

September 29, 2005

Mr. L. William Pearce  
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 - ISSUANCE OF  
AMENDMENT RE: INCREASE OF THE EMERGENCY DIESEL GENERATOR  
(EDG) ALLOWED OUTAGE TIME FROM 72 HOURS TO 14 DAYS (TAC NOS.  
MC3331 AND MC3332)

Dear Mr. Pearce:

The Commission has issued the enclosed Amendment No. 268 to Facility Operating License No. DPR-66 and Amendment No. 150 to Facility Operating License No. NPF-73 for the Beaver Valley Power Station, Unit Nos. 1 and 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated May 26, 2004, as supplemented by letters dated October 29 and December 3, 2004, and January 18, June 15, and August 15, 2005.

The amendments extend the allowable outage time for the EDGs from 72 hours to 14 days. The amendments also delete surveillance requirement (SR) 4.8.1.1.2.b.1 concerning periodic EDG inspections. Requirements for periodic EDG inspections will be specified in a licensee-controlled EDG maintenance program referenced in the Updated Final Safety Analysis Report. The amendments also revise footnote (1) of TS 3.8.1.1 to clarify the wording to allow actions to be delayed for up to 7 days to allow time to restore fuel oil back to its specified limits when an EDG is inoperable solely due to failure to meet fuel oil property limits of SR 4.8.1.1.2.d.2 or SR 4.8.1.1.2.e.

L. Pearce

-2-

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. 268 to DPR-66  
2. Amendment No. 150 to NPF-73  
3. Safety Evaluation

cc w/encls: See next page

L. Pearce

-2-

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

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Timothy G. Colburn, Senior Project Manager, Section 1  
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2. Amendment No. 150 to NPF-73  
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cc w/encls: See next page

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\*SE input provided. No substantive changes made.

|        |          |          |           |          |          |          |          |
|--------|----------|----------|-----------|----------|----------|----------|----------|
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| DATE   | 9/28/05  | 09/27/05 | 09/02/05  | 02/24/05 | 09/19/05 | 9/29/05  | 9/28/05  |

OFFICIAL RECORD COPY

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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. 268  
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 May 26, 2004, as supplemented by letters dated October 29 and December 3, 2004, and January 18, June 15, and August 15, 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, (a) when exercising the extended Emergency Diesel Generator allowed outage time (greater than 72 hours) in the operation of the Emergency Diesel Generators required by Technical Specification 3.8.1.1., the licensee shall, within 72 hours of entering an unplanned outage and within 1 hour of entering a planned outage, provide an additional AC power source (AACPS) capable of supplying safe shutdown loads during station blackout without the need for rescheduling of safety system operation in the unaffected unit; (b) if an AACPS of the required capacity is not available after entering the extended allowed outage time (i.e., after 72 hours), the technical specification requirement to be in at least hot standby within the next 6 hours and in cold shutdown within the following 30 hours shall apply; and (b) 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. 268, 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. The implementation shall include the commitments as described in the licensee's submittal dated May 26, 2004, as supplemented by letters dated December 3, 2004, and January 18, 2005, and as described in the NRC staff's safety evaluation related to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/ JBoska for RLaufer***

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 29, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 268

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.

| <u>Remove</u> | <u>Insert</u> |
|---------------|---------------|
| 3/4 8-1       | 3/4 8-1       |
| 3/4 8-2       | 3/4 8-2       |
| 3/4 8-3       | 3/4 8-3       |
| 3/4 8-4       | 3/4 8-4       |
| B 3/4 0-7     | B 3/4 0-7     |
| B 3/4 8-1     | B 3/4 8-1     |
| B 3/4 8-2     | B 3/4 8-2     |
| B 3/4 8-3     | B 3/4 8-3     |
| --            | B 3/4 8-4     |
| --            | B 3/4 8-5     |

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 2  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 150  
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 May 26, 2004, as supplemented by letters dated October 29 and December 3, 2004, and January 18, June 15, and August 15, 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, (a) when exercising the extended Emergency Diesel Generator allowed outage time (greater than 72 hours) in the operation of the Emergency Diesel Generators required by Technical Specification 3.8.1.1., the licensee shall, within 72 hours of entering an unplanned outage and within 1 hour of entering a planned outage, provide an additional AC power source (AACPS) capable of supplying safe shutdown loads during station blackout without the need for rescheduling of safety system operation in the unaffected unit; (b) if an AACPS of the required capacity is not available after entering the extended allowed outage time (i.e., after 72 hours), the technical specification requirement to be in at least hot standby within the next 6 hours and in cold shutdown within the following 30 hours shall apply; and (b) 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. 150, 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. The implementation shall include the commitments as described in the licensee's submittal dated May 26, 2004, as supplemented by letters dated December 3, 2004, and January 18, 2005, and as described in the NRC staff's safety evaluation related to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/ JBoska for RLaufer***

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 29, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 150

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.

| <u>Remove</u> | <u>Insert</u> |
|---------------|---------------|
| 3/4 8-1       | 3/4 8-1       |
| 3/4 8-2       | 3/4 8-2       |
| 3/4 8-3       | 3/4 8-3       |
| 3/4 8-4       | 3/4 8-4       |
| B 3/4 0-6     | B 3/4 0-6     |
| B 3/4 8-1     | B 3/4 8-1     |
| B 3/4 8-2     | B 3/4 8-2     |
| B 3/4 8-3     | B 3/4 8-3     |
| --            | B 3/4 8-4     |
| --            | B 3/4 8-5     |

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NOS. 268 AND 150 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  
DOCKET NOS. 50-334 AND 50-412

## 1.0 INTRODUCTION

By application dated May 26, 2004, as supplemented by letters dated October 29 and December 3, 2004, and January 18, June 15, and August 15, 2005, the FirstEnergy Nuclear Operating Company (FENOC, the licensee), requested changes to the Technical Specifications (TSs) for Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and 2). The supplements dated October 29 and December 3, 2004, and January 18, June 15, and August 15, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on July 6, 2004, (69 FR 40673).

The proposed changes would revise the BVPS-1 and 2 TSs to extend the allowable outage time (AOT) for the emergency diesel generators (EDGs) from 72 hours to 14 days. The amendments also delete surveillance requirement (SR) 4.8.1.1.2.b.1 concerning periodic EDG inspections. Requirements for periodic EDG inspections will be specified in a licensee-controlled EDG maintenance program referenced in the Updated Final Safety Analysis Report. The amendments also revise footnote (1) of TS 3.8.1.1 to clarify the wording to allow actions to be delayed for up to 7 days to allow time to restore fuel oil back to its specified limits when an EDG is inoperable solely due to failure to meet fuel oil property limits of SR 4.8.1.1.2.d.2 or SR 4.8.1.1.2.e.

## 2.0 REGULATORY EVALUATION

The regulatory requirements which the Nuclear Regulatory Commission (NRC) staff applied in the review of the application include:

Appendix A of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 17, "Electric power systems," requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

GDC-18, "Inspection and testing of electric power systems," requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

Section 50.36, "Technical specifications," requires a licensee's TSs to establish Limiting Conditions for Operation (LCOs), which include Completion Times for equipment that are required for safe operation of the facility.

Section 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," requires that preventive maintenance activities must not reduce the overall availability of the systems, structures and components.

Regulatory Guide (RG) 1.93, "Availability of Electric Power Sources," provides guidance with respect to operating restrictions (i.e., AOTs) if the number of available alternate current (AC) power sources are less than that required by the TS LCO. In particular, this guide prescribes a maximum AOT of 72 hours for an inoperable onsite or offsite AC power source.

## 3.0 TECHNICAL EVALUATION

### 3.1 Background

The offsite and onsite power systems at BVPS-1 and 2 are designed to comply with the requirements of GDCs 17 and 18 respectively. As described by the licensee's application dated May 26, 2004, the BVPS-1 and 2 AC electrical power distribution system consists of two offsite power sources from the 138 kV switchyard and two onsite standby power sources, EDGs. The design of the onsite electrical power system provides independence and redundancy to ensure an available power source of power to the engineered safety feature (ESF) systems.

Each BVPS unit is equipped with two redundant 4160-volt, 3-phase, 60-Hz synchronous EDGs. Each EDG is seismically qualified, safety-related and electrically and physically isolated from

each other. The EDGs 2000-hour load rating is 2850 kW for BVPS-1 and 4535 kW for BVPS-2. The EDGs supply onsite emergency AC power to electrical loads needed to achieve safe shutdown of the plant or to mitigate the consequences of postulated accidents coincident with the loss of the normal and offsite AC power sources. Assuming a credible single failure, the EDGs are capable of assuring a safe shutdown of both units during a loss of offsite power (LOOP) concurrent with a loss-of-coolant accident (LOCA) on one unit.

In the event that an EDG is inoperable in operating Modes 1, 2, 3, and 4, existing TS 3.0.5 requires that within 2 hours all required systems, subsystems, trains, components, and devices that depend on the remaining operable EDG as a source of emergency power be verified to be operable. This required action is intended to provide assurance that a loss of offsite power event will not result in a complete loss of safety function during the period when one of the required EDGs is inoperable.

At BVPS-1 and 2, a cross-tie connecting the normal 4 kV buses at BVPS-1 and the normal 4 kV buses at BVPS-2 provides the capability to power up either of the emergency 4 kV buses at one unit from either of the EDGs at the other unit. In conformance with 10 CFR 50.63, "Loss of all alternating current power," BVPS-1 and 2 utilize the EDGs at each unit as an alternate AC power source to operate systems necessary for the required station blackout (SBO) coping duration and recovery. With the cross-tie, BVPS-1 and 2 can cope with a postulated total loss of offsite power to both units coincident with the loss of all onsite power (EDGs) at one unit, by enabling any single available EDG at either unit to supply power to the required SBO loads at both units within 1 hour. The SBO cross-tie circuit consists of two locally operated 4 kV breakers installed in both the BVPS-1 and 2 normal 4 kV buses interconnected by a cross-tie cable protected against the effects of weather-related events. The normal supply-to-emergency 4 kV bus connection and the EDG-to-emergency 4 kV bus connections complete the circuit to the alternate AC power source. The cross-tie between the normal 4 kV buses is disconnected (breakers racked out) during normal plant operation and requires manual operator action to place it into service during an SBO event. Energizing of the cross-tie and startup of equipment to cope with an SBO is administratively controlled and procedurally addressed by the BVPS-1 and 2 Emergency Operating Procedures.

### 3.2 Proposed TS Changes

#### 3.2.1 Diesel Generator Outage Time Extension

The current BVSP-1 and 2 TS, 3.8.1.1, requires that two separate and independent EDGs be operable in Modes 1, 2, 3, and 4. In the event that one of the required EDGs becomes inoperable, the LCO requires the inoperable EDG to be returned to operable status within 72 hours, or the plant must be in hot standby (Mode 3) within 6 hours and be placed in cold shutdown (Mode 5) within the following 30 hours. Additionally, if two of the required EDGs become inoperable, TS 3.8.1.1, Action e, requires that at least one of the inoperable EDGs be returned to operable status within 2 hours or the plant must be brought to hot standby conditions within the next 6 hours and to cold shutdown conditions within the following 30 hours. The remaining EDG must be returned to operable status within 72 hours or the unit must be in at least hot standby conditions within the next 6 hours and cold shutdown within the following 30 hours. The licensee is proposing to replace the current 72-hour AOT with a 14-day AOT.

As a defense-in-depth measure during the extended outages of the EDG, the licensee will install an additional AC power source (AACPS) capable of supplying safe shutdown loads during an SBO without the need for rescheduling of safety system operation in the unaffected unit. For unplanned EDG outages, capability to supply from AACPS will be available upon entering the extended allowed-outage period (i.e., by 72 hours into the AOT). For outages planned to exceed the existing initial 72-hour AOT, AACPS will be provided within 1 hour of entering the AOT. In any event, if the AACPS of the required capacity is not available after entering the extended AOT period (after 72 hours into the AOT), the existing TS requirement to be in at least hot standby within the next 6 hours and in cold shutdown within the following 30 hours would apply.

### 3.2.2 Relocation of Diesel Generator Maintenance Program

TS SR 4.8.1.1.2.b.1 requires that at least once per 18 months during shutdown the EDG will be inspected in accordance with procedures prepared in conjunction with its manufacturer's recommendations. The licensee proposes to relocate this requirement to an administratively controlled maintenance program.

### 3.2.3 Revision of footnote (1) for TS 3.8.1.1

Footnote (1) for TS 3.8.1.1 currently states:

Fuel oil contained in the storage tanks not meeting the properties in accordance with [SRs] 4.8.1.1.2.d.2 or 4.8.1.1.2.e shall be brought within the specified limits within 7 days.

The licensee proposes to revise footnote (1) as follows:

Required actions may be delayed for up to 7 days if the diesel generator(s) is inoperable solely due to the fuel oil contained in the storage tanks not meeting the properties in accordance with [TS] 4.8.1.1.2.d.2 or [TS] 4.8.1.1.2.e.

## 3.3 Deterministic Evaluation

The staff has evaluated the licensee's proposed amendments to the TSs using both deterministic and probabilistic risk-analysis methods. The deterministic evaluation is discussed below.

### 3.3.1 Diesel Generator Outage Time Extension

The purpose of the proposed change to TS 3.8.1.1, Actions b and e, is to extend the EDG AOT from the current 72 hours to 14 days to allow the licensee to perform major preventive maintenance work that requires more than 3 days while the plant is at power. Currently such work can only be performed during shutdown. In addition, the longer AOT will help the licensee avert unplanned shutdowns by providing margin for the performance of corrective maintenance. The extra margin may be needed to resolve EDG deficiencies that are discovered during scheduled preventive maintenance activities.

The NRC staff evaluated the licensee's request to extend the AOT for EDGs to determine whether the implementation of the SBO requirement in 10 CFR 50.63 would be eroded by the proposed changes, and whether the overall availability of the EDGs would be reduced significantly as a result of increased on-line preventive maintenance activities. In light of the recent experiences in grid outages, it has been the NRC staff's position that the availability of an additional power source is a necessary condition for approval of the extended EDG AOT in order to maintain defense-in-depth.

The licensee would apply the following criteria to any AACPS used as a defense-in-depth measure:

1. A source may be of either a temporary or permanent nature and would not be required to satisfy Class 1E requirements.
2. Dynamic effects of source failure (GDC-4 events) would not adversely affect safety-related plant equipment.
3. A source would not be required to be protected against natural phenomena (GDC-2 events) or abnormal environmental or dynamic effects (GDC-4 events).
4. A source would be capable of starting and carrying designated loads required for safe shutdown, including maintaining adequate voltage and frequency such that performance of powered equipment is acceptable. For scoping purposes, the capacity of the AACPS has been conservatively estimated based on power needed to operate desirable LOOP loads, rather than just the required SBO loads. For the unit with greater demand (BVPS-2), loads assumed in the estimate include a service water pump (the largest motor currently connected to the EDGs), charging pump, and a motor-driven auxiliary feedwater pump among other loads which are not currently assumed in the SBO scenario.

If the licensee chooses a temporary AACPS, its availability would be determined by (1) starting the AACPS and verifying proper operation, (2) verifying that sufficient fuel is available onsite to support 24 hours of operation, and (3) ensuring that the AACPS is in the correct electrical alignment to supply power to designated safe shutdown loads. Subsequently, when not in operation, a status check for availability will also be performed once every 72 hours. This check consists of (1) verifying the AACPS is mechanically and electrically ready for operation, (2) verifying that sufficient fuel is available onsite to support 24 hours of operation, and (3) ensuring that the AACPS is in the correct electrical alignment to supply power to designated safe-shutdown loads.

If the licensee chooses a permanent AACPS, its availability would be determined to be available by starting the AACPS and verifying a proper operation. In addition, initial and periodic testing, surveillance, and maintenance will conform to NUMARC 87-00, Revision 1, Appendix B, "Alternate AC Power Criteria," guidelines. The guidelines include provisions for quarterly functional testing, timed starts and load capacity testing on a fuel-cycle basis, surveillance and maintenance consistent with manufacturer's recommendations, and initial testing of the capability to power required shutdown equipment within the necessary time.



The licensee has made the following commitments for limiting plant vulnerabilities during the extended EDG outages.

1. The BVPS-1 and 2 Updated Final Safety Analysis Reports (UFSARs) will be revised to include the following statement: "The emergency diesel generators are periodically inspected in accordance with a licensee-controlled maintenance program. The emergency diesel generator maintenance program specifies required inspections based on the manufacturer's and Diesel Generator Owners Group recommendations and industry operating experience. Changes to the emergency diesel generator maintenance program are controlled under 10 CFR 50.59."
2. The BVPS-2 UFSAR description of conformance to RG 1.93, "Availability of Electric Power Sources," will be revised to include exceptions to the guidance concerning a 72-hour AOT for restoring an inoperable EDG and avoidance of this AOT for preventive maintenance.
3. The BVPS-1 and 2 administrative procedures for Amendment implementing Section (a)(4) of the Implementation Maintenance Rule will be revised to reflect the following restrictions for entering the 14-day EDG AOT for scheduled maintenance:

If either offsite power circuit is unavailable, an EDG will be removed from service only for corrective maintenance, i.e., maintenance required to restore operability.

If an EDG is unavailable, the offsite power circuits will be removed from service only for corrective maintenance required to restore operability.

An EDG will not be removed from service for scheduled maintenance unless both of the opposite unit's EDG are available.

An EDG will not be removed from service for scheduled maintenance unless the SBO cross-tie circuits between the units are available.

If an EDG is unavailable, an EDG on the opposite unit will be removed from service only for corrective maintenance, i.e., maintenance required to ensure or restore operability, or for the performance of required surveillance testing.

If an EDG is unavailable, the SBO cross-tie will be removed from service only for corrective maintenance, i.e., maintenance required to ensure or restore operability.

An EDG will not be removed from service for scheduled maintenance if weather forecasts are predicting severe weather conditions for the BVPS-1 and 2 area with the potential to degrade or limit offsite power availability.

When an EDG is removed from service for scheduled maintenance, no discretionary switchyard maintenance will be allowed. In addition, switchyard



access will be strictly controlled by the control room operating crew to minimize the potential for offsite power transients.

Prior to removing the EDG from service, the stability of the offsite power system in the vicinity of BVPS-1 and 2 will be verified by contacting the FirstEnergy and Duquesne Light Company System Control Centers or other applicable grid operating organizations, to determine the projected load demand and status of the grid during the period the EDG will be unavailable.

4. The BVPS-1 and 2 administrative procedures for Amendment implementing Section (a)(4) of the Implementation Maintenance Rule will be revised to reflect the following compensatory measure:

Prior to entering the 14-day EDG AOT for scheduled maintenance and within 24 hours after entering the 14-day EDG AOT for unscheduled corrective maintenance (maintenance required to restore operability) an hourly fire watch will be established in the EDG room for the operable EDG.

5. The BVPS-1 and 2 administrative procedures for implementing Section (a)(4) of the Maintenance Rule will be revised to reflect the following restrictions for entering the 14-day EDG AOT:

An EDG will not be removed from service for planned on-line maintenance if the associated unit's steam-driven auxiliary feedwater pump is out of service; and, while in the EDG AOT, the steam-driven auxiliary feedwater pump will not be removed from service for any planned maintenance.

The NRC staff concludes that the proposed change to install either a temporary or permanent AACPS when the option for an extended EDG outage is exercised, adhering to a 72-hour AOT in the absence of an available AACPS, and preserving the capability to feed AC power between the units along with the commitments stated above, is acceptable because it provides an adequate level of defense-in-depth.

### 3.3.2 Relocation of Diesel Generator Maintenance Program

The NRC staff recognizes that the EDG manufacturers and EDG Owners Group have recently endorsed changes to the current 18-month inspection frequency to allow a 24-month inspection frequency. Removal of this requirement from the TSs and reliance on a licensee-controlled EDG maintenance program to perform the required inspections provides BVPS-1 and 2 the flexibility to evaluate and make changes to the EDG inspection frequencies based on industry recommendations under the provisions of 10 CFR 50.59.

The licensee has made the following commitment regarding the relocation of the EDG maintenance program.

The BVPS-1 and 2 UFSARs will be revised to include the following statement: "The emergency diesel generators are periodically inspected in accordance with a licensee controlled maintenance program. The emergency diesel generator maintenance program specifies required inspections based on the manufacturer's and Diesel

Generator Owners Group recommendations and industry operating experience. Changes to the emergency diesel generator maintenance program are controlled under 10 CFR 50.59."

The NRC staff concludes that the proposed change to relocate the requirements of SR 4.8.1.1.2.b.1 to a licensee-controlled EDG maintenance program which is subject to 10 CFR 50.59 coupled with the commitment stated above, will provide adequate assurance that the current requirements will continue to be met and will allow the licensee to incorporate manufacturer recommendations in a more timely manner without requiring a license amendment. Therefore, the change is acceptable.

### 3.3.3 Footnote (1) to TS 3.8.1.1

SR 4.8.1.1.2.d.2 requires verification of fuel oil properties as specified in Table 1 of ASTM [American Society of Testing and Materials] D975-81 within 31 days of new fuel addition. The fuel oil properties of SR 4.8.1.1.2.d.2, if not met, do not have an immediate effect on EDG operation, but are meant to ensure a high-grade fuel-oil source is available for the EDGs. SR 4.8.1.1.2.e requires verification at least once every 31 days that the particulate content of the fuel oil is within limits. The presence of fuel-oil particulate does not mean the fuel oil would fail to burn and particulate concentration of stored fuel oil is unlikely to change significantly between surveillance intervals to the point where particulate fouling of filters and injectors would be a concern. Failure of either of the above surveillance requirements would currently require declaring the EDGs inoperable and following the associated actions statements.

The proposed changes are consistent with RG 1.137, "Fuel Oil systems for Standby Diesel Generators," Revision 1, dated October 1979, position C.2.a, which states that fuel-oil properties contained in the supply tank and not meeting fuel-oil surveillance specifications should be replaced in a short period of time (about a week). The proposed changes are also consistent with NUREG-1431, "Standard Technical Specifications [STSS] for Westinghouse Plants," Revision 3, which requires fuel-oil particulate not meeting the requirements to be restored within 7 days, and fuel oil not meeting other fuel-oil properties to be restored within 30 days before declaring the EDGs inoperable.

Based on the above, the NRC staff has determined that the proposed changes are consistent with the intent of the STSS and regulatory guidance and clarify the intent of EDG operability requirements with respect to fuel oil properties. Therefore, the NRC staff finds the proposed changes to footnote (1) for TS 3.8.1.1 acceptable.

### 3.3.4 Deterministic Conclusion

The NRC staff concludes that the AOT extension for an inoperable EDG from the current 72 hours to 14 days, relocating the EDG maintenance program, and revision of the wording for the footnote related to inoperability solely due to fuel-oil testing considerations would not have an unacceptable effect on the overall safety of the plant. The NRC staff's conclusion was based on the following considerations: (1) the longer AOT would reduce the entries into the LCO and reduce the number of EDG starts for EDG maintenance activities, (2) the licensee's commitment to provide either a permanent or temporary AACPS whenever an extended outage for the EDG is exercised, (3) the licensee preserving the capability to feed AC power between the units, and (4) the administrative controls in the licensee's commitments for increasing

availability of safety systems and power sources. Further, the NRC staff has determined that the compensatory measures to be taken by the licensee will minimize the occurrence of an SBO during the extended EDG AOT. Therefore, the proposed changes are acceptable.

### 3.4 Risk-Informed Evaluation

#### 3.4.1 Description of System/Component and Current Requirements

The information in this section was derived from the licensee's amendment request dated May 26, 2004, as supplemented October 29, 2004. The offsite power systems for both BVPS-1 and 2 consist of two physically independent circuits between the offsite transmission network and the onsite power systems. Each offsite circuit is supplied from one of two 138 kV switchyard buses through a system service transformer to the onsite 4 kV station service and emergency buses.

Each Beaver Valley unit is designed with two redundant 4 kV emergency buses. The onsite standby power source for each redundant 4 kV emergency bus is a dedicated EDG. The EDGs are 4160-V, 3-phase, 60-Hz synchronous generators. The EDGs are seismically qualified, safety-related and electrically and physically isolated from each other. The 2000-hour load rating for each EDG is 2850 KW for BVPS-1 and 4535 KW for BVPS-2. The EDGs supply onsite emergency AC power to those electrical loads needed to achieve safe shutdown of the plant to mitigate the consequences of any postulated accidents coincident with the loss of the normal and offsite AC power sources. Each EDG has sufficient capability for operating all required engineered safety equipment that must be operated in the event of any postulated accident.

A BVPS-1 and 2 cross-tie connecting the normal 4 kV buses at BVPS-1 and the normal 4 kV buses at BVPS-2 provides the capability to power either of the emergency 4 kV buses at one unit from either of the EDGs at the other unit. To comply with 10 CFR 50.63, BVPS-1 and 2 utilize the EDGs at each unit as an alternate AC power source to operate systems necessary for the required SBO coping duration and recovery therefrom. With the cross-tie, BVPS-1 and 2 can cope with a postulated total loss of offsite power to both units coincident with the loss of all onsite power EDGs at one unit, by enabling any single available EDG at either unit to supply power to the required SBO loads at both units within 1 hour.

The SBO cross-tie circuits consists of two locally operated 4 kV breakers installed in both the BVPS-1 and 2 normal 4 kV buses interconnected by a cross-tie cable protected against the effects of weather-related events. The normal-to-emergency 4 kV bus connection and the EDG-to-emergency 4 kV bus connections complete the circuit to the alternate AC power source. The cross-tie between the normal 4 kV buses is disconnected (breakers racked out) during normal plant operation and requires manual operator action to place it into service during an SBO event. Energizing of the cross-tie and startup of equipment to cope with an SBO is administratively controlled and procedurally addressed by the BVPS-1 and 2 emergency operating procedures (EOPs).

In the licensee's October 29, 2004, response to a request for additional information (RAI), it stated:

In January 1993, Emergency Operation Procedures walkthrough validations were performed by the BVPS, Unit 1 and Unit 2 Operations personnel to

demonstrate that the SBO cross-tie could be established and required SBO loads powered from the opposite unit within one hour, consistent with the BVPS SBO analysis. In addition a SBO crosstie functional test was performed in May 1993. This test consisted of energizing a Unit 1 station chiller unit on the 1D non-emergency 4 kV bus through the SBO cross-tie from the Unit 2 2A non-emergency 4 kV bus. While the test only passed a portion (approximately 28 amps) of the maximum current through the cross-tie that could be expected under SBO condition, the tests also measured voltage drops across the cross-tie cable to verify the design capability for the SBO loads. A similar functional test was again performed in October 1997 by energizing a Unit 1 station chiller on the 1A non-emergency 4 kV bus through the SBO cross-tie from the Unit 2 2D non-emergency 4 kV bus.

The operability of the AC and DC power sources and associated distribution systems during operation ensure that sufficient power will be available to supply the safety-related equipment required for 1) the safe shutdown of the facility, and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant AC and DC power sources and distribution systems satisfy the requirements of GDC 17 of Appendix A to 10 CFR Part 50.

TS 3.8.1.1, "AC Sources - Operating," requires two independent offsite power sources and two separate and independent EDGs be operable in operating Modes 1, 2, 3, and 4. The limiting condition for operation (LCO) specifies required actions to be taken in the event of AC source inoperability including when one or both offsite sources are declared inoperable, when one or both EDGs are declared inoperable, or when an offsite source is declared inoperable in combination with an inoperable EDG. The required AOTs for restoring inoperable AC sources to operability is consistent with RG 1.93.

In the event that one of the required EDGs becomes inoperable, the LCO requires the inoperable EDG be returned to operable status within 72 hours, or a plant shutdown be initiated by transitioning to Hot Standby within 6 hours, and Cold Shutdown within the following 30 hours. If two EDGs become inoperable, the LCO requires that one of the inoperable EDGs be returned to operable status within 2 hours. The remaining inoperable EDG must be returned to operable status within the 72-hour AOT for that EDG. In the event that one of the required offsite power circuits becomes inoperable, the LCO requires the inoperable offsite power circuit be returned to operable status within 72 hours, or a plant shutdown be initiated. If two offsite power circuits become inoperable, the LCO requires that one of the inoperable circuits be returned to operable status within 24 hours.

If both of the required offsite power circuits and an EDG are inoperable, the LCO requires one of the inoperable power sources be returned to operable status within 12 hours, or a plant shutdown initiated. In addition, TS applicability statement 3.0.5 discusses operability considerations for systems and components that depend on the EDGs as a source of emergency power. Per TS 3.0.5, when in operating Modes 1, 2, 3, and 4 and an EDG is inoperable, systems, subsystems, trains, components or devices that depend on the EDG may be considered operable provided: (1) their normal power source is operable; and (2) all of the redundant systems, subsystems, trains, components and devices associated with the remaining operable EDG are operable or likewise satisfy the requirements of TS 3.0.5. Unless both of

these conditions are satisfied, action is initiated to place the unit in a mode in which the applicable LCO does not apply.

These actions ensure that a loss of offsite power event will not result in a complete loss of safety function of critical systems during periods when an EDG is inoperable. SR 4.8.1.1.2.b.1 states that at least once-per-18 months during shutdown, the EDGs will be subjected to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations. This inspection requirement is primarily associated with maintaining EDG reliability. SR 4.8.1.1.2.d.2 verifies, within 31 days of new EDG fuel-oil addition, that the fuel-oil properties specified in Table 1 of ASTM D975-81, beyond those specified in SR 4.8.1.1.2.d.1, are within limits. SR 4.8.1.1.2.e verifies, every 31 days, that the stored fuel oil total particulate contamination is within the specified limits.

### 3.4.2 Applicable Regulatory Criteria/Guidelines

The regulatory criteria/guidelines on which the NRC staff based its risk-based acceptance are:

- RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," describes a risk-informed approach, acceptable to the NRC, for assessing the nature and impact of proposed licensing-basis changes by considering engineering issues and applying risk insights. This regulatory guide also provides risk-acceptance guidelines for evaluating the results of such evaluations.
- RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," describes an acceptable risk-informed approach specifically for assessing proposed TS changes in allowed outage times (AOTs). (Note that the phrase "completion time" used in some licensee's technical specifications is equivalent to the phrase "allowed outage time" used in RG 1.177.) This regulatory guide also provides risk-acceptance guidelines for evaluating the results of such evaluations.

One acceptable approach to making risk-informed decisions about proposed TS changes is to show that the proposed changes meet five key principles stated in RG 1.174, Section 2, and RG 1.177, Section B:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.
2. The proposed change is consistent with the defense-in-depth philosophy.
3. The proposed change maintains sufficient safety margins.
4. When proposed changes result in an increase in core-damage frequency or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
5. The impact of the proposed change should be monitored using performance measurement strategies.



For non-temporary TS changes, RG 1.174 and RG 1.177 provide numerical risk acceptance guidelines that are helpful in determining whether or not the fourth key principle has been satisfied. These guidelines are not to be applied in an overly prescriptive manner; rather they provide an indication, in numerical terms, of what is considered acceptable. The intent in comparing risk results with the risk-acceptance guidelines is to demonstrate with reasonable assurance that the fourth key principle has been satisfied.

The NRC staff has reviewed the licensee's regulatory and technical analyses in support of its proposed license amendment, which are described in Sections 4 and 5 of the licensee's submittal.

### 3.4.3 Detailed Description of the Proposed Risk-Informed TS Change

Action statement b of TS 3.8.1.1 for AC electrical power sources is revised to change the allowable time for restoring an inoperable EDG to operable status before initiating the station shutdown action requirements from the current 72 hours to 14 days. The remaining proposed TS changes were not risk-informed.

### 3.4.4 NRC Staff's Review Methodology

As required by the Standard Review Plan (SRP), Chapter 16.1, "Risk-Informed Decisionmaking: Technical Specifications," the NRC staff reviewed the submittal against the five key principles of the NRC staff's philosophy of risk-informed decision making listed in RG 1.177, Section B.

### 3.4.5 Key Information Used in the NRC Staff's Review

The key information used in the NRC staff's review of the risk evaluation is contained in Section 4 of the licensee's submittal, as supplemented by the licensee in response to the NRC staff's RAIs by letters dated October 29, 2004, and January 18, 2005. In addition, the NRC staff reviewed the staff's evaluation reports on the individual plant examinations (IPEs) and individual plant examinations - external events (IPEEEs) submitted by the licensee.

### 3.4.6 Evaluation

The risk evaluation presented below addresses the last two key principles of the NRC staff's philosophy of risk-informed decision making, which concern changes in risk and performance measurement strategies. These key principles were evaluated by using the three-tiered approach described in Chapter 16.1 of the SRP and RG 1.177.

- Tier 1 - The first tier evaluates the licensee's probabilistic risk assessment (PRA) and the impact of the change on plant operational risk, as expressed by the change in core damage frequency (CDF) and the change in large early release frequency (LERF). The change in risk is compared against the acceptance guidelines presented in RG 1.174. The first tier also aims to ensure that plant risk does not increase unacceptably during the period when equipment is taken out of service per the license amendment, as expressed by the incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP). The incremental risk is compared against the acceptance guidelines presented in RG 1.177.

- Tier 2 - The second tier addresses the need to preclude potentially high-risk plant configurations that could result in equipment, in addition to that associated with the proposed license amendment, taken out of service simultaneously, or if other risk-significant operational factors, such as concurrent system or equipment testing, are also involved. The objective of this part of the review is to ensure that appropriate restrictions on dominant risk-significant plant configurations associated with the AOT extension are in place.
- Tier 3 - The third tier addresses the licensee's overall configuration risk management program (CRMP) to ensure that adequate programs and procedures are in place for identifying risk-significant plant configurations resulting from maintenance or other operational activities and taking appropriate compensatory measures to avoid such configurations. The CRMP is to ensure that equipment removed from service prior to or during the proposed extended AOT period will be appropriately assessed from a risk perspective.

#### 3.4.6.1 Tier 1: PRA Capability and Insights

The Tier 1 NRC staff review involved two aspects: (1) evaluation of the validity of the PRA and its application to the proposed AOT extension, and (2) evaluation of the PRA results and insights stemming from its application.

##### 3.4.6.1.1 Evaluation of PRA Validity

To determine whether the PRA used in support of the proposed AOT extension is of sufficient quality, scope, and level of detail, the staff evaluated the relevant information provided by the licensee in their submittal, as supplemented. The NRC staff's review of the licensee's submittal focused on the validity of the licensee's PRA model to analyze the risks stemming from the proposed AOT extension and did not involve an in-depth review of the licensee's PRA. The following descriptions from the licensee's submittal provided the basis for this portion of the NRC staff's review.

The PRA models used for this EDG AOT extension request were the BVPS-1 PRA model updated in September 2003 to Revision 3 (BV1REV3) and the BVPS-2 PRA model updated in May 2003 to Revision 3B (BV2REV3B). These are updates of the original BVPS-1 and 2 IPE models developed in response to Generic Letter (GL) 88-20. The scope of these PRA models encompasses both level 1 and level 2, internal and external initiating events during power operation. Shutdown risk was not evaluated within the scope of the PRA model.

The licensee stated that the key changes to the PRA models since the IPE include: (1) use of the latest industry methodology for reactor coolant pump seal LOCAs, including plant-specific thermal hydraulic analyses; (2) updated initiating events data using Bayesian update; (3) updated electric power recovery model; (4) incorporation of BVPS PRA peer review comments; and (5) level 2 changes for steam generator tube rupture scenarios.

The licensee stated that the PRA models have been extensively reviewed including internal multi-disciplined reviews during the IPE process, internal and external PRA-consultant reviews during the PRA model updates, and a Westinghouse Owners' Group peer review conducted in July 2002.

The NRC staff found the licensee's internal events PRA models met the intent of GL 88-20. The industry peer review assessed the internal events portion of the models. As part of a previous licensing action, the licensee provided the results (i.e., category A and B facts and observations) of the industry peer review as Attachment B to the licensee's letter dated October 24, 2003. Following the PRA peer review, both the BVPS-1 and 2 PRA models were updated, and now incorporate the PRA peer review Category A and Category B findings and observations that were found to have an impact on the models. In the licensee's October 29, 2004, RAI response, the licensee provided a list of key differences between the BVPS-1 and 2 PRA models and qualitatively assessed the impact of these differences on the risk assessment of the proposed change in EDG AOT.

The BVPS-1 and 2 seismic- and fire-PRA models were reviewed internally by both utility personnel and IPEEE contractors (Pickett, Lowe, and Garrick, and Stevenson & Associates). The NRC staff found the results to be reasonable and capable of identifying the most likely severe accidents and vulnerabilities from external events. Additionally, the seismic- and fire-PRA models are integrated with the internal events PRA models, so the plant response modeling (fault trees and event trees) following the external initiating events have been updated as part of the PRA-model update process. During this update, the seismic PRA models were also revised to incorporate the uniform hazard spectrum shape.

The maintenance and updating of the BVPS-1 and 2 PRA models are controlled by Administrative Procedure 1/2-ADM-2033, "Risk Management Program," and Business Practice BVBP-DES-0001, "Probabilistic Risk Assessment Guideline." The administrative procedure ensures that the PRA models are kept current with the plant design and operation, and provides the general processes used for configuration control of the PRA models in the areas of plant and system models, and data analysis. It also contains the requirements for PRA-model periodic updating. The PRA software is maintained in accordance with the licensee's software quality assurance program.

Based upon the above, the NRC staff finds that the PRA used in support of the proposed AOT extension is of sufficient quality, scope, and level of detail to analyze the risks stemming from the proposed AOT extension, consistent with the guidance in RG 1.174 (Section 2.2.3), SRP 19 (Sections III.2.2.2, III.2.2.3, III.2.2.4 and Appendix A) and SRP 19.1, and is, therefore, acceptable.

#### 3.4.6.1.2 Evaluation of PRA Results and Insights

The following evaluates the licensee's proposed license amendment for increasing the EDG AOT associated with TS 3.8.1.1 from 72 hours to 14 days. The licensee provided results of the calculated increase in risk from additional online EDG unavailability as a result of the proposed increase in AOT in its application dated May 26, 2004, as supplemented October 29, 2004, and January 18, 2005. The licensee stated in the January 18, 2005, RAI response that the EDG nonrecovery curves used in the PRA "... were bounding for both the current extended AOT cased, so they were not adjusted in the analysis supporting the LAR submittal ..." The NRC staff does not agree with this approach, because use of an analysis that bounds both the "before" and "after" configurations can mask the true change in risk. However, in the same RAI response, the licensee provided a risk assessment that used revised EDG nonrecovery curves to model the effect of the EDG extended AOT. The NRC staff considers this approach to be a more realistic method of assessing the risk impact of the proposed change. These are the



results used by the NRC staff in evaluating the proposed license amendment and that are summarized in the tables that follow.

| Table 1<br>CDF and LERF Results for Sensitivity Cases - Revised EDG Nonrecovery                  |                   |                    |                   |                    |
|--|-------------------|--------------------|-------------------|--------------------|
|  | BVPS-1            |                    | BVPS-2            |                    |
| Case   | CDF<br>(per year) | LERF<br>(per year) | CDF<br>(per year) | LERF<br>(per year) |
| Case 1 Baseline<br>(Current EDG Unavailability)  | 2.34E-05          | 1.03E-06           | 3.27E-05          | 1.2E-06            |
| Case 2<br>(14-day AOT Estimated Unavail.)  | 2.36E-05          | 1.03E-06           | 3.41E-05          | 1.12E-06           |
| Case 3<br>(One EDG in PM* Alignment)   | 2.45E-05          | 1.05E-06           | 4.39E-05          | 1.06E-06           |
| Case 4<br>(One EDG in CM** Alignment)  | 2.67E-05          | 1.05E-06           | 7.95E-05          | 1.09E-06           |
| Case 5<br>(One EDG in CM Alignment)<br>(One Offsite Power Circuit Unavail.)                      | 3.37E-04          | 1.08E-05           | 2.01E-03          | 1.64E-06           |
| Case 6<br>(One EDG in CM Alignment)<br>(One Offsite Power Circuit Unavail.)<br>(No Common Cause) | 3.24E-04          | 1.09E-05           | 1.67E-03          | 1.36E-06           |
| * PM = Preventive Maintenance<br>** CM = Corrective Maintenance                                  |                   |                    |                   |                    |

The increase in CDF and LERF due to the extended AOT is the difference between Case 1 and Case 2 and is shown in Table 2 below:

| Table 2<br>Change in CDF and LERF Post AOT Extension - Revised EDG Nonrecovery |                                  |                                  |
|--|----------------------------------|----------------------------------|
| Risk Measure   | BVPS-1<br>Increase over Baseline | BVPS-2<br>Increase over Baseline |
| Delta CDF  | 2.10E-07/reactor yr              | 1.45E/reactor yr                 |
| Delta LERF   | 5.00E-10/reactor yr              | 7.00E-11/reactor yr              |

The calculated risk increases are within the Region III, "very small" area of the RG 1.174 acceptance guidelines, with one exception, the BVPS-2 CDF increase is just slightly within the Region II "small" area. The licensee provided an alternate method of calculating the change in

BVPS-2 CDF as a sensitivity. This alternate method considered the expected number of hours that BVPS-2 would be in specific EDG maintenance configurations. This time was used to weight the configuration-specific core damage frequencies to estimate the increase in annual CDF, as shown in Table 3:

| Table 3<br>BVPS-2 Conditional Core Damage Probability (CCDP)<br>Using Expected Time in Maintenance Alignments<br>Revised EDG Nonrecovery |   |                            |                             |          |
|--|---|----------------------------|-----------------------------|----------|
| Case   | Alignment Description                       | Configuration CDF (per yr) | Time in Configuration (hrs) | CCDP     |
| Corrective Maint. (Case 4)   | One EDG in Corrective Maintenance           | 7.95E-05                   | 86.4                        | 7.84E-07 |
| Preventive Maint. (Case 3)   | One EDG in Preventive Maintenance           | 4.39E-05                   | 206.0                       | 1.03E-06 |
| Surveillances (Case 4)   | One EDG in routine surveillance testing     | 7.95E-05                   | 21.0                        | 1.91E-07 |
| Baseline (Case 1)  | Base case assumptions for remainder of year | 3.27E-05                   | 8446.6                      | 3.15E-05 |
| Summation  |   | 3.35E-05                   |                             |          |

The increase in the BVPS-2 CDF based on the expected time in the preventive and corrective alignments is therefore:

$$\begin{aligned}
 \text{Delta CDF} &= (\text{CDF using expected time in maintenance alignments}) - (\text{CDF for Baseline}) \\
 &= (3.35\text{E-}05) - (3.27\text{E-}05) \\
 &= 7.71\text{E-}07 \text{ per reactor year}
 \end{aligned}$$

The calculated increase in BVPS-2 CDF using this method is in the Region III “very small” area of the Regulatory Guide 1.174 acceptance guidelines.

The licensee also calculated ICCDP and ICLERP while an EDG is unavailable during the extended AOT. This analysis was done assuming no recovery or repair of the EDG in maintenance. The results were compared to the acceptance guidelines provided in RG 1.177.

The ICCDP and ICLERP were calculated for an EDG unavailable both for preventive and corrective maintenance. The results are provided in Tables 4 and 5 below.

| Table 4<br>ICCDP and ICLERP during EDG Preventive Maintenance<br>Revised EDG Nonrecovery |          |          |          |              |
|--|----------|----------|----------|--------------|
|  | BVPS-1   |          | BVPS-2   |              |
| Maintenance Duration   | ICCDP    | ICLERP   | ICCDP    | ICLERP       |
| Maximum Expected Duration<br>(Unit 1-168 hrs) (Unit 2-264 hrs)                           | 2.12E-08 | 4.15E-10 | 3.38E-07 | Risk Neutral |
| Full 14-day AOT  | 4.25E-08 | 8.31E-10 | 4.30E-07 | Risk Neutral |

| Table 5<br>ICCDP and ICLERP during EDG Corrective Maintenance<br>Revised EDG Nonrecovery |          |          |              |
|--|----------|----------|--------------|
| BVPS-1   |          | BVPS-2   |              |
| ICCDP  | ICLERP   | ICCDP    | ICLERP       |
| 5.01E-08   | 8.58E-10 | 5.39E-07 | Risk Neutral |

The BVPS-1 and 2 calculated ICCDP and ICLERP when an EDG is unavailable for preventive maintenance are less than the RG 1.177 acceptance guidelines of 5.0E-07 for ICCDP and 5.0E-08 for ICLERP for both the maximum expected maintenance duration and the full 14-day AOT. In the case of corrective maintenance of 14 days, the ICCDP for BVPS-2 very slightly exceeds the RG 1.177 acceptance guideline. However:

- The calculation uses the entire 14-day AOT, which is conservative. The licensee assumed that the mean-time-to-repair a BVPS-2 EDG would increase from 9.25 hours to 43.17 hours (Table 2, BVPS-2 of the October 29, 2004, letter). This increase assumed that corrective maintenance duration would increase by 14/3, the ratio of the new to the old AOT, which is a conservative assumption. Even with this increase, the mean-time-to-repair is under 2 days, a small portion of the new AOT.
- The licensee described the site's risk-informed configuration risk management program in Section 4.3.2, Tier 3, of its May 26, 2004, request. The description said, in part, "When entering maintenance configurations which result in Yellow risk levels, steps are taken to minimize duration of activities and increase supervisory oversight." "Yellow" risk is defined in the licensee's program as CDF between 2 and 10 times the "no-maintenance baseline." The licensee stated that the BVPS-2 CDF for one EDG in corrective maintenance (case 4 in Table 1, above) is 7.95E-5 per year. This is more than two times the baseline risk (case 1

in Table 1). The “no-maintenance baseline” would increase this factor. Therefore, a BVPS-2 EDG out-of-service for corrective maintenance would be “yellow” and the licensee would take steps to minimize the out-of-service duration. Therefore, the calculated BVPS-2 ICCDP for corrective maintenance is acceptable.

In addition to clarifying aspects of the risk assessment, the licensee provided additional risk information in response to RAIs from the NRC staff by letters dated October 29, 2004, and January 18, 2005. This information included:

- Details of the ability to cross-tie buses between units, including a sensitivity analysis on cross-tie credit;
- A comparison of the dominant accident scenarios for both units for the base case and the 14-day EDG AOT, which concluded that no new risk outliers were identified, and existing outliers were not exacerbated;
- A discussion of the reliability and availability of offsite power sources relating to the proposed change, including the basis of the loss of offsite power frequencies and nonrecovery probabilities used in the PRA models. A sensitivity analysis on the loss of offsite power initiating event frequency was provided.
- Sensitivity analyses on fast bus transfer repair and refueling water storage tank refill.
- Key PRA model assumptions important to the EDG AOT risk assessment.
- The results of a review of the past 5 years of EDG fuel-oil sampling data, indicating no adverse trend.

The above information provided added confidence in the efficacy of the licensee’s risk assessment. The sensitivity to a loss of offsite power initiating event indicated that, even assuming one additional loss of offsite power event in the data, CDF would increase by about  $1\text{E-}8$  (BVPS-1) and  $2\text{E-}8$  (BVPS-2) per year. The licensee stated that a review of the CDF and LERF dominant sequences for all of the EDG sensitivity cases did not reveal any other PRA modeling assumptions that would significantly impact the risk metrics of the extended EDG AOT.

Considering the information presented above, including the conservatisms and uncertainties in the analysis, the NRC staff concludes that the risk impact of the proposed EDG AOT extension from 72 hours to 14 days lies in Region III of Figures 3 and 4 contained in RG 1.174. Therefore, in accordance with the RG 1.174 risk-acceptance guidelines, the licensee’s proposed licensee amendment results in an acceptable increase in risk that is very small and consistent with the NRC’s Safety Goal Policy Statement. The NRC staff also concludes that the BVPS-1 and 2 calculated ICCDP and ICLERP, when an EDG is unavailable for preventive maintenance during the extended AOT, are less than the RG 1.177 acceptance guidelines of  $5.0\text{E-}07$  for ICCDP and  $5.0\text{E-}08$  for ICLERP for both the maximum expected maintenance duration and the full 14-day AOT. In the case of corrective maintenance of 14 days, only the ICCDP for BVPS-2 exceeds the RG 1.177 acceptance guideline; however, this is acceptable for reasons presented above.

Therefore, the NRC staff finds that the licensee's first-tier risk evaluation, as described in Chapter 16.1 of the SRP and RG 1.177, is acceptable.

#### 3.4.6.2 Tier 2: Avoidance of Risk-Significant Plant Configurations

The second tier evaluates the capability of the licensee to recognize the avoidance of risk-significant plant configurations that could result if equipment, in addition to that associated with the proposed license amendment, is taken out of service simultaneously or if other risk-significant operational factors, such as concurrent system or equipment testing, are also involved.

The licensee stated that the availability of the offsite power circuits to the 4 kV emergency buses, the SBO alternate AC power source and offsite grid will affect the risk-significance of removing an EDG from service, and provided information in Section 4.3.2 of the submittal. Key information provided by the licensee is summarized below.

##### Offsite Power Circuits

The licensee stated that the following Tier 2 restrictions will be required for EDG and offsite power circuit maintenance with the proposed AOT:

- If either offsite power circuit is unavailable, an EDG will be removed from service only for corrective maintenance, i.e., maintenance required to restore operability.
- If an EDG is unavailable, the offsite power circuits will be removed from service only for corrective maintenance required to restore operability.

If a condition is entered in which both an EDG and an offsite power circuit are both unavailable at the same time, the EDG or the offsite power circuit will be restored to service within 12 hours as required by TS 3.8.1.1, action statement c.

##### SBO Alternate AC

An EDG on each unit out-of-service at the same time would create a degraded condition with regard to the unaffected unit's ability to provide SBO alternate AC power to the other unit through the SBO cross-tie. The following Tier 2 restrictions will therefore be required regarding EDG and SBO cross-tie maintenance with the proposed AOT:

- An EDG will not be removed from service for scheduled maintenance unless both of the opposite unit's EDGs are available.
- An EDG will not be removed from service for scheduled maintenance unless the station blackout cross-tie circuits between the units are available.
- If an EDG is unavailable, an EDG on the opposite unit will be removed from service only for corrective maintenance, i.e., maintenance required to ensure or restore operability or for the performance of required surveillance testing.

- If an EDG is unavailable, the station blackout cross-tie will be removed from service only for corrective maintenance, i.e., maintenance required to ensure or restore operability.

If a condition is entered in which both an EDG is unavailable and either the SBO cross-tie or an opposite unit's EDG becomes unavailable at the same time, the licensee will evaluate the BVPS-1 and 2 plant condition using the BVPS-1 and 2 Maintenance Rule configuration risk management program.

The licensee provided supplemental information in a letter dated October 29, 2004, which is presented below:

The current procedure, 1/2-ADM-0804, "On-line Work Management and Risk Assessment" states that only one of the four EDGs at both BVPS-1 and 2 will be intentionally removed from service at the same time. This is not applicable when both BVPS-1 and 2 are in shutdown modes. The performance of diesel surveillance testing is exempted from this requirement.

Therefore, it is not expected that a condition would arise where one EDG from one unit is in preventive maintenance and one from the other unit is in corrective maintenance at the same time, especially for the full 14 days. However, if this condition did exist, the conscientious site practice would be to work the EDG that is in corrective maintenance around the clock until it is repaired. If the repair time was estimated to take longer than the time to restore the EDG that is in preventive maintenance, then the focus would be to work around the clock to restore the EDG in preventive maintenance.

Although this alignment would not be intentionally scheduled, the on-line risk configuration program (safety monitor) evaluated the risk associated with taking one EDG out-of-service at each unit concurrently while assuming that all other equipment was available. The risk increase associated with this alignment remained within the GREEN threshold values (i.e., less than two times the no maintenance CDF) at both units.

#### Offsite Grid Availability

The licensee also stated that the following restrictions will be employed to provide increased assurance of offsite grid availability during EDG maintenance with the proposed AOT:

- An EDG will not be removed from service for scheduled maintenance if weather forecasts are predicting severe weather conditions for the BVPS area with the potential to degrade or limit offsite power availability.
- When an EDG is removed from service for scheduled maintenance, no discretionary switchyard maintenance will be allowed. In addition, switchyard access will be strictly controlled by the control room operating crew to minimize the potential for offsite power transients.
- Prior to removing the EDG from service, the stability of the offsite power system in the vicinity of BVPS will be verified by contracting the FirstEnergy and Duquesne Light Company System Control Centers to

determine the projected load demand and status of the grid during the period the EDG will be unavailable.

The licensee also committed to implement a compensatory fire watch prior to entering the proposed EDG AOT for scheduled maintenance and within 24 hours after entering the proposed EDG AOT for unscheduled corrective maintenance; refer to Section 4 of this safety evaluation.

In addition, the licensee stated that assessments performed in accordance with the provisions of the Maintenance Rule (10 CFR 50.65) paragraph (a)(4) will ensure that other potentially risk significant configurations are identified prior to removing an EDG from service for scheduled maintenance. The Maintenance Rule configuration risk management program also ensures that the risk significance of unexpected configurations resulting from unplanned maintenance or conditions while an EDG is out of service is properly evaluated.

The information provided by the licensee indicates the capability of the licensee to recognize and avoid risk-significant plant configurations that could result if equipment, in addition to that associated with the proposed license amendment, is taken out of service simultaneously or if other risk-significant operational factors, such as concurrent system or equipment testing, are also involved. Therefore, the NRC staff finds that the licensee's second-tier risk evaluation, as described in Chapter 16.1 of the SRP and RG 1.177, is acceptable.

#### 3.4.6.3 Tier 3: Risk-Informed Configuration Risk Management

The third tier assesses the licensee's program to ensure that the risk impact of out-of-service equipment is appropriately evaluated prior to performing any maintenance activity. The need for this third tier stems from the difficulty of identifying all possible risk-significant configurations under the second tier that could ever be encountered. Section 4.3.2 of the licensee's submittal discusses implementation of the third tier.

Consistent with 10 CFR 50.65(a)(4), BVPS-1 and 2 has implemented a program that ensures that the risk impact of out-of-service equipment is appropriately evaluated. This program provides a risk-informed process to manage the risk associated with planned and unplanned maintenance activities. The program ensures that the risk impact of out of service equipment is appropriately evaluated prior to performing a planned maintenance activity and soon after entering into an emergent maintenance condition. The program requires a review of maintenance activities to identify risk-significant plant equipment outage configurations. This review is required both during the work management process and for emergent conditions during normal plant operation. The program includes provisions for performing a configuration dependent assessment of the overall impact on risk of proposed plant configurations prior to the performance of maintenance activities that remove equipment from service. Risk is reassessed if an equipment failure/malfunction or emergent condition produces a plant configuration that has not been previously assessed.

The risk assessment is performed to ensure that the activity does not pose any unacceptable risk. This evaluation is performed using the BVPS-1 and 2 PRA models and the safety monitor program to calculate CDF for actual plant conditions. The risk assessment results are classified by a color code based on the increasing levels of risk, using Green, Yellow, Orange and Red. Green risk extends from the no-maintenance baseline (NMBL) to 2 times the NMBL. Yellow risk ranges from 2 to 10 times the NMBL. Orange risk extends from 10 times the NMBL to a CDF of



1.0 E-3 and the Red risk category is defined as a CDF of higher than 1.0 E-3. When entering maintenance configurations which result in Yellow risk levels, steps are taken to minimize duration of activities and increase supervisory oversight. Management approval is required for maintenance configurations which result in an Orange or Red risk level.

Prior to the performance of scheduled work, work activities are reviewed by operations to ensure the scheduled activities are consistent with the protected train concept, ensure they are consistent with the risk evaluation performed during the work planning process and confirm that the overall safety impact has not changed due to emergent work or equipment failures.

Based on the licensee's description of their program for complying with paragraph (a)(4) of 10 CFR 50.65, the NRC staff finds that the licensee's third tier risk evaluation, as described in Chapter 16.1 of the SRP and RG 1.177, is acceptable.

### 3.5 NRC Staff's Findings

In summary, the NRC staff finds that the licensee's proposed change to revise the TSs to extend the AOT for an EDG from 72 hours to 14 days is acceptable because the five key principles of risk-informed decision making identified in RG 1.174 and RG 1.177 have been satisfied.

### 4.0 REGULATORY COMMITMENTS

The licensee made the following commitments in its letters dated May 26, 2004, and January 18, 2005, to be put into effect upon implementation of the requested license amendment.

1. The BVPS-1 and 2 UFSARs will be revised to include the following statement: "The emergency diesel generators are periodically inspected in accordance with a licensee controlled maintenance program. The emergency diesel generator maintenance program specifies required inspections based on the manufacturer's and Diesel Generator Owner's Group recommendations and industry operating experience. Changes to the emergency diesel generator maintenance program are controlled under 10 CFR 50.59."
2. The BVPS-2 UFSAR description of conformance to RG 1.93 will be revised to include exceptions to the guidance concerning a 72-hour AOT for restoring an inoperable EDG and avoidance of this AOT for preventive maintenance.
3. The BVPS-1 and 2 administrative procedures for implementing Section (a)(4) of the Maintenance Rule will be revised to reflect the following restrictions for entering the 14-day EDG AOT for scheduled maintenance:
  - If either offsite power circuit is unavailable, an EDG will be removed from service only for corrective maintenance, i.e., maintenance required to restore operability.
  - If an EDG is unavailable, the offsite power circuits will be removed from service only for corrective maintenance required to restore operability.
  - An EDG will not be removed from service for scheduled maintenance unless both of the opposite unit's EDGs are available.



- An EDG will not be removed from service for scheduled maintenance unless the station blackout cross-tie circuits between the units are available.
  - If an EDG is unavailable, an EDG on the opposite unit will be removed from service only for corrective maintenance, i.e., maintenance required to ensure or restore operability, or for the performance of required surveillance testing.
  - If an EDG is unavailable, the station blackout cross-tie will be removed from service only for corrective maintenance, i.e., maintenance required to ensure or restore operability.
  - An EDG will not be removed from service for scheduled maintenance if weather forecasts are predicting severe weather conditions for the BVPS area with the potential to degrade or limit offsite power availability.
  - When an EDG is removed from service for scheduled maintenance, no discretionary switchyard maintenance will be allowed. In addition, switchyard access will be strictly controlled by the control room operating crew to minimize the potential for offsite power transients.
  - Prior to removing the EDG from service, the stability of the offsite power system in the vicinity of BVPS will be verified by contracting the FirstEnergy and Duquesne Light Company System Control Centers to determine the projected load demand and status of the grid during the period the EDG will be unavailable.
4. The BVPS-1 and 2 administrative procedures for implementing Section (a)(4) of the Maintenance Rule will be revised to reflect the following compensatory measure: Prior to entering the 14-day EDG AOT for scheduled maintenance and within 24 hours after entering the 14-day EDG AOT for unscheduled corrective maintenance (maintenance required to restore operability) an hourly fire watch will be established in the EDG room for the operable EDG.
5. To correctly assess and manage risk during on-line performance of the manufacturer's recommended maintenance (since the EDG will not be recoverable until the maintenance evolution is concluded) the safety monitor program will be revised. This revision will include utilizing the indirect effects module in the safety monitor to set the baseline electric power recovery (Top Event RE) split fraction values to the appropriate split fraction values corresponding to either one EDG recoverable or zero EDGs recoverable, whenever the manufacturer's recommended maintenance activities are performed on-line.

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program. The above regulatory commitments do not warrant the creation of regulatory requirements, i.e., items requiring prior NRC approval of subsequent changes.

## 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 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 40673). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22©)(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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