



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION I
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KING OF PRUSSIA, PENNSYLVANIA 19406-2713

February 5, 2019

Mr. Richard Bologna
Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 – INTEGRATED
INSPECTION REPORT 05000334/2018004 AND 05000412/2018004

Dear Mr. Bologna:

On December 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Beaver Valley Power Station, Units 1 and 2. On January 14, 2019, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. These findings involved violations of NRC requirements. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Beaver Valley Power Station. In addition, if you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC, 20555-0001; with copies to the Regional Administrator, Region I, and the NRC Resident Inspector at Beaver Valley Power Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Matthew R. Young, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket Numbers: 50-334 and 50-412
License Numbers: DPR-66 and NPF-73

Enclosure:
Inspection Report 05000334/2018004 and
05000412/2018004

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INSPECTION REPORT 05000334/2018004 AND 05000412/2018004

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers: 50-334 and 50-412

License Numbers: DPR-66 and NPF-73

Report Numbers: 05000334/2018004 and 05000412/2018004

Enterprise Identifier: I-2018-004-0074

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Shippingport, PA 15077

Inspection Dates: October 1, 2018 to December 31, 2018

Inspectors: J. Krafty, Senior Resident Inspector
S. Horvitz, Resident Inspector
J. DeBoer, Emergency Preparedness Inspector
L. Dumont, Reactor Inspector
N. Floyd, Senior Reactor Inspector
J. Furia, Senior Health Physicist
J. Kulp, Senior Reactor Inspector
R. Rolph, Health Physicist
K. Warner, Health Physicist

Approved By: M. Young, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring FirstEnergy Nuclear Operating Company's (FENOC's) performance at Beaver Valley Power Station Units 1 and 2 by conducting the baseline inspections described in this report in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. NRC identified and self-revealing findings, violations, and additional items are summarized in the table below.

List of Findings and Violations

| Inadvertent Service Water Header Pressure Reduction | | | |
|--|--|--|----------------------------|
| Cornerstone | Significance | Cross-Cutting Aspect | Inspection Results Section |
| Initiating Events | Green NCV 05000412/2018004-01 Closed | H.12 – Human Performance – Avoid Complacency | 71111.15 |
| A self-revealed Green non-cited violation of technical specification 5.4.1, "Procedures," was identified when FENOC failed to adequately implement procedure NOP-WM-1001, "Order Planning Process." Specifically, the work order failed to identify how the work would affect system operation, which, when implemented, resulted in a low pressure condition in the service water system. | | | |

| Failure to correct a degraded condition with the Unit 2 'B' safeguards area air conditioning unit | | | |
|---|--|--|----------------------------|
| Cornerstone | Significance | Cross-Cutting Aspect | Inspection Results Section |
| Mitigating Systems | Green NCV 05000412/2018004-02 Closed | P.3 – Problem Identification and Resolution – Resolution | 71152 |
| The inspectors identified a Green non-cited violation of Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," because FENOC did not promptly identify and correct a condition adverse to quality. Specifically, from August 24, 2015, to present, FENOC did not identify and correct service water flow below the design required minimum for the Unit 2 'B' safeguards area air conditioning unit. | | | |

Additional Tracking Items

| Type | Issue number | Title | Inspection Results Section | Status |
|------|----------------------|--|----------------------------|--------|
| LER | 05000412/2018-001-00 | Technical Specification Required Shutdown due to Loss of 2P 480 Volt Emergency Bus | 71153 | Closed |
| LER | 05000412/2018-002-00 | Inadvertent Automatic Actuation Signal to the Unit 2 Standby Service Water System | 71153 | Closed |

PLANT STATUS

Unit 1 operated at or near rated thermal power for the entire inspection period.

Unit 2 began the inspection period at rated thermal power. On October 21, 2018, the unit was shut down for a planned refueling and maintenance outage (2R20). 2R20 was completed on November 14, 2018, and the unit was returned to rated thermal power on November 17, 2018, and remained at or near rated thermal power for the remainder of the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed plant status activities described in IMC 2515 Appendix D, "Plant Status" and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather (1 Sample)

The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of seasonal low temperatures on October 31, 2018.

71111.04 - Equipment Alignment

Partial Walkdown (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 2, low head safety injection system following planned maintenance on October 30, 2018
- (2) Unit 2, fuel pool cooling system following core offload on October 30, 2018
- (3) Unit 2, high head safety injection system following planned maintenance on November 6, 2018

Complete Walkdown (1 Sample)

The inspectors evaluated system configurations during a complete walkdown of the Unit 2 recirculation spray system on November 6, 9, and 14, 2018.

71111.05A/Q - Fire Protection Annual/Quarterly

Quarterly Inspection (4 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Unit 2, transformers, fire compartments 2-TR-1, 2, 3, 4, and 5, on October 11, 2018
- (2) Unit 2, control room and computer room, fire compartments 3-CR-1, and 2-CB-4, on October 16, 2018
- (3) Unit 2, main steam valve room/emergency switchgear vent room, fire compartments 2-MS-1 and 2-CV-4 on October 19, 2018
- (4) Unit 2, reactor containment building, fire compartment 2-RC-1, on October 23, 2018

71111.06 - Flood Protection Measures

Cables (1 Sample)

The inspectors evaluated cable submergence protection in manholes 1EMH8A and 1EMH8B on October 10, 2018.

71111.07 - Heat Sink Performance

Heat Sink (1 Sample)

The inspectors evaluated FENOC's monitoring and maintenance of the Unit 2 emergency diesel generator 2-1 jacket water heat exchanger performance.

71111.08 – Inservice Inspection Activities (1 Sample)

The inspectors evaluated pressurized water reactor non-destructive examination and welding activities by observing or reviewing the following examinations from October 29, 2018, to November 8, 2018:

(1) Volumetric Examinations

- a) manual ultrasonic testing of pressurizer spray line nozzle inner radius
- b) manual ultrasonic testing of 'B' power operated relief valve nozzle inner radius
- c) manual ultrasonic testing of pressurizer spray line nozzle to shell weld
- d) manual ultrasonic testing of steam generator circumferential weld 3
- e) automated time of flight ultrasonic testing of control rod drive mechanism penetration 27

(2) Visual Examinations

- a) bare metal visual examination of reactor vessel head

(3) Surface Examination

- a) dye penetrant test (PT) of reactor vessel head to control rod drive mechanism nozzle weld 27 – as found

- b) PT of reactor vessel head to control rod drive mechanism nozzle weld 27 – post repair
 - c) PT of reactor coolant system drain valve socket weld 2RCS-5
- (4) The inspectors reviewed the welding activities associated with the replacement of:
- a) replacement of reactor coolant drain valve 2RCS-5
 - b) repair of reactor vessel head penetration 27
- (5) The inspectors evaluated FENOC's boric acid corrosion control program performance.
- (6) The inspectors performed an independent walkdown of accessible portions of the containment liner and moisture barrier and reviewed FENOC's containment coating inspection.
- (7) The inspectors observed a sample of FENOC's steam generator tube inspection, evaluation, sleeving and plugging activities.

71111.11 - Licensed Operator Requalification Program and Licensed Operator Performance

Operator Requalification (1 Sample)

The inspectors observed and evaluated a crew of licensed operators in the Unit 2 simulator during licensed operator training conducted in preparation for upcoming plant evolutions on October 18, 2018.

Operator Performance (1 Sample)

The inspectors observed and evaluated the reactor shutdown for refueling outage 2R20 at Unit 2 on October 20, 2018.

71111.12 - Maintenance Effectiveness

Routine Maintenance Effectiveness (1 Sample)

The inspectors evaluated the effectiveness of routine maintenance activities associated with Unit 2, 120 volt alternating current distribution on October 11, 2018.

71111.13 - Maintenance Risk Assessments and Emergent Work Control (4 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Unit 2, yellow shutdown risk for decay heat removal while reactor coolant system depressurized and reactor cavity less than 23 feet on October 24, 2018
- (2) Unit 2, yellow shutdown risk for power availability during AE bus outage on October 30, 2018
- (3) Unit 2, yellow shutdown risk for decay heat removal due to lowered reactor cavity level on November 6, 2018
- (4) Unit 1, elevated risk for turbine driven auxiliary feed pump testing on November 8, 2018

71111.15 - Operability Determinations and Functionality Assessments (6 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Unit 2, service water minimum flow requirement to 2-2 emergency diesel generator not met on September 20, 2018
- (2) Unit 2, 'B' steam generator level instrument line steam leak on October 4, 2018
- (3) Unit 2, service water pressure drop during standby service water motor operated discharge isolation valve static testing on October 9, 2018
- (4) Unit 2, 'A' low head safety injection pump differential pressure at minimum value during full flow test on November 1, 2018
- (5) Unit 2, risk assessment to credit 2-1 emergency diesel generator as operable due to low fuel inventory on November 3, 2018
- (6) Unit 1, intake cubicle ventilation fan unable to cool the 'B' river water pump on November 21, 2018

71111.18 - Plant Modifications (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Engineering Change Package 16-0134-02 – Replace 125V DC distribution panel (PNL*DC2-06)

71111.19 - Post Maintenance Testing (4 Samples)

The inspectors evaluated post maintenance testing for the following maintenance/repair activities:

- (1) Unit 2, low head safety injection pump system planned maintenance on October 27, 2018
- (2) Unit 2, service water motor operated butterfly valve replacement on November 2, 2018
- (3) Unit 2, 2-1 emergency diesel generator planned maintenance on November 2, 2018
- (4) Unit 2, 'B' recirculation spray heat exchanger disassembly and inspection on November 3, 2018

71111.20 - Refueling and Other Outage Activities (1 Sample)

The inspectors evaluated Unit 2 refueling outage (2R20) activities from October 20, through November 14, 2018.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Routine (3 Samples)

- (1) 2BVT 1.21.2, Trevitest Method for Main Steam Safety Valve Setpoint Check on October 20, 2018
- (2) 2OST-36.4, Emergency Diesel Generator [2EGS*EG2-2] Automatic Test on October 21, 2018

(3) 1OST-36.1, Diesel Generator No. 1 Monthly Test on October 31, 2018

Containment Isolation Valve (1 Sample)

(1) 2OST-47.117, Type C Leak Test - Penetration #28 (Reactor Coolant Letdown) on October 29, 2018

71114.04 - Emergency Action Level and Emergency Plan Changes (1 Sample)

The inspectors verified that the changes made to the emergency plan were done in accordance with 10 CFR 50.54(q)(3), and any change made to the Emergency Action Levels, Emergency Plan, and its lower-tier implementing procedures, had not resulted in any reduction in effectiveness of the Plan. This evaluation does not constitute NRC approval.

RADIATION SAFETY

71124.01 - Radiological Hazard Assessment and Exposure Controls

Contamination and Radioactive Material Control (1 Sample)

The inspectors observed personnel and material exiting the radiologically controlled area for both Unit 1 and Unit 2 from the Unit 2 control point. The inspectors observed personnel monitor alarm responses. The inspectors ensured Nationally Tracked Sources were accounted for and reported as required.

71124.03 - In-Plant Airborne Radioactivity Control and Mitigation

Engineering Controls (1 Sample)

The inspectors evaluated engineering controls for in-plant airborne radioactivity.

Use of Respiratory Protection Devices (1 Sample)

The inspectors evaluated the use of respiratory protection devices by observing personnel using devices, qualifications of personnel, breathing zone air sample results, and grade D air sample results.

Self-Contained Breathing Apparatus for Emergency Use (1 Sample)

The inspectors evaluated FENOC's self-contained breathing apparatus program by reviewing maintenance records, observing control room operators, and observing the inspection of a self-contained breathing apparatus ready for issue.

71124.08 - Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

Radioactive Material Storage (1 Sample)

The inspectors observed radioactive waste container storage areas and verified the postings and controls and that FENOC had established a process for monitoring the impact of long-term storage of the waste.

Radioactive Waste System Walkdown (1 Sample)

The inspectors walked down accessible portions of liquid and solid radioactive waste processing systems; abandoned in place radioactive waste processing equipment; and, current methods and procedures for dewatering waste.

Waste Characterization and Classification (1 Sample)

The inspectors identified radioactive waste streams and reviewed radiochemical sample analysis results to support radioactive waste characterization. The inspectors reviewed the use of scaling factors and calculations to account for difficult-to-measure radionuclides.

Shipment Preparation (1 Sample)

The inspectors reviewed the records of shipment packaging, surveying, labeling, marking, placarding, vehicle checks, emergency instructions, disposal manifest, shipping papers provided to the driver, and licensee verification of shipment readiness.

Shipping Records (1 Sample)

The inspectors reviewed selected non-excepted package shipment records.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification (5 Samples)

The inspectors verified FENOC's performance indicator submittals listed below for the period from October 1, 2017, through September 30, 2018:

- (1) Unit 1 and 2, Reactor Coolant System Specific Activity
- (2) Unit 1 and 2, Reactor Coolant System Leak Rate
- (3) Occupational Exposure Control Effectiveness

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (2 Samples)

The inspectors reviewed FENOC's implementation of its preventive maintenance and corrective action programs related to the following issues:

- (1) Preventive maintenance program for 120 volt alternating current and 125 volt direct current molded case circuit breakers
- (2) CR-2017-02985, B Safeguards Area Cooler Low Service Water Flow during 2OST-30.13B

71153 - Follow-up of Events and Notices of Enforcement Discretion

Licensee Event Reports (2 Samples)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 05000412/2018-001-00, Technical Specification Required Shutdown due to Loss of 2P 480 Volt Emergency Bus (ADAMS accession: ML18274A081)

The inspectors reviewed the LER submittal. The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER because there were no vendor PM replacement schedule requirements associated with this specific relay and vendor customer support quoted that this type of relay has a rated life of forty years. The concerned relay had been in service for thirty five years. Therefore, no performance deficiency was identified. The inspectors also concluded that no violation of NRC requirements occurred.

- (2) LER 05000412/2018-002-00, Inadvertent Automatic Actuation Signal to the Unit 2 Standby Service Water System (ADAMS accession: ML18341A119)

The circumstances surrounding this LER are documented in report Section 71111.15.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT, AND ABNORMAL

Impact of Financial Conditions on Continued Safe Performance

In that the licensee's parent company, FirstEnergy Solutions, was under bankruptcy protection/reorganization during the inspection period, NRC Region I conducted reviews of processes at Beaver Valley. Using the flexibilities in the baseline inspection program, the inspectors evaluated several aspects of FENOC's operations to assess whether any identified plant performance issues could be related to the station's financial condition. The factors reviewed included: (1) impact on regulatory required plant staffing, (2) corrective maintenance backlog, (3) changes to the planned maintenance schedule, (4) corrective action program implementation, and (5) reduction in outage scope, including risk-significant modifications. In particular, the inspectors assessed whether FENOC personnel continued to identify problems at an appropriate threshold and enter these problems into the corrective action program for resolution. The inspectors also assessed whether FENOC continued to develop and implement corrective actions commensurate with the safety significance of the problems identified.

INSPECTION RESULTS

| Inadvertent Service Water Header Pressure Reduction | | | |
|--|--|--|----------------|
| Cornerstone | Significance | Cross-cutting Aspect | Report Section |
| Initiating Events | Green NCV 05000412/2018004-01 Closed | H.12 – Human Performance – Avoid Complacency | 71111.15 |
| <p>A self-revealed Green non-cited violation of technical specification 5.4.1, “Procedures,” was identified when FENOC failed to adequately implement procedure NOP-WM-1001, “Order Planning Process.” Specifically, the work order failed to identify how the work would affect system operation, which, when implemented, resulted in a low pressure condition in the service water system.</p> | | | |
| <p><u>Description:</u> On October 7, 2018, both trains of Unit 2 standby service water were tagged out of service for inspection and testing of the 'A' standby service water pump discharge isolation valve, 2SWE-MOV116A. On October 9, 2018, a crew of electricians was assigned to perform the work on 2SWE-MOV116A. Two pre-job briefs were held and the crew was briefed on the need to call the control room prior to stroking the valve so that the evolution could be coordinated. The electricians locally stroked open 2SWE-MOV116A per the work order, but failed to notify the control room. Opening the valve diverted water to the standby service water piping, which quickly dropped service water system pressure from 76 psig to less than 34 psig. This actuated a timer, which closes the service water isolation valves for secondary plant components if pressure remains less than 34 psig for 45 seconds, and sent an automatic start signal to the standby service water pumps. The standby service water pumps did not start, because they were tagged out of service. The diverted flow subsequently filled the standby service water piping, and service water system pressure recovered.</p> <p>The non-safety related standby service water system was connected to the 'A' train of service water, which caused the 'A' train to be inoperable. The 'B' train of service water remained operable during this transient, because if pressure would have been lower than 34 psig for greater than 45 seconds, the 'B' train service water isolation valve for secondary plant components would have closed, separating the trains, which would have enabled the 'B' train to regain pressure and perform its safety function. However, operators would have been required to trip the plant due to loss of cooling to secondary plant components.</p> <p>Upon investigation, FENOC determined that the work order was inadequate in that it did not describe how opening 2SWE-MOV116A would impact the plant.</p> <p>Corrective Actions: FENOC has revised the work order and clearance associated with this work to include the system impact to ensure that new work orders will indicate that this piping may be voided and reference the associated actions.</p> <p>Corrective Action References: CR-2018-08876, CR-2018-08878</p> | | | |

Performance Assessment:

Performance Deficiency: FENOC procedure NOP-WM-1001, "Order Planning Process" requires that work orders describe how the work affects plant or system operation and any actions required based on the impact of the work on the plant. On June 13, 2018, work order 200531755 was approved without adequately identifying the impact of the work on the service water system.

Screening: The inspectors determined the performance deficiency was more than minor because it adversely affected the procedure quality attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations.

Significance: The inspectors assessed the significance of the finding using IMC 0609.04, "Initial Characterization of Findings," and IMC 0609, Appendix A, Exhibit 1, "Initiating Events Screening Questions." The inspectors determined that this performance deficiency did not involve the complete or partial loss of a support system that contributes to the likelihood of, or cause, an initiating event and affected mitigation equipment. Therefore, the inspectors determined the finding to be of very low safety significance (Green).

Cross-cutting Aspect: This finding has a cross-cutting aspect of Human Performance – Avoid Complacency, because FENOC did not perform a thorough review of the work activity.

Enforcement:

Violation: Technical Specification 5.4.1 "Procedures" requires that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, "Quality Assurance Program Requirements (Operation)." Section 1.e. lists "Procedure Review and Approval" as one of the required administrative procedures. NOP-WM-1001, "Order Planning Process" requires that work orders describe how the work affects plant or system operation and any actions required based on the impact of the work on the plant.

Contrary to the above, from June 13, 2018, to October 9, 2018, FENOC failed to adequately implement NOP-WM-1001. Specifically, work order 200531755 failed to describe how opening 2SWE-MOV116A would affect plant or system operation and any actions required based on the impact of the work.

Disposition: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

The disposition of this finding closes LER 05000412/2018-002-00.

| Failure to correct a degraded condition with the Unit 2 'B' safeguards area air conditioning unit | | | |
|---|--|--|----------------|
| Cornerstone | Significance | Cross-Cutting Aspect | Report Section |
| Mitigating Systems | Green NCV 05000412/2018004-02 Closed | P.3 – Problem Identification and Resolution – Resolution | 71152 |
| <p>The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because FENOC did not promptly identify and correct a condition adverse to quality. Specifically, from August 24, 2015, to present, FENOC did not identify and correct service water flow below the design required minimum for the Unit 2 B safeguards area air conditioning unit.</p> <p><u>Description:</u> On August 24, 2015, FENOC staff conducted the operating surveillance test 2OST-30.13B, Train B Service Water System Full Flow Test, and discovered that the service water flow to the Unit 2 B safeguards area air conditioning unit, 2HVR-ACU207B, was less than the minimum required by design to ensure adequate cooling. The measured flow was 141.4 gpm and the minimum required flow was 155.2 gpm (based on river water elevation) as established by the acceptance criteria in procedure 2OST-30.13B and the updated final safety analysis report.</p> <p>The safeguards area air conditioning unit is a safety-related component that maintains temperature at an adequate level during normal and accident conditions to support operation of emergency equipment in the area. The air cooling is provided by circulating service water through the unit.</p> <p>In response to this degraded and non-conforming condition, FENOC generated condition report CR 2015-11477 and concluded there was no impact to equipment in the building as a result of degraded service water flow based on reference calculation 10080-DMC-3811 for the loss of safeguards ventilation cooling. FENOC staff cleaned and inspected the 'B' safeguards area air conditioning unit on September 3, 2015, documenting that the as-found tube surfaces and tube sheet were very clean. FENOC staff retested the unit on January 11, 2016, with unacceptable results, 145.3 gpm versus the required 154.75 gpm. Subsequently, the unit was cleaned and inspected on June 2, 2016.</p> <p>On March 16, 2017, the 'B' unit was tested and failed to meet the minimum required flow, 134.9 gpm versus the required 154.4 gpm. FENOC staff generated condition report CR 2017-02985 and concluded there was no challenge to equipment using the same basis as before. FENOC staff documented that engineering evaluation request 600955166 concluded the function of the units is not required to ensure post-accident operability of the safety-related equipment in the building and stated that retirement of the cooling units was previously presented to the Plant Health Committee on April 4, 2016. Subsequently, the unit was cleaned and inspected on June 29, 2018. On September 20, 2018, the 'B' unit was again tested and failed to meet the minimum required flow, 145.4 gpm versus the required 155.2 gpm. FENOC staff generated condition report CR 2018-08304 and concluded there was no challenge to equipment using the same basis as before.</p> <p>The inspectors reviewed FENOC procedure NOP-LP-2001, Corrective Action Program, which defines and requires corrective actions for conditions adverse to quality (i.e., deficiencies and non-conforming conditions affecting the safety-related function of a structure, system, or component). The inspectors determined that there were no corrective actions documented in</p> | | | |

any of the above condition reports for the degraded service water flow to the safeguards area air conditioning unit. While FENOC did perform cleaning of the units after unacceptable test results, the inspectors determined that these actions were untimely in two instances (5 months for the second occurrence and 15.5 months for the third occurrence) and ineffective to resolve the degraded condition. Specifically, the action of cleaning the unit did not restore the degraded service water flow, and the documentation of the as-found condition in multiple work orders stated that the unit was clean.

Corrective Actions: On October 4, 2018, FENOC entered this issue into the corrective action program.

Corrective Action References: CR 2018-07933

Performance Assessment:

Performance Deficiency: FENOC procedure NOP-LP-2001, "Corrective Action Program," and 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires that conditions adverse to quality (i.e., deficiencies and non-conforming conditions) are corrected. Since August 24, 2015, FENOC staff have not corrected the degraded condition associated with the service water flow to the safety-related Unit 2 'B' safeguards area air conditioning unit.

Screening: This finding is more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the reliability and capability of the Unit 2 'B' safeguards area air conditioning unit was affected because the causes of lower cooling water flow have not been identified and corrected.

Significance: The inspectors assessed the significance of the finding using IMC 0609.04, "Initial Characterization of Findings," and IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions." The inspectors determined that this finding was a deficiency affecting the design or qualification of a mitigating structure, system, or component, where the structure, system, or component maintained its operability or functionality. Therefore, the inspectors determined the finding to be of very low safety significance (Green).

Cross-Cutting Aspect: This finding has a cross-cutting aspect of Problem Identification and Resolution – Resolution, because FENOC did not take effective corrective actions in a timely manner.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that "measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected."

Contrary to the above, from August 24, 2015, to present, FENOC's corrective action program did not assure that conditions adverse to quality, service water flow below the design required minimum for the Unit 2 'B' Safeguards room coolers (a deficiency), was promptly identified and corrected.

Disposition: This violation is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the Enforcement Policy.

| Minor Performance Deficiency | 71152 |
|--|-------|
| <p>Minor Performance Deficiency: NORM-ER-3114, "Low Voltage (less than 480 Volts) Distribution Panel," recommends that molded case circuit breakers in critical applications be trip tested every 8 years and replaced every 25 years. Since October 6, 2008, when NORM-ER-3114 was implemented, FENOC has not trip tested any of the 120 volt alternating current or 125 volt direct current breakers in critical applications and has not replaced any breakers in Unit 1 and only a small percentage of the breakers in Unit 2. FENOC's justification for not performing the recommended preventive maintenance was documented in 1999 in CR 991850 which concluded that the failure rate of the molded case circuit breakers was low (<1%) and, therefore did not require any periodic maintenance. The inspectors determined that FENOC's conclusion was not validated because the trip function of the majority of the breakers had not been adequately challenged.</p> <p>Screening: The performance deficiency was determined to be minor because there have been no 120 volt alternating current or 125 volt direct current breaker failures in critical applications in the past three years.</p> | |

| Observations | 71152 |
|---|-------|
| <p>The inspectors performed an in-depth review of FENOC's corrective actions associated with condition report CR 2017-02985 for lower than acceptable service water flow to the Unit 2 'B' safeguards area air conditioning unit during periodic surveillance testing. Since August 24, 2015, the measured service water flow has been below the minimum required by design as established in procedure 2OST-30.13B and the updated final safety analysis report.</p> <p>The inspectors interviewed engineering staff and reviewed past maintenance activities to assess the cause of the degraded service water flow. The inspectors noted that FENOC has not determined the causes of the degraded condition. Based on discussions with FENOC staff and plant operating experience, the inspectors understood the likely cause is partial flow blockage in the upstream or downstream service water piping.</p> <p>In addition, the inspectors reviewed FENOC's evaluation of the degraded service water flow to ensure that the equipment cooled by the safeguards area air conditioning unit maintained its ability to function. FENOC staff concluded that the degraded flow had no impact on the equipment and that the condition was bounded by calculation 10080-DMC-3811, which analyzed the maximum temperature profiles in the safeguards rooms without cooling. The inspectors reviewed this calculation and determined that it did not fully consider the age of equipment (e.g., square D electrical transformers) in the safeguards area or the effects of increased ambient temperatures. The inspectors considered the significant margin in the design of the safeguards area air conditioning unit as well as the conservative assumption of no service water flow in the calculation, and determined there was reasonable assurance that the unit would have performed its safety function. However, the inspectors noted the unit has a credited design function in the current licensing and design basis documents to maintain the temperature in the safeguards building under normal and accident conditions and therefore, must be appropriately maintained.</p> <p>The inspectors reviewed documentation in the corrective action program for lower than acceptable service water flow to the Unit 2 'B' safeguards air conditioning unit and noted that there were no corrective actions documented in any of the condition reports for this issue.</p> | |

While cleaning has been implemented as a recommended action, this action has been ineffective to resolve the degraded flow as repetitive test results continue to be unacceptable. The inspectors determined FENOC's response to the issue did not include appropriate corrective actions and was therefore a performance deficiency. This performance deficiency is documented in section 71152 of this report.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On January 14, 2019, the inspectors presented the quarterly resident inspector inspection results to Mr. Richard Bologna, Site Vice President, and other members of the Beaver Valley Power Station staff.

DOCUMENTS REVIEWED**71111.07: Heat Sink Performance**Procedures

2MSP-36.29-M, No. 1 Emergency Diesel Generator Filter, Strainer, Heat Exchanger And
Woodward Governor Maintenance, Revision 30

Condition Reports

2018-09333 2018-09423

Work Orders

200723231 200726113

71111.08: Inservice Inspection ActivitiesCondition Reports (*initiated in response to inspection)

| | | | |
|------------|------------|-------------|------------|
| 2018-09222 | 2018-09335 | 2018-09594* | 2018-09756 |
| 2018-09255 | 2018-09567 | 2018-09683 | 2018-09868 |

Maintenance Orders/Work Orders

200399658 200770977

NDE Reports

UT-18-1020, Pressurizer Spray Line to Shell Weld 2RCS*PRE21-N-14, dated
November 2, 2018

VEN-18-1007, Pressurizer Spray Line Inner Radius 2RCS-PRE21-N-14IR, dated
October 27, 2018

VEN-18-1006, Pressurizer "B" PORV Inner Radius 2RCS-PRE21-N-13IR, dated
October 27, 2018

UT-18-1021, 2RCS*SG21B-C-03 Shell Circumferential Weld #3, dated November 5, 2018

BOP-PT-18-043, 2RCS-5, Pipe to Valve/Pipe to Coupling, dated November 3, 2018

WesDyne International Reactor Vessel Weld Result Summary for Weld 2RCS*REV21-N24,
Outlet Nozzle at 265 Degree DM Weld, Dated October 30, 2018

WesDyne International Reactor Vessel Weld Result Summary for Weld 2RCS*007-F01, Outlet
Nozzle at 265 Degree SS Weld, Dated October 30, 2018

913481-PT-001, Report of Nondestructive Examination Visible Solvent Removable Liquid
Penetrant Examination: Penetration #27, dated November 4, 2018

WDI-PJF-1320401-FSR-001, Beaver Valley 2R20 Reactor Vessel Head Examination,
Revision 0

WDI-PJF-1320385-FSR-001, Reactor Vessel Outlet Nozzle DM and Safe-End Weld
Examinations 2R20, dated October 2018

WesDyne International Reactor Vessel Weld Result Summary for Weld 2RCS*REV21-N24
Outlet Nozzle at 265 degrees DM Weld, dated October 30, 2018

WesDyne International Reactor Vessel Weld Result Summary for Weld 2RCS*007-F01 Outlet
Nozzle at 265 degrees SS Weld, dated October 30, 2018

WesDyne International, Surface Examination Data RPV Head CRDM J-Weld #27, dated
November 1, 2018

WesDyne International, Top of Head Visual Examination Data Sheet, dated October 28, 2018

DMW-R20-CP-02-27-06, 07, Ultrasonic Report Data Sheet for Penetration 27- Post Repair,
dated November 5, 2018

DMW-R20-CP-02-27-01, 02, Ultrasonic Report Data Sheet for Penetration 27, dated November 1, 2018

Miscellaneous

BV-NDE-18-031, NDE Memorandum: BV2R20 Under Head J-Groove Weld LP Examination Modification for Penetration 27, dated October 30, 2018
 ECP 08-0605-007, Replace Kerotest Valve BV-2RCS-5, Revision 5
 200399658, ASME Section XI Repair/Replacement Plan
 Westinghouse LTR-SGDA-03-09, 0.640" Wide Groove Bobbin Probe Equivalency, dated January 24, 2003
 Westinghouse LTR-SGDA-03-35, Re-Evaluation of 640 Wide Groove Bobbin Detection of ODSCC, dated February 25, 2003
 Westinghouse LTR-SGDA-04-126, 520 and 540 Wide Groove Bobbin Probe Evaluation, dated April 18, 2004
 MRS-TRC-2349, Use of Appendix H and Appendix I Qualified Techniques 2R20 Refueling Outage, dated October 2018
 SG-SGMP-18-20, Beaver Valley Power Station Unit 2 2R20 Steam Generator Condition Monitoring and Preliminary Operational Assessment Evaluation, Revision 0
 WCAP-16158-P, Technical Basis for Repair Options for Reactor Vessel Head Penetration Nozzles and Attachment Welds: Beaver Valley Unit 2, Revision 1
 WCAP-15987-P, Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations, Revision 2-P-A
 BV2-OAR1-2R19, ISI Owner's Activity Report, Cycle 19 and 19th Refueling Outage, Beaver Valley Power Station Unit No. 2, dated June 6, 2017
 SG-SGMP-18-17, Beaver Valley Unit 2 2R20 Steam Generator Degradation Assessment, Revision 0

71111.15: Operability Determinations and Functionality Assessments

Condition Reports

| | | | |
|------------|------------|------------|------------|
| 2007-23594 | 2013-07279 | 2018-08299 | 2018-09489 |
| 2007-29057 | 2013-07303 | 2018-08536 | 2018-09735 |
| 2009-59489 | 2018-06291 | 2018-08876 | |
| 2012-03768 | 2018-06862 | 2018-08878 | |

Work Order

200531755

Miscellaneous

EER 601189147, Evaluations to Support Relief Request for Tubing Leakage at 2FWS-LT487
 EER 601189625, Determine Potential Effects from Complete Failure of 2FWS-LT487 Tubing
 EER 601189792, Evaluate Benefits of CAR Fan Coolers
 6001191560
 6001191559
 10 CFR 50.59 Screen 18-02138, Procedure 1OM-44F.4.A, Revision 00
 8700-DMC-2702, Outdoor Design Base Site Temperature of 90F, Revision 0
 8700-DMC-3002, Ventilation Calculation – Intake Structure, Revision 0
 Unit 1 Control Room Logs, July 19, 20, and 24, 2018
 Tagout: 2BVP-CYC-020-1; Clearance: 2W04-30-MNE-002

71111.20: Refueling and Other Outage ActivitiesCondition Reports (*initiated in response to inspection)

| | | |
|-------------|-------------|-------------|
| 2018-09044* | 2018-09111* | 2018-09776* |
|-------------|-------------|-------------|

71124.01: Radiological Hazard Assessment and Exposure ControlsRadiation Work Permits

| | | |
|----------|----------|----------|
| 218-5017 | 218-5018 | 218-5028 |
|----------|----------|----------|

Surveys

BV-M-20180826-2, 202220 Chem Sample Area, 8/26/18 21:45

BV-M-20180923-1, 202220 Chem Sample Area, 9/23/18 17:34

71124.03: In-Plant Airborne Radioactivity Control and MitigationProcedures

NOP-OP-4702-07, Lapel Air Sample Data Sheet, Under Reactor head 10/29/2018, Revision 6

Air Samples

| | | |
|---------|---------|---------|
| 18-0072 | 18-0073 | 18-0074 |
|---------|---------|---------|

Condition Reports (*initiated in response to inspection)

| | | |
|------------|------------|-------------|
| 2018-03375 | 2018-06473 | 2018-09290* |
| 2018-03463 | 2018-06816 | 2018-09490* |
| 2018-03795 | 2018-07106 | 2018-09546* |

Grade D air sample results of BAUER k12 SN 34544

| | | | |
|----------|----------|----------|----------|
| 12/09/16 | 07/07/17 | 02/14/18 | 08/08/18 |
| 03/16/17 | 11/17/17 | 05/16/18 | |

71124.08: Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and TransportationMiscellaneous

Shipments: B-4743; B-4744; B-4796; B-4821; B-4823

71151: Performance Indicator VerificationCondition Report (*initiated in response to inspection)

2018-09982*

Miscellaneous

NOBP-LP-4012-34, Reactor Coolant System Specific Activity – Beaver Valley, Revision 0 for Unit 1 from October 2017 to September 2018

NOBP-LP-4012-34, Reactor Coolant System Specific Activity – Beaver Valley, Revision 0 for Unit 2 from October 2017 to September 2018

NOBP-LP-4012-35, Reactor Coolant System Leakage – Beaver Valley, Revision 0 for Unit 2 from October 2017 to September 2018

NOBP-LP-4012-35, Reactor Coolant System Leakage – Beaver Valley, Revision 0 for Unit 2 from October 2017 to September 2018

71152: Problem Identification and ResolutionProcedures

1/2-ADM-2106, River/Service Water System Control and Monitoring Program, Revision 6

Condition Reports

| | | | |
|-----------|------------|------------|------------|
| 1999-1850 | 2001-4653 | 2017-02991 | 2018-02462 |
| 2000-2622 | 2002-00844 | 2017-04585 | 2018-07933 |
| 2001-4551 | 2014-14385 | 2017-06270 | |

Work Orders

| | |
|-----------|-----------|
| 200625139 | 200709974 |
|-----------|-----------|

Miscellaneous

1009832, Molded Case Circuit Breaker Application and Maintenance Guide, Revision 2
 IEEE Std 308-1974, IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power
 Generating Stations
 NORM-ER-3114, Low Voltage (less than 480 Volts) Distribution Panel, Revision 1
 Unit 1 120 VAC Distribution and Lighting System Health Report 2016-2
 Unit 1 System 38 Monthly Monitoring Spreadsheet, December 2018
 Unit 1 System 39 Monthly Monitoring Spreadsheet, December 2018
 Unit 2 System 38 Monthly Monitoring Spreadsheet, December 2018
 Unit 2 System 39 Monthly Monitoring Spreadsheet, December 2018
 2DBD-44B, Design Basis Document for Area Ventilation - Cooling Systems, Revision 4

71153: Follow-up of Events and Notices of Enforcement DiscretionProcedures

1/2RCP-63-PC, Calibration of ITE/ABB Single and Three Phase Overcurrent Relays Type 50D
 and 50H, revision EN-DC-115, Engineering Change Process, Revision 18

Condition Report

2018-07138

Work Orders

| | | |
|-----------|-----------|-----------|
| 200761774 | 200468009 | 200249212 |
|-----------|-----------|-----------|

Miscellaneous

ASEA Brown Boveri instructions for High-Dropout Current relays Types, 50B, 50H, 50D, 37H,
 37D, Series 268 and Series 468, dated 10/1/1990
 NOP-CC-207-01, Part/Component Equivalent Replacement Package, Completed 8/10/18
 Stock Material # 9209667 Purchase Order Description Information for ABB Relay Overcurrent
 Type 50D