidance in its evaluation of the licensee's amendment request, the NRC staff's review was limited to confirming the reasonableness of the licensee's unavailability insights. The license amendment request did not follow the guidance of RG 1.174 or 1.177, but was based instead on Topical Report WCAP-10271 and traditional engineering analysis. The NRC staff did not specifically evaluate traditional engineering insights such as vendor maintenance recommendations, surveillance or maintenance history, instrument loop analog circuitry/logic, or topical report recommendations (not specific to PRA analysis).

These risk insights demonstrated that the WCAP-10271 changes, based on a plant-specific evaluation, are applicable to STIs for RWST Level (functional units 1.1.c (Unit 1) and 1.1.b (Unit 2)), and Loss of Power (functional units 6.a (Unit 1), 6.b (Unit 1), 6.a.1 (Unit 2), 6.a.2 (Unit 2), 6.b (Unit 2), and 6.c (Unit 2)). Therefore, the proposed STI changes to the RTS and ESFAS components are acceptable.

## 5.0 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.

## 6.0 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. 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 40674). 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.

## 7.0 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.

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