

September 15, 2009

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EA-09-237  
EA-09-238

Mr. Peter P. Sena, III  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Beaver Valley Power Station  
Mail Stop A-BV-SEB1  
P.O. Box 4  
Shippingport, PA 15077-0004

SUBJECT: BEAVER VALLEY POWER STATION UNITS 1 AND 2 - NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000334/2009007 AND 05000412/2009007 AND EXERCISE OF ENFORCEMENT DISCRETION

Dear Mr. Sena:

On August 6, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Beaver Valley Power Station Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on August 6, 2009, with Mr. Ray Lieb and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. The scope of the inspection was reduced for both Units 1 and 2, in accordance with Inspection Procedure 71111.05TTP, "Fire Protection-NFPA 805 Transition Period (Triennial)," issued on May 9, 2006, as a result of your ongoing project to convert the fire protection program of both units to the performance-based methodology as described in National Fire Protection Association Standard 805.

The report documents three violations for which the NRC is exercising enforcement discretion. The NRC is not taking enforcement action for these violations because they meet the criteria of the NRC Enforcement Policy, "Interim Enforcement Policy regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)," and NRC Inspection Manual Chapter 0305, Section 12.01.b, "Violations in Specified Areas of Interest Qualifying for Enforcement Discretion."

P. Sena

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Sincerely,

**/RA/**

Darrell J. Roberts, Director  
Division of Reactor Safety

Docket Nos. 50-334, 50-412  
License Nos. DPR-66, NPF-73

Enclosure: Inspection Report No. 05000334/2009007 and 05000412/2009007  
w/Attachment: Supplemental Information

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2

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**/RA/**

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.: 50-334, 50-412

License No.: DPR-66, NPF-73

Report No.: 05000334/2009007, 05000412/2009007

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Post Office Box 4  
Shippingport, PA 15077

Dates: July 20-24, 2009 and August 3-6, 2009

Inspectors: D. Orr, Senior Reactor Inspector (Team Leader)  
O. Ayegbusi, Reactor Inspector  
M. Patel, Reactor Inspector

Approved by: John F. Rogge, Chief  
Engineering Branch 3  
Division of Reactor Safety

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## SUMMARY OF FINDINGS

IR 05000334/2009007, 05000412/2009007; 07/20/2009 - 08/06/2009; Beaver Valley Power Station Units 1 and 2; Triennial Fire Protection Team Inspection.

The report covered a two-week triennial fire protection team inspection by specialist inspectors from the NRC's Region I office. FENOC has committed to converting the Beaver Valley Power Station (BVPS) Units 1 and 2 fire protection programs to one program which meets 10 CFR 50.48(c), National Fire Protection Association (NFPA) Standard 805. As a result of NRC enforcement policy changes applicable to plants in the process of transitioning to NFPA 805, three issues were identified and documented in this inspection report but were subject to enforcement discretion. (Section 1R05.01)

The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

None

B. Licensee-Identified Violations

None

## REPORT DETAILS

### Background

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure (IP) 71111.05TTP, "Fire Protection-NFPA 805 Transition Period (Triennial)." The objective of the inspection was to assess whether FENOC has implemented an adequate fire protection program and that post-fire safe shutdown capabilities have been established and were being properly maintained at the Beaver Valley Power Station (BVPS), Units 1 and 2. The following fire areas were selected for detailed review based on risk insights from the BVPS, Units 1 and 2 Individual Plant Examination of External Events:

#### BVPS Unit 1

Fire Area CV-3  
Fire Area NS-1

#### BVPS Unit 2

Fire Area CB-3  
Fire Area CV-3

Inspection of these four fire areas fulfills the inspection procedure requirement to inspect a minimum of three samples.

The inspection team evaluated FENOC's fire protection program against applicable requirements which included plant Technical Specifications, Operating License Conditions 2.C.5 (Unit 1) and 2.F (Unit 2), NRC Safety Evaluations, 10 CFR 50.48, and 10 CFR 50, Appendix R. The team also reviewed related documents that included the Updated Final Safety Analysis Report (UFSAR), the Fire Hazards Analysis (FHA), and the post-fire safe shutdown analyses for both Units 1 and 2.

Specific documents reviewed by the team are listed in the attachment.

### 1. **REACTOR SAFETY**

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

1R05 Fire Protection (IP 71111.05T)

.01 Post-Fire Safe Shutdown From Outside Main Control Room (Alternative Shutdown) and Normal Shutdown

a. Inspection Scope

#### Methodology

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings, electrical drawings, the UFSARs, and other supporting documents to verify that hot and cold shutdown could be achieved and maintained for fires that rely on shutdown from outside the control rooms of both units. This review

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included verification that shutdown from outside the control rooms could be performed both with and without the availability of offsite power. Plant walkdowns were also performed to verify that the plant configurations were consistent with that described in the safe shutdown and fire hazards analyses. These inspection activities focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor decay heat removal, process monitoring instrumentation, and support systems functions. The team verified that the systems and components credited for use during these shutdown methods would remain free from fire damage.

Similarly, for fire areas that utilize shutdown from the control rooms, the team also verified that the shutdown methodologies properly identified the components and systems necessary to achieve and maintain safe shutdown conditions.

### Operational Implementation

The team verified that the training program for licensed and non-licensed operators included alternative shutdown capability. The team also verified that personnel required for safe shutdown using the normal or alternative shutdown systems and procedures were trained and available onsite at all times, and were exclusive of those assigned as fire brigade members.

The team reviewed the adequacy of procedures used for post-fire shutdown and performed an independent walk through of procedure steps to ensure the implementation and human factors adequacy of the procedures. The team also verified that the operators could be reasonably expected to perform specific actions within the time required to maintain plant parameters within specified limits. Time critical actions, which were verified, included the restoration of alternating current (AC) electrical power, establishing the remote shutdown and local shutdown panels, establishing reactor coolant makeup, auxiliary feedwater, and decay heat removal.

Specific procedures reviewed for alternative shutdown, including shutdown from outside the control room included the following:

#### BVPS Unit 1

- 1OM.56B.4.B, Safe Shutdown Following a Serious Fire in the Cable Tunnel, Rev. 6; and,
- 1OM.56B.4.I, Safe Shutdown Following a Serious Fire in the Service Building, Rev. 11.

#### BVPS Unit 2

- 2OM.56B.4.B, Safe Shutdown Following a Serious Fire in the Cable Vault Building, Rev. 19;
- 2OM-56.C.4.B, Unit Supervisor Procedure, Rev. 28;
- 2OM-56.C.4.C, NCO Procedure, Rev. 18;
- 2OM-56.C.4.D, Nuclear Operator #1 Procedure, Rev. 22;

- 2OM-56.C.4.E, Nuclear Operator #2 Procedure, Rev. 20; and,
- 2OM-56.C.4.F-1, ASP Activation, Rev. 12.

The team reviewed manual actions to ensure that they could be implemented in accordance with plant procedures in the time necessary to support the safe shutdown method for each fire area. The team verified that FENOC had identified operator manual actions for post-fire safe-shutdown and had plans in place to assess them as part of the plant-wide risk evaluation for transition to National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition. The team also reviewed the periodic testing of the alternative shutdown transfer capability and instrumentation and control functions to ensure the tests were adequate to ensure the functionality of the alternative shutdown capability.

b. Findings

.1 Failure to Evaluate the Impact of Spurious Volume Control Tank Outlet Valves Closure During Alternative Shutdown

Introduction: The team identified a violation of very low safety significance of Beaver Valley Unit 2 License Condition 2.F, Fire Protection Program, for failure to evaluate the volume control tank (VCT) outlet valves spurious closing and damaging the single charging pump credited for alternative shutdown. However, this issue was determined to satisfy the criteria specified for the exercise of enforcement discretion for plants in transition to a fire protection program that meets the requirements of 10 CFR 50.48(c), National Fire Protection Association Standard NFPA 805.

Description: While evaluating the alternative shutdown capability for Beaver Valley Unit 2, the team questioned whether FENOC appropriately evaluated whether a fire in the Unit 2 control room could spurious close either VCT outlet valve, 2CHS\*LCV115C or 2CHS\*LCV115E. The VCT was the normal suction source for all charging pumps. Closure of either VCT outlet valve would cause immediate consequential damage to an operating centrifugal charging pump. Charging pump 21A was the only charging pump available for high-head injection to the reactor coolant system credited for alternative shutdown and was routinely operated during normal plant operation.

The team noted that 2OM-56C.4.C, Alternate Safe Shutdown from Outside Control Room NCO Procedure, Rev. 18, included an operator action to open a refueling water storage tank suction valve (2CHS\*LCV115B) prior to control room evacuation. However, spurious closure of a VCT outlet valve was a credible single circuit failure that could occur while the operators were transitioning into the alternate safe shutdown procedures and the 21A charging pump would be damaged if it was operating at the onset of the spurious operation. Therefore, opening the 2CHS\*LCV115B would not always ensure the 21A charging pump remained undamaged.

FENOC reviewed the circuits for 2CHS\*LCV115C and 2CHS\*LCV115E and concluded that a spurious closure of either valve could occur due to fire damage in the Unit 2 control room, the process rack room, the cable spreading room, the remote shutdown

panel area, or the cable tunnel. Branch Technical Position (BTP) CMEB 9.5-1, Rev. 2 of July 1981 section C.5.c.(7) required that alternative safe shutdown equipment and systems for each fire area should be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. FENOC did not meet this requirement and failed to protect the 21A charging pump from a single circuit failure causing spurious closure of either VCT outlet valve. FENOC initiated condition report 09-62471 for long term resolution and promptly initiated hourly fire watches in each of the affected fire areas as an interim compensatory measure. The team walked down several of the affected fire areas and did not observe any issue with fire barriers, fire suppression systems, fire detection, transient combustibles, or transient ignition sources.

The team considered the interim actions acceptable to address the fire protection program noncompliance until FENOC completes a full evaluation of this issue during the NFPA 805 conversion.

Analysis: FENOC's failure to evaluate the post-fire safe shutdown availability of the 21A charging pump, if the VCT outlet valves were to spuriously close from fire damage to electrical circuits is a performance deficiency. This performance deficiency is more than minor because it is associated with the Reactor Safety/Mitigating Systems Cornerstone, protection against external factors (fire) attribute, that has the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). As stated above, FENOC entered this issue into the Corrective Action Program (reference CR 09-62471) and implemented hourly fire watches in the multiple affected fire areas to ensure transient ignition sources and combustible loading is minimized or eliminated pending final resolution of the issue. In addition, FENOC completed a bounding risk assessment of this postulated fire-induced condition to estimate the risk associated with this alternate safe shutdown vulnerability. An NRC senior reactor analyst (SRA) reviewed FENOC's evaluation and concluded that the assessment assumptions and risk quantification methodologies were appropriately conservative. Accordingly, the SRA agrees with FENOC's risk estimate for this condition and concludes that this NRC-identified issue would be of very low safety significance (Green). The team concluded that FENOC's interim compensatory measures were commensurate with the risk significance.

Cross-cutting aspects are not applicable to findings involving enforcement discretion.

Enforcement: Beaver Valley Unit 2 License Condition 2.F requires in part that FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report (FSAR) through Amendment No. 17, and submittals dated May 18, May 20, May 21, June 24, and July 6, 1987. BVPS Unit 2 FSAR Rev. 17 Section 9.5.1.1 states that the fire protection system is designed using the guidance of BTP CMEB 9.5-1, Rev. 2. BTP CMEB 9.5-1, Rev. 2, Section C.5.c.(7) requires that alternative safe shutdown equipment and systems for each fire area should be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. Contrary to the above, on August 4,

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2009, the NRC identified that FENOC did not meet this requirement and failed to protect the 21A charging pump from a single circuit failure resulting in the spurious closure of the VCT outlet valves.

FENOC is in transition to NFPA 805 and therefore the NRC-identified violation was evaluated in accordance with the criteria established by Section A of the NRC's Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR Part 50.48) for a licensee in NFPA 805 transition. Specifically, although the NRC identified the violation, it is likely that FENOC would have identified and corrected this issue as part of the transition to NFPA 805, FENOC entered the issue into the corrective action program, FENOC implemented compensatory measures in a reasonable time commensurate with the risk significance, the issue was not likely to have been previously identified by routine FENOC efforts, and the violation was not willful. Because all the criteria were met, the NRC is exercising enforcement discretion for this issue.

.2 Failure to Evaluate the Affects of a Spurious Safety Injection Signal During Alternative Shutdown

Introduction: The team identified a violation of very low safety significance of Beaver Valley Unit 2 License Condition 2.F, Fire Protection Program, for failure to evaluate the affects of a spurious safety injection (SI) signal during alternative shutdown. However, this issue was determined to satisfy the criteria specified for the exercise of enforcement discretion for plants in transition to a fire protection program that meets the requirements of 10 CFR 50.48(c), National Fire Protection Association Standard NFPA 805.

Description: While evaluating the alternative shutdown capability for Beaver Valley Unit 2, the team questioned whether FENOC appropriately evaluated the potential for a complete SI signal from a single circuit failure resulting in spurious operation. Spurious operation of SI signals during alternative shutdown scenarios can automatically start charging pumps and open valves for SI leading to pressurizer overfill and challenging the integrity of reactor coolant system (RCS) safety relief valves (SRVs). BTP CMEB 9.5-1, Rev. 2 section C.5.c.(1) requires that the RCS primary coolant boundary remain intact during postfire shutdown. The Beaver Valley Unit 2 RCS SRVs were not qualified for repeated water relief and may stick open during pressurizer solid water conditions leading to a loss of coolant accident (LOCA).

FENOC determined that a single spurious operation of some components could cause a complete SI signal to occur. Although operators were trained to recognize and respond to a spurious SI signal in other abnormal plant conditions, FENOC promptly recognized that its alternative shutdown procedures did not contain any steps to address a spurious SI signal such as stopping the second charging pump or closing valves in the SI flow path.

FENOC initiated condition report 09-62244 for long term resolution and promptly initiated hourly fire watches in each of the affected fire areas as an interim compensatory measure. The affected fire areas conservatively included CB-1, CB-2,

CB-3, CT-1, CV-1, CV-2, CV-3, MS-1, PA-3, PT-1, PA-3, PT-1, SB-1, SB-2, and SB-3. Although reactor containment was a potential area of concern, FENOC provided appropriate justification for not performing fire watches in the reactor containment. FENOC also evaluated its existing procedure network and determined that the operators were sufficiently trained and would take appropriate action to mitigate a spurious SI during alternative shutdown. FENOC reviewed the issue for reportability and concluded that it was not reportable because the alternative shutdown transient with a spurious SI was bounded by an existing design basis small break LOCA analysis. The team walked down several of the affected fire areas and did not observe any issue with fire barriers, fire suppression systems, fire detection, transient combustibles, or transient ignition sources.

The team considered the interim actions acceptable to address the fire protection program noncompliance until FENOC completes a full evaluation of this issue during their NFPA 805 conversion.

Analysis: FENOC's failure to adequately evaluate the consequences of a fire-induced single spurious operation resulting in a SI signal is a performance deficiency. This performance deficiency is more than minor because it is associated with the Reactor Safety/Initiating Events Cornerstone, protection against external factors (fire) attribute that has the objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown and power operations. As stated above, FENOC entered this into the Corrective Action Program (reference CR 09-62244) and ensured operators were sufficiently trained to cope with an inadvertent SI and resultant challenge of the SRVs and power-operated relief valves (PORVs) and implemented hourly fire watches in the multiple affected fire areas to ensure transient ignition sources and combustible loading is minimized or eliminated pending final resolution of the issue. In addition, FENOC completed a bounding risk assessment of the potential failure of the relief valves (due to passing water) to estimate the risk associated with this fire-induced single spurious operation. FENOC's risk estimate represents the cumulative risk in all 15 potentially affected fire areas. No individual fire area calculated risk increase exceeded the Green/White significance threshold. Review by the NRC SRA identified that FENOC's risk estimate was conservative, based upon the principle assumptions that all fires in the affected areas would result in an SI, and that no credit was given to operator action to close the affected PORV block valves to mitigate the resultant loss of coolant accident. The SRA agrees with FENOC's risk estimate for this condition and concludes that this NRC-identified issue would be of very low safety significance (Green). The team concluded that FENOC's interim compensatory measures were commensurate with the risk significance.

Cross-cutting aspects are not applicable to findings involving enforcement discretion.

Enforcement. Beaver Valley Unit 2 License Condition 2.F requires in part that FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report (FSAR) through Amendment No. 17, and submittals dated May 18, May 20, May 21, June 24, and July 6, 1987. BVPS Unit 2 FSAR Rev. 17 Section 9.5.1.1 states that the fire protection system is designed using the guidance of BTP CMEB 9.5-1, Rev. 2. BTP CMEB 9.5-1, Rev. 2,

Section C.5.c.(1) requires that during postfire shutdown, the fission product boundary integrity shall not be affected; i.e., there shall be no rupture of any primary coolant boundary. Contrary to the above, on July 23, 2009, the NRC identified that FENOC did not meet this requirement and failed to ensure that the RCS SRVs would remain closed if a single spurious operation of the SI signal were to occur during a postfire shutdown.

FENOC is in transition to NFPA 805 and therefore the NRC-identified violation was evaluated in accordance with the criteria established by Section A of the NRC's Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR Part 50.48) for a licensee in NFPA 805 transition. Specifically, although the NRC identified the violation, it is likely that FENOC would have identified and corrected this issue as part of the transition to NFPA 805, FENOC entered the issue into the corrective action program, FENOC implemented compensatory measures in a reasonable time commensurate with the risk significance, the issue was not likely to have been previously identified by routine FENOC efforts, and the violation was not willful. Because all the criteria were met, the NRC is exercising enforcement discretion for this issue.

.3 Failure to Ensure RCPs were Tripped and Remain Tripped Prior to Securing Reactor Coolant Pump Seal Cooling

Introduction: The team identified a violation of very low safety significance of the Beaver Valley Power Station Unit 1 License Condition 2.C.5, Fire Protection Program, in that the procedure for shutting down the plant in response to a serious fire in the service building did not provide adequate guidance to the operators to verify that all reactor coolant pumps (RCPs) were tripped and remain tripped prior to isolating RCP seal injection and thermal barrier cooling. However, this issue was determined to satisfy the criteria specified for the exercise of enforcement discretion for plants in transition to a fire protection program that meets the requirements of 10 CFR 50.48(c), National Fire Protection Association Standard NFPA 805.

Description: The team reviewed Beaver Valley Power Station Unit 1 Updated Fire Protection Appendix R Report, Rev. 29, and noted that the reactor coolant pump trip circuits were not analyzed for safe shutdown and may not trip from the control room due to damage of the control power cables or benchboard control switches. The team noted that backup actions to trip the RCPs from emergency control stations were provided in all safe shutdown procedures. The team also noted that for a fire in the normal switchgear room, RCP seal injection and component cooling to the RCP thermal barriers were isolated after the RCPs were tripped with the benchboard control switches to prevent a subsequent uncontrolled restoration of seal cooling. Uncontrolled restoration of seal cooling would thermally shock the RCP seals and cause excessive reactor coolant system water inventory losses often referred to as a RCP seal loss of coolant accident. Precautions to avoid RCP seal thermal shock were provided in a vendor technical bulletin: Westinghouse Technical Bulletin, TB-04-22, Reactor Coolant Pump Seal Performance -- Appendix R Compliance and Loss of All Seal Cooling, Rev. 1. Safe shutdown procedure, 1OM-56B.4.I, Safe Shutdown Following a Serious Fire in the Service Building, Rev. 11, directed the operator to trip the RCPs from the main control room. After tripping the RCPs from the main control room, 1OM-56B.4.I directed

manual actions be performed to isolate component cooling to the RCP thermal barrier heat exchangers by opening low voltage electrical panel breakers in the main control room. 1OM-56B.4.I also directed a field operator to isolate seal injection by manually closing a valve. RCP seal cooling was isolated by these local actions to prevent a subsequent uncontrolled restoration of seal cooling. However, the team determined that the RCP trips from the main control room benchboard control switches may not be successful due to fact that dc power to actuate the RCP breaker trip coils originates from batteries located in the process rack area and was routed through the cable spreading area to the normal switchgear room. The team also determined that the backup actions specified in 1OM-56B.4.I, to trip the RCPs by locally opening switchyard breakers to the normal switchgear busses was not directed to be performed prior to isolation of the RCP thermal barrier heat exchanges and seal injection. Operating a RCP without any seal cooling is contrary to Westinghouse Technical Bulletin, TB-04-22, Reactor Coolant Pump Seal Performance -- Appendix R Compliance and Loss of All Seal Cooling, Rev. 1 and may cause excessive seal leakages that challenge safe shutdown.

FENOC entered this issue into the corrective action program for long term resolution as CR 09-62461. FENOC also identified that other safe shutdown procedures may similarly lack adequate guidance to ensure RCPs remain tripped prior to isolating seal cooling. FENOC promptly established a standing night order to alert the operators to not isolate seal cooling until after the RCPs were verified secured using the 1OM-56B and 1OM-56C series of safe shutdown procedures.

Analysis: FENOC's failure to provide adequate procedural guidance and ensure the integrity of RCP seals is maintained consistent with Westinghouse Technical Bulletin, TB-04-22, with respect to a post-fire safe shutdown scenario is a performance deficiency. This performance deficiency is more than minor because it is associated with the Reactor Safety/Initiating Events Cornerstone, protection against external factors (fire) attribute that has the objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown and power operations.

As stated above, FENOC entered this into the Corrective Action Program (reference CR 09-62461) and promptly provided additional procedural guidance to operators to ensure RCPs were tripped prior to securing RCP seal cooling and injection flow. In addition, FENOC completed a bounding risk assessment of the condition resulting from the spurious failure of all three RCPs to trip and the postulated improper operator actions (due to procedural inadequacies) potentially leading to a loss of coolant accident. FENOC's risk estimate represents the cumulative risk in all potentially affected fire areas. This bounding risk estimate was not based upon a detailed hazards analysis and assumed: 1) 0.5 probability that all RCPs would fail to trip based upon trip circuit fire damage; 2) all three RCPs would be impacted by the fire (includes some multiple spurious operations vice only single spurious actuation); and, 3) fire hazard frequencies accounted for relatively high probabilities of non-suppression (0.82 to 0.84). Discussions between the NRC SRA, the inspection team, and the FENOC staff identified that the station's risk estimate was overly conservative, and may be reduced by an order of magnitude or more, with additional detailed fire dynamics analysis and

refinements such as Inspection Manual Chapter 0609 Appendix F, Fire Protection Significance Determination Process. The SRA agrees with FENOC's risk estimate for this condition and concludes that this NRC-identified issue would be of very low safety significance (Green). Based upon the interim enforcement policy regarding enforcement discretion for plants transitioning to NFPA 805, further refinement of this analysis is not required nor warranted. The team concluded that FENOC's interim compensatory measures were commensurate with the risk significance.

Cross-cutting aspects are not applicable to findings involving enforcement discretion.

Enforcement: Beaver Valley Unit 1 License Condition 2.C.5 requires that FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report. BVPS Unit 1 UFSAR Rev. 24 Section 9.10.1 states that the fire protection plan that satisfies General Design Criterion 3 of Appendix A to 10 CFR 50 is described in BVPS Administrative Procedures. 1/2 ADM-1900, Fire Protection Program, Rev. 19 step 7.17.4 requires operating procedures be maintained to implement the actions required to achieve safe shutdown. Contrary to the above, on July 29, 2009, the NRC identified that FENOC did not meet this requirement and failed to maintain safe shutdown procedure 1OM-56B.4.I, Safe Shutdown Following a Serious Fire in the Service Building, Rev. 11, and ensure that the RCPs were tripped and remain tripped prior to securing RCP seal cooling.

FENOC is in transition to NFPA 805 and therefore the NRC-identified violation was evaluated in accordance with the criteria established by Section A of the NRC's Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR Part 50.48) for a licensee in NFPA 805 transition. Specifically, although the NRC identified the violation, it is likely that FENOC would have identified and corrected this issue as part of the transition to NFPA 805, FENOC entered the issue into the corrective action program, FENOC implemented compensatory measures in a reasonable time commensurate with the risk significance, the issue was not likely to have been previously identified by routine FENOC efforts, and the violation was not willful. Because all the criteria were met, the NRC is exercising enforcement discretion for this issue.

.02 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the FHA, safe shutdown analyses and supporting drawings and documentation to verify that safe shutdown capabilities were properly protected. The team ensured that separation requirements of Section III.G of 10 CFR 50, Appendix R were maintained for the credited safe shutdown equipment and their supporting power, control and instrumentation cables. This review included an assessment of the adequacy of the selected systems for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and associated support system functions. The inspection team validated three non-conformances identified in the licensee's transitional assessment of their fire areas to verify that interim compensatory measures were adequate and appropriately implemented. The team reviewed FENOC's

procedures and programs for the control of ignition sources and transient combustibles to assess their effectiveness in preventing fires and in controlling combustible loading within limits established in the FHA. A sample of hot work and transient combustible control permits were also reviewed. The team performed plant walkdowns to verify that protective features were being properly maintained and administrative controls were being implemented.

b. Findings

No findings of significance were identified.

.03 Passive Fire Protection

a. Inspection Scope

The team walked down accessible portions of the selected fire areas to observe material condition and the adequacy of design of fire area boundaries (including walls, fire doors, and fire dampers) to ensure they were appropriate for the fire hazards in the area.

The team reviewed installation/repair and qualification records for a sample of penetration seals to ensure the fill material was of the appropriate fire rating and that installation met the engineering design.

b. Findings

No findings of significance were identified.

.04 Active Fire Protection

a. Inspection Scope

The team reviewed the design, maintenance, testing, and operation of the fire detection and suppression systems in the selected plant fire areas. This included verification that the manual and automatic detection and suppression systems were installed, tested, and maintained in accordance with the NFPA code of record, or NRC approved exemptions for Unit 1 or deviations for Unit 2, and that each suppression system would control and/or extinguish fires associated with the hazards in the selected areas. A review of the design capability of the suppression agent delivery systems verified the code requirements for the hazards involved. The team also performed a walkdown of accessible portions of the detection and suppression systems in the selected areas as well as a walkdown of major system support equipment in other areas (e.g., fire pumps, Halon and carbon dioxide (CO<sub>2</sub>) storage tanks and supply system) to assess the material condition of the systems and components.

The team reviewed electric and diesel fire pump flow and pressure tests to ensure that the pumps were meeting their design requirements. The team also reviewed the fire main loop flow tests to ensure that the flow distribution circuits were able to meet the design requirements.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. The team also reviewed pre-fire plans and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. In addition, the team inspected the fire brigade equipment (including smoke removal equipment) to verify operational readiness for fire fighting.

b. Findings

No findings of significance were identified.

.05 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The team performed document reviews and plant walkdowns to verify that redundant trains of systems required for hot shutdown were not subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, the team verified that:

- A fire in one of the selected fire areas would not directly, through production of smoke, heat or hot gases, cause activation of suppression systems that could potentially damage all redundant safe shutdown trains;
- A fire in one of the selected fire areas (or the inadvertent actuation or rupture of a fire suppression system) would not directly cause damage to all redundant trains (e.g., sprinkler caused flooding of other than the locally affected train); and
- Adequate drainage was provided in areas protected by water suppression systems.

b. Findings

No findings of significance were identified.

.06 Alternative Shutdown Capability

a. Inspection Scope

Alternative shutdown capability is discussed in section 1R05.01 of this report.

.07 Circuit Analysis

a. Inspection Scope

NRC Inspection Procedure 71111.05TTP, "Fire Protection-NFPA 805 Transition Period (Triennial)," reduces the scope of this inspection by specifically excluding review of circuit configurations for plants transitioning their fire protection program to the requirements of NFPA 805.

.08 Communications

a. Inspection Scope

The team reviewed safe shutdown procedures, the safe shutdown analysis, and associated documents to verify an adequate method of communications would be available to plant operators following a fire. During this review the team considered the effects of ambient noise levels, clarity of reception, reliability, and coverage patterns. The team also inspected the designated emergency storage lockers to verify the availability of portable radios for the fire brigade and for plant operators. The team also verified that communications equipment such as repeaters and transmitters would not be affected by a fire.

b. Findings

No findings of significance were identified.

.09 Emergency Lighting

a. Inspection Scope

The team observed the placement and coverage area of eight-hour emergency lights throughout the selected fire areas to evaluate their adequacy for illuminating access and egress pathways and any equipment requiring local operation and/or instrumentation monitoring for post-fire safe shutdown. The team also verified that the battery power supplies were rated for at least an eight-hour capacity. Preventive maintenance procedures, the vendor manual, completed surveillance tests, and battery replacement practices were also reviewed to verify that the emergency lighting was being maintained in a manner that would ensure reliable operation.

b. Findings

No findings of significance were identified.

.10 Cold Shutdown Repairs

a. Inspection Scope

The team verified that FENOC had dedicated repair procedures, equipment, and materials to accomplish repairs of components required for cold shutdown which might be damaged by the fire to ensure cold shutdown could be achieved within the time frames specified in their design and licensing bases. The team verified that the repair equipment, components, tools, and materials (e.g., pre-cut cables with prepared attachment lugs) were available and accessible on site.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team verified that compensatory measures were in place for out-of-service, degraded or inoperable fire protection and post-fire safe shutdown equipment, systems, or features (e.g., detection and suppression systems and equipment, passive fire barriers, or pumps, valves, or electrical devices providing safe shutdown functions or capabilities). The team also verified that the short term compensatory measures compensated for the degraded function or feature until appropriate corrective action could be taken and that FENOC was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES [OA]**

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The team verified that FENOC was identifying fire protection and post-fire safe shutdown issues at an appropriate threshold and entering them into the corrective action program. The team also reviewed a sample of selected issues to verify that FENOC had taken or planned appropriate corrective actions.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented their preliminary inspection results to Mr. Ray Lieb, Director of Site Operations, and other members of the site staff at an exit meeting on August 6, 2009. No proprietary information was included in this inspection report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

J. Belfiore, Design Engineer  
R. Fedin, Regulatory Compliance Engineer  
D. Gmys, System Engineer  
H. Kahl Electrical Design Engineer  
C. Keller, Manager Regulatory Compliance  
R. Lieb, Director Site Operations  
C. McFeaters, Manager Site Operations  
M. Manoleras, Director Site Engineering  
F. Mantine, NFPA 805 Program Manager  
J. Miller, Site Fire Marshal  
R. Mueller, Operations Support  
M. Unfried, Design Engineer

NRC

J. Rogge, Chief, Engineering Branch 3, Division of Reactor Safety  
W. Cook, Senior Reactor Analyst, Division of Reactor Safety  
D. Werkheiser, Senior Resident Inspector, Beaver Valley Station

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

None

**LIST OF DOCUMENTS REVIEWED**Fire Protection License Basis Documents

Beaver Valley Power Station Unit 1, Updated Fire Protection Appendix R Review, Rev. 29  
 Beaver Valley Power Station Unit 2, Safe Shutdown Report, Rev. 32  
 BVPS Unit 1 Fire Protection Safety Evaluation Report dated 05/03/79  
 Safety Evaluation Report related to the operation of BVPS Unit 2, NUREG 1057 through  
 Supplement 6

Calculations/Engineering Evaluation Reports

8700-DMC-0825, Pressurizer Level Response Following a Fire, Rev. 1  
 8700-DMC-1352, Emergency Diesel Generator Operating Time With Loss of RW, Rev. 0  
 8700-DMC-3232, Minimum Time Required to Overfill Steam Generator Using Only Auxiliary  
 Feedwater Following a Plant Trip, Rev. 2  
 8700-B-084, Fire Hazards Analysis, Rev. 10  
 10080-DMC-0841, Minimum Time Available to Isolate Hydrogen Supply to the VCT for Fire  
 Protection Safe Shutdown, Rev. 0

Condition Reports

05-06058	08-48587	09-62065	09-62244
06-04134	08-49351	09-62067	09-62247
06-06932	09-51627	09-62094	09-62249
06-11337	09-52325	09-62101	09-62255
07-12548	09-52338	09-62103	09-62268
07-12551	09-53243	09-62106	09-62355
07-13092	09-56260	09-62113	09-62461
07-14058	09-57231	09-62117	09-62471
07-18264	09-59797	09-62125	09-62532
07-19876	09-59808	09-62146	09-62709
07-21723	09-59915	09-62147	09-62731
07-23716	09-59917	09-62151	09-62738
07-23776	09-59931	09-62170	09-62740
07-24411	09-60055	09-62189	09-62745
07-28371	09-60058	09-62195	09-62758
07-28811	09-60375	09-62196	09-62792
08-40050	09-60935	09-62199	09-62807
08-42031	09-61136	09-62203	
08-47539	09-62061	09-62233	

Completed Tests/Surveillances

1/2 OST-56B.1, Appendix R Equipment Verification, Rev. 6, completed 4/17/09  
1/2 OST-56B.2, Appendix R Equipment Inventory Verification, Rev. 6, completed 07/21/09  
1/2 OST-33.12, Fire Protection System Loop Flow Test, Rev. 11 completed 09/11/06  
1/2 OST-33.12, Fire Protection System Loop Flow Test, Rev. 11 completed 09/09/07  
1/2 OST-33.12, Fire Protection System Loop Flow Test, Rev. 11 completed 09/13/08  
1 OST-33.35, Fire Rated Assemblies Visual Inspection, Rev. 0 completed 12/18/08  
2 OST-33.35, Fire Rated Assemblies Visual Inspection, Rev. 0 completed 06/04/08  
2 OST-33.13A, Smoke Detector Test, Rev. 8 completed 12/03/06  
2 OST-45.9, Alternate Shutdown Panel Checks in MODES 1, 2, and 3, Rev. 13, completed  
02/16/08  
SOV-2.33A.01, Main Plant Carbon Dioxide System Test, Rev. 0 completed 12/11/86

Drawings and Wiring Diagrams

8700-10.1-678, Normal 4kv Switchgear EL 713'-6" 3HR Fire Rated Floor and Walls, Rev. B  
8700-10.1-679, Normal 4kv Switchgear EL 713'-6" 3HR Fire Rated Floor and Walls, Rev. C  
8700-10.1-0680, Normal 4kv Switchgear EL 713'-6" 3HR Fire Rated Floor and Walls, Rev. E  
8700-10.1-721, Cable Tunnel EL 720' 3HR Fire Rated Walls, Rev. D  
8700-RE-22KR, Loop Diagram Incore Thermocouples Train B, Rev. 1  
8700-RE-72A, Lighting Plan – Intake Structure Unit 1, Rev. 11  
8700-RE-272A, Egress Emergency Lighting Plan Intake Structure Unit 1, Rev. 1  
10080-E-5DE Sh. 1, Elementary Diag.-4160V Stm. Gen. Aux. Pump-2FWE\*P23A, Rev. 28  
10080-E-6JJ Sh.2, Elementary Diagram-480V MCC Ckt. Charging Pump Suction Valves,  
Rev. 24  
10080-RE-265A, Egress Emergency Lighting Plan and Details – Control Building, Rev. 4  
10080-RE-37D, Concealed Conduit and Sleeves Aux Building Unit 2, Rev. 21  
10080-RE-37G, Concealed Conduit and Sleeves Rod Control Building Unit 2, Rev. 19  
10080-RE-37A, Concealed Conduit and Sleeves Control Building Unit 2, Rev. 14  
10080-RE-37B, Concealed Conduit and Sleeves Control Building Unit 2, Rev. 1  
10080-RE-37L, Concealed Conduit and Sleeves Cable Tunnel Aux Building Unit 2, Rev. 15  
10080-RE-37M, Concealed Conduit and Sleeves Cable Tunnel Aux Building Unit 2, Rev. 12  
10080-RA-9G, Identification of Shake Space Fire Stops Unit 2, Rev. 4  
12241-E-11AJ Sh. 2&3, Elementary Diagram Letdown Orifice Isolation Valves, Rev. 11

Fire Brigade Drills/Critiques

Completed on:

09/30/05	11/26/06	07/11/07	02/06/08	11/19/08
10/02/05	12/03/06	07/12/07	03/11/08	11/26/08
10/11/05	12/08/06	07/18/07	03/27/08	11/30/08
10/19/05	12/15/06	07/25/07	04/02/08	12/15/08
10/26/05	12/19/06	07/28/07	06/01/08	12/17/08
11/02/05	12/22/06	08/05/07	06/04/08	12/18/08
11/09/05	01/24/07	08/15/07	06/15/08	12/19/08
11/16/05	02/07/07	11/07/07	06/15/08	01/21/09
11/23/05	02/14/07	11/11/07	06/21/08	02/04/09
12/01/05	02/21/07	11/14/07	06/29/08	02/18/09
01/11/06	02/28/07	11/17/07	08/13/08	03/04/09
01/18/06	03/08/07	12/05/07	08/20/08	03/06/09
08/18/06	03/14/07	12/12/07	09/03/08	03/18/09
08/23/06	04/10/07	12/14/07	09/10/08	04/01/09
09/13/06	04/18/07	12/20/07	09/17/08	05/27/09
09/20/06	04/25/07	01/09/08	10/15/08	05/30/09
09/24/06	05/06/07	01/16/08	11/01/08	06/03/09
11/07/06	05/16/07	01/23/08	11/12/08	06/06/09
11/22/06	06/09/07	02/02/08	11/14/08	06/20/09

Hot Work and Ignition Source Permits

200023701	200248034	200297709	200326860	200342418
200220820	200254964	200321699	200341138	200376424

Operations Procedures

- 1OM-56B.4.B, Safe Shutdown Following a Serious Fire in the Cable Tunnel (CV-3), Rev.6
- 1OM-56B.4.I, Safe Shutdown Following a Serious Fire in the Service Building, Rev. 11
- 1OM-56C.4.F-14, Alternate Shutdown From Outside Control Room Operating Procedures, Water-to-Water Heat Exchange, Rev. 0
- 2OM-56B.4.B, Safe Shutdown Following a Serious Fire in the Cable Vault Building, Rev. 19
- 2OM-56C.4.A, Alternate Safe Shutdown From Outside Control Room Operating Procedures, Intent and Methodology, Rev. 11
- 2OM-56C.4.B, Alternate Safe Shutdown From Outside Control Room Operating Procedures, Unit Supervisor Procedure, Rev. 28
- 2OM-56C.4.C, Alternate Safe Shutdown From Outside Control Room Operating Procedures, NCO Procedure, Rev. 18
- 2OM-56C.4.D, Alternate Safe Shutdown From Outside Control Room Operating Procedures, Nuclear Operator #1 Procedure, Rev. 22
- 2OM-56C.4.E, Alternate Safe Shutdown From Outside Control Room Operating Procedures, Nuclear Operator #2, Rev. 20
- 2OM-56C.4.F-1, Alternate Safe Shutdown From Outside Control Room Operating Procedures, ASP Activation, Rev. 12

Procedures

- 1/2-ADM-1900, Fire Protection Program, Rev. 19
- 1/2-ADM-1901, Fire Protection Pre-Fire Plans Administrative Control, Rev. 3
- 1/2-ADM-1902, Fire Brigade, Rev. 7
- 1/2-ADM-1904, Control of Ignition Sources (Hot Work) and Fire Watches, Rev. 1
- 1/2-ADM-1905, Fire Protection/Fire Barrier Impairments, Rev. 1
- 1/2-ADM-1906, Control of Transient Combustible and Flammable Materials, Rev. 4
- 1/2-ADM-1336, Fire Protection Training, Rev. 1

Quality Assurance Audits and Self Assessments

Quality Assurance Audit Report BV-C-09-06-04/BV-C-09-06-06, performed June 1- 25, 2009  
BVPS Latent Issues Review Report, BVPS Fire Protection, dated 07/06/09

Vendor Manuals

- 2501.931-852-002, Modular AC Power Station Series 7XX180, 1200VA thru 3000VA Installation and Maintenance Manual, Rev. C
- 2501.931-852-001, Unit 2 12VDC Emergency Lighting Installation and Maintenance Instructions, Rev. H
- 01.034-0025, Unit 1 Emergency Battery Powered Lighting Units Technical Manual, Rev. E
- 8700-1.28-540A, Unit 1 Emergi-Lite Instruction Manual, Rev. B

Work Orders

200285255                      200285256                      200285257                      200319329

**LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
AC	Alternating Current
BTP	Branch Technical Position
BVPS	Beaver Valley Power Station
CFR	Code of Federal Regulations
FENOC	FirstEnergy Nuclear Operating Company
FHA	Fire Hazards Analysis
FSAR	Final Safety Analysis Report
IP	Inspection Procedure
IR	Inspection Report
LOCA	Loss of Coolant Accident
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
PAR	Publicly Available Records
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
SRV	Safety Relief Valve
SUNSI	Sensitive Unclassified Non-Safeguards Information
UFSAR	Updated Final Safety Analysis Report
VCT	Volume Control Tank