



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION I  
2100 RENAISSANCE BLVD.  
KING OF PRUSSIA, PA 19406-2713

November 8, 2016

Mr. Marty Richey  
Site Vice President  
First Energy Nuclear Operating Company  
Beaver Valley Power Station  
P. O. Box 4  
Shippingport, PA 15077-0004

SUBJECT: BEAVER VALLEY POWER STATION - INTEGRATED INSPECTION REPORT  
05000334/2016003 AND 05000412/2016003

Dear Mr. Richey:

On September 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Beaver Valley Power Station, Units 1 and 2. On October 27, 2016, the NRC inspectors discussed the results of this inspection with Mr. M. Manoleras, Director, Site Engineering, and other members of your staff. The results of this inspection are documented in the enclosed report.

The inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the non-cited violation in this report, 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, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the U.S. NRC Resident Inspector at Beaver Valley Power Station. In addition, if you disagree with the 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 Regional Administrator, Region I, and the U.S. NRC Resident Inspector at Beaver Valley Power Station.

M. Richey

-2-

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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Silas R. Kennedy, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure:  
Inspection Report 05000334/2016003  
and 05000412/2016003  
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION I**

Docket Nos.: 50-334 and 50-412

License Nos.: DPR-66 and NPF-73

Report No.: 05000334/2016003 and 05000412/2016003

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Shippingport, PA 15077

Dates: July 1, 2016 to September 30, 2016

Inspectors: J. Krafty, Senior Resident Inspector  
B. Reyes, Resident Inspector  
K. Carrington, Acting Resident Inspector  
H. Anagnostopoulos, Health Physicist  
B. Dionne, Health Physicist  
T. Fish, Senior Operations Inspector  
E. Gray, Senior Reactor Inspector  
C. Lally, Reactor Inspector  
R. Rolph, Health Physicist

Approved By: Silas R. Kennedy, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

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## SUMMARY

IR 05000334/2016003 and 05000412/2016003; 07/01/2016 – 09/30/2016; Beaver Valley Power Station Units 1 and 2; Problem Identification and Resolution.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified one non-cited violation (NCV), which was of very low safety significance (Green). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated August 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

### Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of Title 10 *Code of Federal Regulations* (CFR) 50, Appendix B, Criterion XVI, "Corrective Action," for FENOC's failure to assure that a condition adverse to quality was promptly identified and corrected. Specifically, FENOC failed to promptly identify and correct a negative trend in setpoint drift and "as found" dropout voltage values in the AB 27N model 411T6375HF 4160 volts alternating current (VAC) and 480 VAC emergency bus degraded voltage relays. FENOC's immediate corrective actions included recalibrating or replacing the relays and entering the issue into their corrective action program (CAP) as condition report (CR) 2016-12018.

The performance deficiency is more than minor because it is associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, FENOC's failure to promptly identify and address a negative trend in dropout voltage setpoint drift and "as found" values resulted in the reduced reliability of safety related bus degraded voltage relays (seven surveillance failures and inoperable degraded bus relays between 2011 and 2016). Inoperable emergency bus degraded voltage relays could lead to damage of safety-related equipment during a loss of offsite power. This finding is of very low safety significance (Green) because it does not represent a loss of system and/or function, an actual loss of function of a single train for greater than its technical specification allowed outage time, an actual loss of function of one non-technical specification trains designated as high safety significant, and did not involve a loss or degradation of equipment designed to mitigate a seismic, flooding, or severe weather initiating event. The finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Trending, because FENOC did not periodically analyze the results of the degraded voltage relay surveillances to provide early indication of a declining trend [P.4]. (Section 4OA2)

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent power and operated at full power until August 28, 2016, when the unit entered the end-of-cycle coastdown operations. On September 14, 2016, operators reduced power to 47 percent to perform emergent work on the 1A condensate pump due to water intrusion in the pump's upper motor bearing oil reservoir. On September 17, 2016, operators raised power to 81 percent, the maximum achievable power due to primary waste water processing limitations. On September 23, 2016, operators commenced a shutdown and entered into a planned refueling outage (1R24) and remained shutdown for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent power. On July 9, 2016, the operators reduced power to 82 percent due to a tube leak in the unit 2 main condenser. Operators returned the unit to full power on July 10, 2016. On September 10, 2016, operators reduced power to 75 percent due to the number 2 main turbine throttle valve failing to reopen during turbine valve testing. The operators returned the unit to 100 percent power on September 11, 2016. The unit remained at or near 100 percent power for the remainder of the inspection period.

## 1. REACTOR SAFETY

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

#### 1R01 Adverse Weather Protection (71111.01 – 1 sample)

##### Summer Readiness of Offsite and Alternate Alternating Current (AC) Power Systems

##### a. Inspection Scope

The inspectors reviewed plant features and procedures for the operation and continued availability of the offsite and alternate AC power system to evaluate readiness of the systems prior to seasonal high grid loading. The inspectors reviewed FENOC's procedures affecting these areas and the communications protocols between the transmission system operator and FENOC. This review focused on changes to the established program and material condition of the offsite and alternate AC power equipment. The inspectors assessed whether FENOC established and implemented appropriate procedures and protocols to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system. The inspectors evaluated the material condition of the associated equipment by interviewing the responsible system manager, reviewing condition reports and open work orders, and walking down portions of the offsite and AC power systems including the 500 kilovolt (kV) and 220 kV switchyards. Documents reviewed for each section of this inspection report are listed in the Attachment.

##### b. Findings

No findings were identified.

## **1R04 Equipment Alignment**

### Partial System Walkdowns (71111.04 – 3 samples)

#### a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 1 river water system following 'B' train flow testing on July 1, 2016
- Unit 2 'A' train of quench spray following post maintenance testing on July 20, 2016
- Unit 1 'B' train of reactor plant component cooling water system following scheduled maintenance on August 3, 2016

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, technical specifications, work orders, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether FENOC staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

#### b. Findings

No findings were identified.

## **1R05 Fire Protection**

### Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)

#### a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that FENOC controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out of service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Unit 2 Diesel Generator 2-1, Fire Area DG-1, on July 18, 2016
- Unit 2 Diesel Generator 2-2, Fire Area DG-2, on July 19, 2016
- Unit 1 AE Switchgear Room, Fire Area ES-1, on August 31, 2016,
- Unit 1 Diesel Generator 1-1, Fire Area DG-1, on September 15, 2016,
- Unit 1 MCC Room and Main Steam Valve Room, Fire Area MS-1, on September 22, 2016



b. Findings

No findings were identified.

**1R06 Flood Protection Measures (71111.06 – 1 sample)**

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the updated final safety analysis report (UFSAR), the site flooding analysis, and plant procedures to identify internal flooding susceptibilities for the site. The inspectors review focused on the Unit 1 main steam valve area. The inspectors verified the adequacy of equipment seals located below the flood line, floor and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers. The inspectors assessed the adequacy of operator actions that FENOC had identified as necessary to cope with flooding in this area and also reviewed the CAP to determine if FENOC was identifying and correcting problems associated with both flood mitigation features and site procedures for responding to flooding.

b. Findings

No findings were identified.

**1R07 Heat Sink Performance (71111.07A – 1 sample)**

a. Inspection Scope

The inspectors reviewed the Unit 2 'A' primary component cooling heat exchanger readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and verified FENOC's commitments to NRC Generic Letter 89-13, "Service Water System Requirements Affecting Safety-Related Equipment." The inspectors reviewed the results of previous inspections of the Unit 2 'A' primary component cooling and similar heat exchangers. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures of the as-found and as-left conditions. The inspectors verified that FENOC initiated appropriate corrective actions for identified deficiencies. The inspectors also verified that the number of tubes plugged within the heat exchanger did not exceed the maximum amount allowed.

b. Findings

No findings were identified.

**1R11 Licensed Operator Regualification Program and Licensed Operator Performance (71111.11Q – 2 samples)**

**.1 Quarterly Review of Licensed Operator Regualification Testing and Training**

**a. Inspection Scope**

The inspectors observed Unit 1 licensed operator simulator training on August 1, which included two faulted steam generators, one inside containment and one outside containment, coincident with a loss of a vital bus and the failure of select components to automatically start as required. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

**b. Findings**

No findings were identified.

**.2 Quarterly Review of Licensed Operator Performance in the Main Control Room**

**a. Inspection Scope**

The inspectors observed operators perform an unplanned power reduction on September 14, 2016, on Unit 1 to 47 percent to support emergent work on the 1A condensate pump. On September 23, the inspectors observed the operators commence a planned shutdown of Unit 1 for refueling outage (1R24). The inspectors observed infrequently performed test or evolution briefings, pre-shift briefings, and reactivity control briefings to verify that the briefings met the criteria specified in FENOC's Operations Section Expectations Handbook and FENOC Administrative Procedure OP-AA-329, "Conduct of Infrequently Performed Tests and Evolutions," Revision 1.

**b. Findings**

No findings were identified.

**1R12 Maintenance Effectiveness (71111.12Q – 2 samples)**

**a. Inspection Scope**

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance work orders, and maintenance rule basis documents to ensure that FENOC was identifying and properly evaluating performance problems within the scope of the maintenance rule.

For each sample selected, the inspectors verified that the structure, system, or component was properly scoped into the maintenance rule in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by FENOC staff was reasonable. As applicable, for structures, systems, and components classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these structures, systems, and components to (a)(2). Additionally, the inspectors ensured that FENOC staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Commercial grade dedication of BV-1NG-518, nitrogen supply check valve for the 'B' pressurizer power operated relief valve accumulator on July 13, 2016 (quality control)
- Unit 2 spent fuel pool cooling and purification on July 11, 2016

b. Findings

No findings were identified.

**1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)**

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that FENOC performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that FENOC personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When FENOC performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Yellow probabilistic risk assessment (PRA) risk for racking of the Unit 1 'B' river water pump breaker following control cable replacement on July 1, 2016
- Unit 1 emergency diesel generator 1-1 out of service for surveillance testing with Unit 2 'C' primary component cooling water pump and 'A' motor-driven auxiliary feedwater pump out of service for maintenance on August 10, 2016
- Unit 1 emergency diesel generator 1-2 out of service for surveillance testing and emergency bus loss of voltage relays out of service for testing on August 24, 2016
- Yellow PRA risk for racking the 'C' river water pump breaker following cable re-routing on September 2, 2016
- Unit 1 risk assessment for the 1R24 refueling outage Pre-Outage Defense-in-Depth Report, Revision 1 on September 20, 2016
- Yellow shutdown risk for decay heat removal while draining the reactor coolant system for reactor vessel head removal on September 27, 2016

b. Findings

No findings were identified.

**1R15 Operability Determinations and Functionality Assessments (71111.15 – 4 samples)**a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems:

- Commercial grade dedication of BV-1NG-518, nitrogen supply check valve for the 'B' pressurizer power operated relief valve accumulator without verification of a critical characteristic on July 14, 2016
- Unit 1 'C' reactor plant component cooling water pump head ratio at the maximum acceptable range on August 9, 2016
- Unit 2 emergency diesel generator 2-2 jacket water leak on September 1, 2016
- Unit 1 'A' reactor plant river water system pinhole leak on September 7, 2016

The inspectors evaluated the technical adequacy of the operability determinations to assess whether technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and UFSAR to FENOC's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by FENOC.

b. Findings

No findings were identified.

**1R18 Plant Modifications (71111.18 – 1 sample)**Permanent Modificationsa. Inspection Scope

The inspectors evaluated a modification to the Unit 2 'D' recirculation spray pump discharge piping snubber, implemented by engineering change package 2004-0040-016, "Replace Snubber 2RSS-PSSP-465X." The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed modification documents associated with the upgrade and design change. The inspectors performed a walkdown of the system following the design change and interviewed engineering personnel to ensure the replacement was installed as designed.

b. Findings

No findings were identified.

**1R19 Post-Maintenance Testing (71111.19 – 7 samples)**a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- Unit 1 'B' river water pump control cable replacement on July 1, 2016
- Unit 2 'A' train quench spray breaker replacement and coupling lubrication on July 19, 2016
- Unit 2 'B' charging pump mechanical seal replacement on July 25, 2016
- Unit 1 'B' component cooling reactor pump control cable replacement on August 3, 2016
- Unit 1 'A' low head safety injection pump outboard motor bearing oil leak repair on August 15, 2016
- Unit 1 'B' motor driven auxiliary feedwater train diverse and flexible coping strategies piping modification on August 30, 2016
- Unit 2 emergency diesel generator 2-2 jacket water connection fitting replacement on September 28, 2016

b. Findings

No findings were identified.

**1R22 Surveillance Testing (71111.22 – 5 samples)**a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant structures, systems, and components to assess whether test results satisfied technical specifications, the UFSAR, and FENOC procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions.

The inspectors reviewed the following surveillance tests:

- 2OST-36.2, Emergency Diesel Generator (2EGS\*EG2-2) Monthly Test, Revision 72 on July 6, 2016
- 1OST-13.7B, 2B Recirculation Spray Pump Flow Test, Revision 13 on July 7, 2016 (in-service test)
- 1OST-36.1, Diesel Generator No. 1 Monthly Test, Revision 64 on July 13, 2016
- 1MSP-36.41-E, 1AE 4KV Emergency Bus Degraded Voltage Relays 27-VE2100AB and 27-VE2100BC Test, Revision 26; and 1MSP-36.43-E, 1N 480 Volt Emergency Bus Degraded Voltage Relays 27-RN2100AB and 27-RN2100BC Test, Revision 28 on September 7, 2016
- 1OST-1.4A, Train B CIA On-Line Slave Relay Test, Revision 2 on September 20, 2016 (containment isolation valve)

b. Findings

No findings were identified.

## 2. **RADIATION SAFETY**

### **Cornerstones: Occupational and Public Radiation Safety**

#### 2RS5 Radiation Monitoring Instrumentation (71124.05 - 3 samples)

a. Inspection Scope

The inspectors reviewed performance in assuring the accuracy and operability of radiation monitoring instruments used to protect occupational workers during plant operations and from postulated accidents. The inspectors used the requirements in 10 CFR 20, Regulatory Guides, American National Standards Institute 323A, N323D, and N42.14, and procedures required by technical specifications (TS) as criteria for determining compliance.

#### Inspection Planning

The inspectors reviewed Beaver Valley's UFSAR, Radiation Protection audits, records of in-service survey instrumentation, and procedures for instrument source checks and calibrations.

#### Walkdowns and Observations

The inspectors conducted walkdowns of plant area radiation monitors and continuous air monitors. The inspectors assessed material condition of these instruments and that the monitor configurations aligned with the UFSAR. The inspectors checked the calibration and source check status of various portable radiation survey instruments and contamination detection monitors for personnel and equipment.

### Calibration and Testing Program

For the following radiation detection instrumentation, the inspectors reviewed the current detector and electronic channel calibration, functional testing results alarm set-points and the use of scaling factors: laboratory analytical instruments, whole body counter, containment high-range monitors, portal monitors, personnel contamination monitors, small article monitors, portable survey instruments, area radiation monitors, electronic dosimetry, air samplers and continuous air monitors. The inspectors reviewed the calibration standards used for portable instrument calibrations and response checks to verify that instruments were calibrated by a facility that used National Institute of Science and Technology (NIST) traceable sources.

### Problem Identification and Resolution

The inspectors verified that problems associated with radiation monitoring instrumentation (including failed calibrations) were identified at an appropriate threshold and properly addressed in the CAP.

#### b. Findings

No findings were identified.

## **2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06 - 6 samples)**

#### a. Inspection Scope

The inspectors reviewed the treatment, monitoring, and control of radioactive gaseous and liquid effluents. The inspectors used the requirements in 10 CFR 20, 10 CFR 50, Appendix I, TS, Offsite Dose Calculation Manual (ODCM), applicable industry standards, and procedures required by TS as criteria for determining compliance.

### Inspection Planning

The inspectors conducted in-office reviews of the Beaver Valley's (2014) and (2015) annual radioactive effluent and environmental reports, radioactive effluent program documents, UFSAR, ODCM, and applicable event reports.

### Walkdowns and Observations

The inspectors walked down the gaseous and liquid radioactive effluent monitoring and filtered ventilation systems to assess the material condition and verify proper alignment according to plant design. The inspectors also observed potential unmonitored release points and reviewed radiation monitoring system surveillance records and the routine processing and discharge of gaseous and liquid radioactive wastes.

### Calibration and Testing Program

The inspectors reviewed gaseous and liquid effluent monitor instrument calibration, functional test results, and alarm set-points based on NIST calibration traceability and ODCM specifications.

### Sampling and Analyses

The inspectors reviewed radioactive effluent sampling activities, representative sampling requirements, compensatory measures taken during effluent discharges with inoperable effluent radiation monitoring instrumentation, the use of compensatory radioactive effluent sampling, and the results of the inter-laboratory and intra-laboratory comparison program including scaling of hard-to-detect isotopes.

### Instrumentation and Equipment

The inspectors reviewed the methodology used to determine the radioactive effluent stack and vent flow rates to verify that the flow rates were consistent with TS/ODCM and UFSAR values. The inspectors reviewed radioactive effluent discharge system surveillance test results based on TS acceptance criteria. The inspectors verified that high-range effluent monitors used in emergency operating procedures are calibrated and operable and have post-accident effluent sampling capability.

### Dose Calculations

The inspectors reviewed changes in reported dose values from the previous annual radioactive effluent release reports, several liquid and gaseous radioactive waste discharge permits, the scaling method for hard-to-detect radionuclides, ODCM changes, land use census changes, public dose calculations (monthly, quarterly, annual), and records of abnormal gaseous or liquid radioactive releases.

### Problem Identification and Resolution

The inspectors evaluated whether problems associated with the radioactive effluent monitoring and control program were identified at an appropriate threshold and properly addressed in FENOC's CAP.

#### b. Findings

No findings were identified.

## **2RS7 Radiological Environmental Monitoring Program (71124.07 - 3 samples)**

#### a. Inspection Scope

The inspectors reviewed the Radiological Environmental Monitoring Program (REMP) to validate the effectiveness of the radioactive gaseous and liquid effluent release program and implementation of the Groundwater Protection Initiative (GPI). The inspectors used the requirements in 10 CFR 20, 40 CFR 190, 10 CFR 50 Appendix I, and the site's TS, ODCM, Nuclear Energy Institute (NEI) 07-07, and procedures required by TS as criteria for determining compliance.



### Inspection Planning

The inspectors reviewed: Beaver Valley's 2014 and 2015 annual radiological environmental and effluent monitoring reports, REMP program audits, ODCM changes, land use census, UFSAR, and inter-laboratory comparison program results.

### Site Inspection

The inspectors walked down various thermoluminescent dosimeter and air and water sampling locations and reviewed associated calibration and maintenance records. The inspectors observed the sampling of various environmental media as specified in the ODCM and reviewed any anomalous environmental sampling events including assessment of any positive radioactivity results. The inspectors reviewed any changes to the ODCM. The inspectors verified the operability and calibration of the meteorological tower instruments and meteorological data readouts. The inspectors reviewed environmental sample laboratory analysis results, laboratory instrument measurement detection sensitivities; and results of the laboratory quality control program audit, and the inter- and intra-laboratory comparison program results. The inspectors reviewed the groundwater monitoring program as it applies to selected potential leaking structures, systems, and components, and 10 CFR 50.75(g) records of leaks, spills, and remediation since the previous inspection.

### GPI Implementation

The inspectors reviewed: groundwater monitoring results; changes to the GPI program since the last inspection, anomalous results or missed groundwater samples, leakage or spill events including entries made into the decommissioning files (10 CFR 50.75(g)), evaluations of surface water discharges, and FENOC's evaluation of any positive groundwater sample results including appropriate stakeholder notifications and effluent reporting requirements.

### Problem Identification and Resolution

The inspectors evaluated whether problems associated with the REMP were identified at an appropriate threshold and properly addressed in FENOC's CAP.

#### b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

##### 4OA1 Performance Indicator Verification (71151)

###### .1 Radiological Effluent TS/ODCM Radiological Effluent Occurrences (1 sample)

###### a. Inspection Scope

The inspectors reviewed FENOC's submittals for the radiological effluent TS/ODCM radiological effluent occurrences performance indicator (PI) for the first quarter 2015 through the fourth quarter 2015. The inspectors used PI definitions and guidance contained in the NEI 99-02, Revision 7, to determine if the PI data was reported properly. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the CAP database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if indicator results were accurately reported.

###### b. Findings

No findings were identified.

###### .2 Mitigating Systems Performance Index (6 samples)

###### a. Inspection Scope

The inspectors reviewed FENOC's submittal of the Mitigating Systems Performance Index for the following systems for the period of July 1, 2015, through June 30, 2016:

- Unit 1 Heat Removal System (Auxiliary Feedwater)
- Unit 2 Heat Removal System (Auxiliary Feedwater)
- Unit 1 Residual Heat Removal Systems (Low Head Safety Injection and Recirculation Spray)
- Unit 2 Residual Heat Removal System (Recirculation Spray)
- Unit 1 Cooling Water System (River Water)
- Unit 2 Cooling Water System (Service Water)

To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed FENOC's operator narrative logs, condition reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

###### b. Findings

No findings were identified.

**4OA2 Problem Identification and Resolution (71152 – 5 samples)****.1 Routine Review of Problem Identification and Resolution Activities****a. Inspection Scope**

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify FENOC entered issues into the CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the CAP and periodically attended condition report screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, FENOC performed an evaluation in accordance with 10 CFR Part 21.

**b. Findings**

No findings were identified.

**.2 Semi-Annual Trend Review****a. Inspection Scope**

The inspectors performed a semi-annual review of site issues, as required by Inspection Procedure 71152, "Problem Identification and Resolution," to identify trends that might indicate the existence of more significant safety issues. In this review, the inspectors included a high level review of plant systems that were in maintenance rule (a)(1) status. The inspectors also reviewed FENOC's CAP database for the third quarter 2015 through the second quarter 2016 to assess condition reports that required an apparent cause evaluation. The inspectors reviewed the FENOC Fleet Oversight Gap Reports for February/March and April/May 2016 and Performance Assessment Report PA-BV-16-03 and assessment area PA-BV-2016-0085-001, conducted under NOBP-LP-2023, Performance Assessment, to verify that FENOC personnel were appropriately evaluating and trending adverse conditions in accordance with applicable procedures.

**b. Findings and Observations**

No findings were identified.

The inspectors concluded that FENOC followed the guidance in NOBP-LP-2023 in performing their Gap Reports. The inspectors did not identify any adverse trends that had not been previously identified by FENOC in the Gap Reports. NOBP-LP-2023, section 4.2.6, states that the purpose should be described in the assessment area. The inspectors noted that the purpose was not described in assessment area PA-BV-2016-0085-001.

In the inspectors review of the 34 condition reports requiring an apparent cause evaluation, the inspectors noted that eight (24%) were due to radiation monitor issues. The site has been challenged maintaining the radiation monitors functional and they have been a focus area for the site for several years. Fleet Oversight identified that radiation monitoring system availability was a performance concern in January 2016 and issued an elevation letter. A review of system health reports revealed that, despite being a plant focus area, both unit's radiation monitoring systems are in maintenance rule (a)(2) status.

In the inspectors' review of FENOC maintenance rule program, the inspectors noted that over the last two periodic assessments, the number of systems in maintenance rule (a)(1) status declined slightly. Unit 1 decreased from 11 to 9 and Unit 2 decreased from 13 to 10. Systems moving into (a)(1) decreased from 15 to 4 and systems moving into (a)(2) increased from 5 to 8. A review of the 26 systems that have returned to (a)(2) status since 2010 revealed that the average time a system remained (a)(1) was 2.7 years. The most common time was 1 to 1.5 years and the maximum was 6 years. The systems that remained in (a)(1) the longest were Unit 1 solid state protection system and area ventilation and Unit 2 emergency diesel generators, containment, and the emergency response facility substation. The inspectors concluded that the average time a system was in (a)(1) did not appear to be excessive and that there was no adverse trend in the number of system in (a)(1).

### **.3 Annual Sample: Emergency Bus Degraded Voltage Relays**

#### **a. Inspection Scope**

The inspectors performed an review of FENOC's corrective actions associated with condition report 2016-08490, Under Voltage Relay 27-VF3200BC Found Below Tech Spec Allowable Value During MSP, and a review of surveillance test results and condition reports for all the emergency bus degraded voltage relays from 2009 to 2016.

The inspectors assessed FENOC's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of FENOC's corrective actions to determine whether FENOC was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of FENOC's CAP and 10 CFR 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed maintenance and engineering personnel to assess the effectiveness of the implemented corrective actions.

#### **b. Observations**

The relays used for the Unit 1 480 VAC emergency bus and all Unit 2 emergency bus degraded voltage relays are AB 27N model 411T6375HF. There have been seven surveillance test failures since 2011 where the "as found" drop out voltage was below the TS minimum value. Of the 134 surveillances reviewed since 2009, the inspectors noted that there were 30 additional "as found" drop out voltages for the emergency bus degraded voltage relays were outside of the required band, but above the TS minimum value. This condition existed in most of the 12 relays.

The inspectors' search revealed that in March 2015, condition report 2015-03159 identified that the "as found" dropout voltage for relay 27-RP2100BC, Unit 1's 480V bus 1DF degraded voltage relay, was outside of the acceptance band, but above the TS minimum value in the past three surveillances. The extent of condition identified that the "as found" drop out voltage for relay 27-VF3200BC, Unit 2's 4160V bus 2DF degraded voltage relay, was outside the acceptance band in the past four surveillances. The inspectors did not find any condition reports that identified the negative trend in "as found" drop out voltages in the AB 27N model 411T6375HF relays. The inspectors concluded that the failure to identify the negative trend in "as found" drop out voltage that existed since 2009 was a condition to adverse to quality that should have been promptly identified and corrected, and is a violation of NRC requirements. The finding is documented below.

b. Findings

Introduction. The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for FENOC's failure to assure that a condition adverse to quality was promptly identified and corrected. Specifically, FENOC failed to promptly identify and a correct negative trend in setpoint drift and "as found" dropout voltage values in the AB 27N model 411T6375HF emergency bus degraded voltage relays. This led to seven failures to trip above the TS limit over the past five years and caused the relays to be inoperable.

Description. Each unit has two 4160 VAC and two 480 VAC degraded voltage relays per emergency bus, a total of eight per unit. The AB 27N model 411T6375HF relays are used for Unit 1's 480 VAC and all Unit 2's emergency bus degraded voltage relays. The relay's purpose is to separate the emergency bus from the non-vital bus power if the voltage drops below the setpoint for a specified period of time in order to prevent damage to safety related equipment from operating at reduced voltage.

On July 5, 2016, CR 2016-08490 documented that relay 27-VF3200BC, Unit 2's 4160 VAC bus 2DF degraded voltage relay dropout voltage was found below the TS minimum value during a scheduled surveillance test. The relay was recalibrated and placed back in service.

The inspectors' review of condition reports revealed that in March 2015, CR 2015-03159 identified that the "as found" dropout voltage for relay 27-RP2100BC, Unit 1's 480 VAC bus 1DF degraded voltage relay, which is the same model as 27-VF3200BC, was outside of the acceptance band, but above the TS minimum value in the past three surveillances. The extent of condition identified that 27-VF3200BC's "as found" drop out voltage was outside the acceptance band in the past four surveillances. 27-VF3200BC was replaced in January 2016, and in July 2016, failed the first surveillance test performed after its replacement.

FENOC's investigation of 27-VF3200BC's failed surveillance in CR 2016-08490 restated the "as found" drop out voltage trend for relays 27-VF3200BC and 27-RP2100BC that were identified in CR 2015-03159. The investigation identified that both relays experienced the setpoint drift in the first performance of the surveillance following relay replacement. The CR was closed with no additional action.

The drop out voltage required “as found” band is 0.60 volts or +/- 0.30 volts from the midpoint. The inspectors’ further review of condition reports revealed that there were seven failures of the AB 27N model 411T6375HF relay from 2011 through 2016. The inspectors then performed a detailed review of the results of 134 surveillances performed on this style relay since 2009 and identified that there were 45 instances (33.6%) when the setpoint drift was excessive (greater than or equal to 0.30 volts). This led to 37 instances (27.6%) when the “as found” drop out voltage was outside of the required band and was marked UNSAT. Relay calibrations were performed to return the dropout voltages into specification. Additionally, the excessive drift condition was evident in 10 of the 12 locations where this relay is used. The inspectors determined that FENOC’s review of the relays’ surveillance results was inadequate in that it did not identify that surveillances dating back to 2009 revealed excessive setpoint drift leading to “as found” dropout voltages outside the required bands. The inspectors determined that negative trend in dropout voltage setpoint drift and “as found” values were conditions adverse to quality that FENOC should have promptly identified and corrected.

Analysis. The inspectors determined that the failure to assure that a condition adverse to quality was promptly identified and corrected for the Unit 1 and Unit 2 degraded voltage relays is a performance deficiency that was within the capability of FENOC to foresee and correct, and should have been prevented. The performance deficiency is more than minor because it is associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, FENOC’s failure to promptly identify and address the negative trend in dropout voltage setpoint drift and “as found” values resulted in the reduced reliability of safety related bus degraded voltage relays (seven surveillance failures and inoperable degraded bus relays between 2011 and 2016). Inoperable emergency bus degraded voltage relays could lead to damage of safety-related equipment during a loss of offsite power.

In accordance with IMC 0609, Attachment 4, “Initial Characterization of Findings,” issued April 29, 2015, and Exhibit 3 of IMC 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” issued June 19, 2012, the inspectors determined that this finding is of very low safety significance (Green) because it does not represent a loss of system and/or function, an actual loss of function of a single train for greater than its technical specification allowed outage time, an actual loss of function of one non-technical specification trains designated as high safety significant, and did not involve a loss or degradation of equipment designed to mitigate a seismic, flooding, or severe weather initiating event.

This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Trending, because FENOC did not periodically analyze the results of the degraded voltage relay surveillances to provide early indication of a declining trend. (P.4)

Enforcement. 10 CFR 50 Appendix B, Criterion XVI, “Corrective Action,” requires, in part, that conditions adverse to quality such as failures and deviations are promptly identified and corrected. Contrary to the above, FENOC failed to promptly identify and correct a condition adverse to quality. Specifically, from 2009 until August 2016, FENOC failed to promptly identify a negative trend in dropout voltage setpoint drift and “as found” values of the emergency bus degraded voltage relays. This led to seven surveillance failures and inoperable degraded voltage relays. FENOC’s immediate corrective actions included recalibrating or replacing the relays and entering the issue into their CAP as

CR-2016-12018. Because this finding is of very low safety significance (Green) and the issue was entered into FENOC's CAP, this violation is being treated as a NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000334/2016003-01 and 05000412/2016003-01, Failure to Identify Conditions Adverse to Quality Leads to Inoperable Emergency Bus Degraded Voltage Relays)**

#### **.4 Annual Sample: Radiation Monitoring Instrumentation**

##### **a. Inspection Scope**

The inspectors performed an in-depth review of FENOC's causal analysis and corrective actions associated with CR 2016-01155, Radiation Monitoring System availability. Specifically, five monitors required to be restored to service within 30 days per the ODCM, were not restored in the stated time. The inspectors assessed FENOC's problem identification threshold, cause analysis, and the prioritization and timeliness of corrective actions to determine whether FENOC was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of FENOC's CAP. In addition, the inspectors interviewed personnel from the Fix-It-Now team, system engineering, nuclear oversight and reviewed condition reports, Operations logs and procedures to assess the effectiveness of the implemented corrective actions. The inspectors also reviewed the meeting minutes of the Radiation Monitor Make It Happen Team.

##### **b. Findings and Observations**

No findings were identified.

The inspectors concluded that the Radiation Monitor Make It Happen Team was marginally effective in increasing the reliability and availability of the radiation monitors. The team was marginally effective because of the lack of a charter, a procedure, and management sponsorship. For the year starting July 2015 through June 2016, the number of out of service radiation monitors was usually greater than 20 monitors per month and in three months there were 30 or more monitors out of service. A noticeable decrease has only been seen in May 2016 (still over 15 monitors out of service) and June 2016 (with 10 monitors out of service). The review of the Radiation Monitor Make It Happen team meeting minutes indicated for the last year and a half, with the exception of the last four months, the major participants were not in attendance which demonstrates a lack of management sponsorship and support for the Radiation Monitor Make It Happen team. The meeting minutes also indicated that there were no metrics established to measure progress but only reviewed action items with no emphasis on completion of due dates. The interview with the nuclear oversight individual identified numerous reports identifying that the Radiation Monitor Make It Happen team was marginally effective. The inspectors determined that the apparent cause evaluation performed in response to the nuclear oversight elevation letter sent to the manager, site maintenance, was in accordance with the FENOC Cause Analysis procedure, NOBP-LP-2011.

However, the corrective actions have not been completed as of the date of the inspection. The observations were entered into the Beaver Valley CAP as CR-2016-09741 and CR-2016-09767.

**.5 Annual Sample: Pipe and Component Periodic Leak Examinations and Post Installation Tests**

**a. Inspection Scope**

The inspectors performed an in-depth review of FENOC's cause analysis and corrective actions associated with condition reports 2015-14454 and 2015-15669. These CRs, initiated in 2015, identified the need for completion of VT-2 examinations for pressure boundary leakage detection required every 40 months per the American Society of Mechanical Engineers (ASME) Section XI Code, including the Table IWC-2500-1 requirements for both Units 1 and 2. The inspectors reviewed FENOC's updated ASME Section Code XI Pressure Testing Program Procedure 1/2-ADM-2036, Revision 4, which contained the detailed listing of the VT-2 ASME Code required examinations and compared this document to the problems described in the condition reports. This procedure had been revised by FENOC staff as a corrective action to identify each VT-2 pressure test required to be done on a 40 month periodicity for the systems in Units 1 and 2.

During the inspection, the train 'A' river water full flow test and associated VT-2 examinations were performed by FENOC staff per procedure 10ST-30.12A under work scope 44. The inspectors reviewed the flow test scope and the applicable Leakage Examination Requirements Procedure NDE-VT-502, Revision 10 to the ASME Code Section XI requirements and the plant implementation procedures.

This VT-2 examination identified a pin-hole leak on Line 24"-WR-20-151-Q3, as documented in CR 2016-10607. The inspectors reviewed this CR, the quantification of the leak area as done by ultrasonic testing (UT), and the engineering evaluation of the condition completed per the ASME Code Case N-513-2 to confirm structural integrity of the piping.

In the area of the process and controls to accomplish ASME Code work scope for repairs and replacements of pressure retaining components including post installation testing, the inspectors reviewed the process for work scope determination, and the steps to include ASME Code required work scope and examinations into the work process documentation. A sample of work control documents were examined to confirm the work control process was being implemented and the ASME Code examinations were incorporated in the work control packages.

The inspectors assessed FENOC's problem identification threshold, cause analysis, and the prioritization and timeliness of corrective actions to determine whether FENOC was appropriately identifying, characterizing, and correcting problems associated with the VT-2 examination requirements and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of FENOC's CAP. In addition, the inspectors interviewed engineering, training, and maintenance personnel to assess the effectiveness of the implemented corrective actions.

**b. Findings and Observations**

No findings were identified.



At the time of the review, all corrective actions associated with CR 2015-14454 and CR 2015-15669 were complete. The inspectors concluded that the implemented corrective actions adequately addressed the identified conditions. The inspectors noted that the need for specific VT-2 examinations were identified in time to allow completion of these examinations within the ASME Code Section XI timing requirements.

In regard to CR 2016-10607 for the pin-hole leak, the inspectors found the UT quantification of the pipe condition in the area of the leak and the engineering evaluation of the pipe and UT results met the ASME Code Case N-513-2 requirements and confirmed piping structural integrity.

For the topic of work package development and the incorporation of ASME Code requirements into work control documentation, including work scope related testing, the inspectors identified no issues. This was confirmed by review of several work control documents and discussion with work package development staff.

## **.6 Annual Sample: Performance Issues with Unit 2 Steam Dump Operation**

### **a. Inspection Scope**

The inspectors reviewed Beaver Valley staff's evaluation and corrective actions associated with erratic Unit 2 steam dump operation as described in their Apparent Cause Evaluation, CR 2014-09232. Beaver Valley staff identified the apparent causes for erratic operation, conducted an extent of condition review of Unit 1 steam dumps for similar performance issues, and assigned corrective actions to improve Unit 2 steam dump operation.

### **b. Findings and Observations**

No findings were identified.

The inspectors determined the facility staff's evaluation adequately identified the causes of erratic dump operation, and that corrective actions were appropriate for the identified causal factors.

Beaver Valley staff identified the apparent cause for erratic dump operation was inadequate tuning of the dump's control system, due to lack of objective data to support system tuning and troubleshooting. FENOC staff also determined there were several contributing causes. For example, one of the dump's temperature control valves was out of mechanical adjustment; one of the dump's pressure control valves exhibited mechanical binding; and the dump's manual/automatic control station was degraded, which resulted in control signal oscillations.

The extent of condition review noted many of the Unit 2 dump system's valve designs and control cards used in the steam dump control system are different than those on Unit 1. Therefore, the specific component issues identified for Unit 2 did not apply to the Unit 1 system.

FENOC staff initiated corrective actions to address the various causes. Maintenance staff re-tuned the temperature control valve pneumatic booster, replaced the dump system's manual/automatic control station, and eliminated the mechanical binding in a pressure control valve actuator, among other hardware repairs.

The inspectors determined the FENOC's response to Unit 2 steam dump performance issues was acceptable, and the corrective actions taken were reasonable to resolve the erratic operation.

#### **4OA5 Other Activities**

##### **.1 Groundwater Protection Initiative**

###### **a. Inspection Scope**

The inspectors reviewed implementation of the GPI based on the objectives in NEI 07-07 "Industry Ground Water Protection Initiative – Final Guidance Document". The inspectors observed the condition of several groundwater monitoring wells during the inspection.

###### **b. Findings and Observations**

No findings were identified.

During walkdowns of the groundwater monitor wells, several instances of degraded conditions were observed. Monitoring well, MW-13D, had no gasket on the well cap and in two other monitoring wells, MW-13S and MW-11D, the well cap gaskets were in poor condition. At monitoring well MW-13D, in addition to a missing well cap gasket, the plug inside the well pipe was loose and could be easily removed. In one of the other wells the plug was also easily removed but was capable of being secured by tightening the plug screw. While there was no evidence of surface water intrusion into the wells at the time of the inspection observation, these observations indicate that surface water runoff could enter some of the wells and carry contaminants into these wells and/or dilute the groundwater radioactivity levels adversely affecting groundwater radionuclide measurements and resultant effluent release calculations.

NEI 07-07 objective 1.3 section f. states "Establish a long-term program for preventative maintenance of groundwater wells." FENOC Procedure NOP-OP-2012 section 4.4 requires an annual groundwater monitoring well inspection. The last documented groundwater monitoring well inspection was performed in 2014; however, no inspections have been performed since that date as of this inspection in 2016, which is a performance deficiency. The inspectors determined that the performance deficiency is minor because there has been no apparent change in the groundwater sample results. FENOC entered the issue into their CAP as CR 2016-08785.

##### **.2 (Closed) Temporary Instruction 2515/190: Inspection of the Proposed Interim Actions Associated with Near-Term Task Force Recommendation 2.1 Flooding Hazard Evaluations.**

###### **a. Inspection Scope**

The inspectors performed activities to verify FENOC's conclusion that two interim actions were required. The activities performed were based on questions provided by the NRC staff that reviewed FENOC's near-term task force recommendation 2.1 flood hazard re-evaluation submittal, as well as the inspector's assessment of the hazard posed to safety-related equipment by the predicted flood levels. The results of the inspection were provided to the associated NRC staff in separate correspondence.

The specific activities performed included:

- 1) The inspectors reviewed the Beaver Valley Power Station Flooding Hazard Re-Evaluation Report to identify the flooding mechanisms, pathways of concern, and consequences of the postulated worst case flooding events
- 2) The inspectors evaluated the impact of the postulated flooding on the safety-related equipment that would be potentially at risk
- 3) The inspectors inspected the exterior doors that would present the path for water infiltration to assess the material condition of the doors and the door seals
- 4) The inspectors inspected the two flood barrier panels installed as a result of re-evaluated effects of a local intense precipitation event
- 5) The inspectors discussed the NRC staff reviewer's questions with FENOC engineering personnel to directly obtain their responses.

b. Findings

No findings were identified.

**4OA6 Meetings, Including Exit**

On October 27, 2016, the inspectors presented the inspection results to Mr. M. Manoleras, Director, Site Engineering, and other members of the Beaver Valley Power Station staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

**ATTACHMENT: SUPPLEMENTARY INFORMATION**

**SUPPLEMENTARY INFORMATION**  
**KEY POINTS OF CONTACT**

FENOC Personnel

M. Richey	Site Vice President
R. Bologna	General Plant Manager
C. Battistone	Oversight Performance Inspector
P. Batuinskas	Senior Radiation Protection Technician
A. Bohr	Engineer
C. Casto	Advanced Nuclear Specialist
E. Crosby	Radiation protection Manager
A. Crotty	System Engineering Supervisor
E. Ebeck	Mechanical/Structural Engineering Supervisor
T. Fox	Work Planning Support
W. Garman	Design Engineer
R. Gilmore	Procurement Engineer
K. Gillespie	System Engineer
M. Gorham	System Engineer
D. Grabski	Consulting Engineer Programs, (Sect XI – ISI)
A. Hartung	Chemist
D. Hewitt	Superintendent FIN maintenance
E. Hohman	Mechanical/Structural Engineering
T. Hunt	I&C Technician
J. Jansto	Pressure Testing Program Engineer
D. Jones	In-Service Testing Engineer
A. Justice	I&C Supervisor
K. Kimmerle	RP Supervisor
M. Kienzle	System Engineer
P. Logoyda	Superintendent Nuclear Radiation Protection
C. Lord	Flood Seal Engineer
C. Mancuso	Design Engineering Manager
M. Manoleras	Engineering Director
A. Matty	Senior Radiation Protection Technician
M. Kienzle	Senior Nuclear Engineer
J. Miller	Fire Marshall
D. Minkus	System Engineer
C. O'Neil	Supervisor Technical Services Engineer Programs
V. Oravitz	Procurement Engineer
J. Patterson	System Engineer
B. Paul	Electrical Design Engineer
P. Pauvlinch	Manager, Tech Services
L. Proudfoot	Shift Manager
L. Renz	Staff Nuclear Specialist
D. Salera	Manager Site Chemistry
J. Sanders	RP Supervisor
J. Schwer	Shift Manager
J. Sheetz	Work Management Specialist
P. Seidel	Nuclear Specialist

FENOC Personnel

E. Thomas	Regulatory Compliance Supervisor
J. Thompson	Snubber Engineer
D. VanDame	Senior Nuclear Specialist
S. Vicinie	Fleet Oversight
D. Wacker	Regulatory Compliance Engineer
T. White	Nuclear Engineering Work Planning
T. Winfield	Relay Supervisor
R. Winter	Senior Consultant Chemistry

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

Opened/Closed

05000334/2016003-01	NCV	Failure to Identify Conditions Adverse to Quality Leads to Inoperable Emergency Bus Degraded Voltage Relays (Section 40A2)
05000412/2016003-01		

Closed

05000334/2515/190	TI	Inspection of Licensee's Proposed Interim Actions as a Result of the Near-Term Task Force Recommendation 2.1 Flooding Evaluation (Section 40A5)
05000412/2515/190		

**LIST OF DOCUMENTS REVIEWED**

**Section 1R01: Adverse Weather Protection**

Procedures

1/2OM-35.4A.A, Voltage Schedule Guidance, Revision 12  
 1/2OM-53C.4A.35.1, Degraded Grid, Revision 9  
 NOP-OP-1003, Grid Reliability Protocol, Revision 7

Miscellaneous

Unit 1 4KV Station Service System Health Report, 2015-2  
 Unit 1 Emergency Diesel Generators System Health Report, 2015-2  
 Unit 1 Main Generator and Main Transformer System Health Report, 2015-2  
 Unit 1 Switchyard and Transformers System Health Report, 2015-2  
 Unit 2 4KV Station Service System Health Report, 2015-2  
 Unit 2 Emergency Diesel Generators System Health Report, 2015-2  
 Unit 2 Main Generator and Main Transformer System Health Report, 2015-2  
 Unit 2 Switchyard and Transformers System Health Report, 2015-2

**Section 1R04: Equipment Alignment**

Procedures

1OM-15.3.B.1, Valve List – 1CCR, Revision 22  
 1OM-15.3.B.2, Valve List – 1CC, Revision 18  
 1OM-30.3.B.1, Valve List – 1RW, Revision 53  
 1OST-30.3, Reactor Plant River Water Pump 1B Test, Revision 57  
 2OST-13.1, Quench Spray Pump (2QSS\*P21A) Test, Revision 32

Miscellaneous

RM-0413-002, Valve Oper No Diagram Quench Spray System, Revision 21

**Section 1R05: Fire Protection**

Procedures

1PFP-DGBX-735, Diesel Generator 1 Room, Fire Area DG-1, Revision 1  
 1PFP-SFGb-756, MCC Room & Main Steam Valve Room, Fire Area MS-1, Revision 0  
 1PFP-SRVB-713, AE Switchgear Room, Fire Area ES-1, Revision 2  
 2PFP-DGBX-732, Diesel Generator 2-1 Room, Fire Area DG-1, Revision 3  
 2PFP-DGBX-732, Diesel Generator 2-2 Room, Fire Area DG-2, Revision 3  
 2PFP-DGBX-759, EDG 2-1 Vent Room, Fire Area DG-1, Revision 1  
 2PFP-DGBX-759, EDG 2-2 Vent Room, Fire Area DG-2, Revision 1

**Section 1R06: Flood Protection Measures**

Procedures

1/2-ADM-2021, Control of Penetrations (Including HELB Doors), Revision 9  
 1/2-PIP-M16, Penetration Seals, Revision 9  
 1BVT 1.33.07, Flood Seals Visual Inspection, Revision 5

Condition Reports

2016-09742

Miscellaneous

10.001-0718, Main Steam and MCC Room Data Sheet, Revision G  
 10.001-0718, Main Steam Valve and MCC Room 3 hr. Fire Rated Floors and Walls  
 el. 751' 0" - 756'-0", Revision J  
 10.001-0719, Main Steam Valve MCC Room 3 hr. Fire Rated Floors and Walls  
 el. 752' -6" - 756'-0", Revision H  
 1PFP-SFGb-756, MCC Room and Main Steam Valve Room, Fire Area MS-1, Revision 0  
 8700-10.1-1117, Shake Space Elevation – Cable Vault and Safeguards Areas, Adjacent to  
 Containment (sht. 1 of 2), Revision A  
 8700-10.1-1118, Shake Space Elevation – Cable Vault and Safeguards Areas, Adjacent to  
 Containment (sht. 2 of 2), Revision A  
 LER 05000334-1997-038, Unsealed Penetration in Main Steam Valve Cubicle Floor, Revision 1  
 LER 05000334-1998-016, Missing Fire/Flood Seal in Main Steam Valve Room Shakespace,  
 Revision 0  
 LER 05000412-1997-002, Technical Specification Required Shutdown Due to Missing or  
 Degraded Recirculation Spray System Pump Flood Seals, Revision 0

**Section 1R07: Heat Sink Performance**

Condition Reports

2013-14041	2015-04724	2016-05915
2013-14302	2015-10256	2016-06745
2014-09582	2015-14011	2016-11381
2014-09650	2016-01093	

**Section 1R11: Licensed Operator Regualification Program**Procedures

1OM-52.4.B, Load Following, Revision 53

1OM-52.4.K, Tavg Coastdown Operations, Revision 3

Work Orders

200692814

Miscellaneous1LOCT-E-2.001, Licensed Operator Training/Licensed Regualification Training, Revision 0  
Evolution Specific Reactivity Plan, Unit 1 Cycle 24 September 2016 Condensate Pump

Removal, Revision 0

**Section 1R12: Maintenance Effectiveness**Procedures

1OST-6.12, Power Operated Relief Valve Test, Revision 19

NOBP-CC-7001, Procurement Packages, Revision 21

NOP-CC-7002, Procurement Engineering, Revision 13

Condition Reports

2013-14350	2014-13778	2016-05629
2014-08962	2014-17275	2016-08671
2014-11192	2015-02135	
2014-13210	2016-04656	

Work Orders

200190789	200264629	200573179
200227008	200298890	200636809

Purchase Orders

45179343	45377048	45471433
45302399	45434087	

Miscellaneous

24023, NUPIC Joint Audit of Swagelok Company, April 14, 2015

Beaver Valley Evaluation Report of Swagelok Company, February 9, 2016

ESU220, Maintenance Rule System Basis Document for Unit 2 System 20, Revision 5

Maintenance Rule Monthly Monitoring Spreadsheet for Unit 2 System 20, June 6, 2016

QM Package 10008237, Valve, Check, ½ in, 316 Stainless Steel, Revision 2

Quality Control Receiving Inspection Report for Procurement Package 10008237, Revision 2

RM-0411-002, Piping &amp; Instrumentation Diagram Safety Injection System, Revision 17

SAI-00640, Swagelok Testing, Valve Seat and Shell Leak, Revision J

Unit 2 Supplementary Leak Collection and Release System Health Report, 2015-2

### **Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

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NOP-OP-1007, Risk Management, Revision 23

#### Miscellaneous

Beaver Valley Key Shutdown Defense-in-Depth Turnover Checklist, September 27, 2016

Beaver Valley Power Station Daily Status Report, August 10, 2016

Beaver Valley Power Station Daily Status Report, August 24, 2016

Beaver Valley Power Station Daily Status Report, July 1, 2016

Beaver Valley Power Station Daily Status Report, September 27, 2016

Beaver Valley Unit 1 Weekly Maintenance Risk Summary Week of August 8, 2016, Revision 0

Beaver Valley Unit 1 Weekly Maintenance Risk Summary Week of August 22, 2016, Revision 1

Beaver Valley Unit 1 Weekly Maintenance Risk Summary Week of June 27, 2016, Revision 0

Beaver Valley Unit 1 Weekly Maintenance Risk Summary Week of August 29, 2016, Revision 0

Beaver Valley Unit 2 Weekly Maintenance Risk Summary Week of August 8, 2016, Revision 0

Risk Management Plan for 4KV Breaker Racking

### **Section 1R15: Operability Determinations and Functionality Assessments**

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1OST-15.3, Reactor Plant Component Cooling Water Pump Operating Surveillance Test,  
Revision 41

#### Condition Reports

2016-08671

2016-10380

2016-10607

2016-09648

2016-10607

#### Work Orders

200614578

#### Miscellaneous

8700-RM-0430-003, Piping & Instrumentation Diagram River Water System, Revision 30

ASME Boiler and Pressure Vessel Code Case N-513-2, February 20, 2004

### **Section 1R18: Plant Modifications**

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½-ADM-2140, Snubber Program, Revision 14

NOP-CC-2003, Engineering Changes, Revision 20

#### Work Orders

200613934

#### Miscellaneous

30-1021, Type 30 Hydraulic Snubber, Revision 6

DMS-0535, Procurement Specification for Unit 1 and Unit 2 Lisega Snubbers, Revision 0

ECP 04-0040, RFA-Convert TER 7931 to an ECP, Revision 0

EMTG-26-0, Criteria for Snubber Selection, Revision 0

TER-7931, Revision 1



**Section 1R19: Post-Maintenance Testing****Procedures**

1OM-15.4G, Starting an Additional CCR Pump, Revision 17  
 1OST-11.1, Safety Injection Pump Test – (1SI-P-1A), Revision 26  
 1OST-15.2, (1CC-P-1B) Quarterly Test, Revision 40  
 1OST-24.3, Motor Driven Auxiliary Feed Pump Test [1FP-P-3B], Revision 51  
 1OST-30.3, Reactor Plant River Water Pump 1B Test, Revision 57  
 2OST-13.1, Quench Spray Pump (2QSS\*P21A) Test, Revision 32  
 2OST-36.2, Emergency Diesel Generator 2 [EGS\*EG2-2] Monthly Test, Revision 73  
 2OST-7.5, Centrifugal Charging Pump (2CHS\*P21B), Revision 39

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2016-09881	2016-09898
2016-09882	2016-11544

**Work Orders**

200571938	200611831	200670642
200573387	200642873	200684077
200573400	200642875	

**Miscellaneous**

8700-RE-21Z, Three Line Power Diagram 4160V AC 3 Phase 60Hz Bus 1DF, Revision 11  
 8700-RE-8CD, CH 4160V. Wir Diag. Sh. 76 – River Water Pump WR-P-1B Unit 1 F10,  
 Revision 7  
 8700-RM-0424-002, Valve Oper No Diagram Feedwater System, Revision 19  
 ECP 15-0232-007, NFPA 805, BV1-1675, Multiple Cables Originate in Fire Area  
 (1ES-2, DF Switchgear) and Are Routed Through Fire Area (1ES-1 AE Switchgear) –  
 Cut and Reroute the Control Cable for River Water Pump B, Revision 2

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1MSP-36.41-E, 1AE 4KV Emergency Bus Degraded Voltage Relays 27-VE2100AB  
 and 27-VE2100BC Test, Revision 26  
 1MSP-36.43-E, 1N 480 Volt Emergency Bus Degraded Voltage Relays 27-RN2100AB  
 and 27-RN2100BC Test, Revision 28

**Section 2RS5: Radiation Monitoring Instrumentation****Procedures**

1/2CP-2078, Eberline Regulated Air Sampler Model RAS-1 Calibration, Revision 0.  
 1/2-HPP-4.01.009, Model 89-400, Gamma Calibration System, Revision 7  
 1/2-HPP-4.01.012, Precision Electrometer – RADCAL Model 2026C, Revision 6  
 1/2-HPP-4.02.036, Calibration and Use of the MGP AMP Area Monitor Probe, Revision 5  
 1/2-HPP-4.03.002, GM Survey Meter – Model E530 (Eberline Instruments), Revision 1  
 1/2-HPP-4.03.007, Portable Neutron REM Counter – Model PNR-4/NRD-1  
 (Eberline Instruments), Revision 1  
 1/2-HPP-4.03.012, Portable Neutron REM Counter – Model ASP-1/NRD-1  
 (Eberline Instruments), Revision 1

1/2-HPP-4.03.015, Portable Ion Chamber Calibration and Use, Revision 2  
 1/2-HPP-4.03.028, Calibration and Use of the MGP Telepole, Revision 1  
 1/2-HPP-4.04.021, Eberline Personnel Contamination Monitor (Model PCM-1B)  
     Calibration, Revision 1  
 1/2-HPP-4.04.024, NE Technology Small Article Monitor (SAM-11), Revision 5  
 1/2-HPP-4.04.025, Calibration and Use of the Bicon SPM-906, Revision 11  
 1/2-HPP-4.04.026, ASP-2 Portable Radiation Survey Meter (with Various Probe Types),  
     Revision 2  
 1/2-HPP-4.05.008, Use of the Chi Squared Test and Counter Control Chart, Revision 2  
 1/2-HPP-4.06.006, Portable Air Samplers – Model H-809C, H-809V, H-809B2 (RADECO),  
     Revision 1  
 NOP-OP-4401, Radiation Protection Instrumentation Program, Revision 2  
 NOP-OP-4404, PCM-2 Calibration, Source Checks and Use, Revision 4  
 NOP-OP-4410, Fluke 451B Calibration and Use, Revision 1

#### Condition Reports

2014-11720	2014-17803	2015-01277
2014-11723	2014-17804	2015-07510
2014-14442	2014-18682	2016-03105
2014-14747	2015-00910	2016-06212
2014-17191	2015-01243	2016-06267

#### Miscellaneous

Annual Review Report of the 2015 10 CFR Part 61 Radionuclide Analysis – Correction,  
dated 11/25/2015

Benchmarking Report, SPM-906 Portal Monitor Benchmark, dated 3/11/2015  
 BV-1MSP-43\_43\_57-1, plan no 119639, BV-RX-1RM-219B, dated 6/15/2015  
 BV-1MSP-43\_43\_57-1, plan no 119639, BV-RX-1RM-219B, dated 9/24/2014  
 BV-1MSP-43\_43\_57-1, plan no 63153, BV-RX-1RM-219B, dated 10/6/2014  
 BV-1MSP-43\_43\_57-1, plan no 63153, BV-RX-1RM-219B, dated 4/29/2015  
 Calibration check, Model 89-400, S/N 8216, dated 12/7/2015  
 Calibration check, Model 89-400, S/N 8246/9139, dated 12/3/2015  
 Calibration, Canberra Accuscan-II, dated 9/14/2015  
 Calibration, Canberra Accuscan-II, dated 9/4/2014  
 Calibration, Canberra Fastscan, dated 10/2/2014  
 Calibration, Canberra Fastscan, dated 9/16/2015  
 Calibration, Eberline ASP-1/43-2, S/N 1270/238864, dated 3/3/16  
 Calibration, Eberline ASP-1/SPA-6, S/N 935/149, dated 4/16/14  
 Calibration, Eberline E-530, S/N 1205, dated 7/13/16  
 Calibration, Fluke 451B, S/N 137, dated 2/9/16  
 Calibration, MGP APM-100, S/N 5005-026, dated 9/16/14  
 Calibration, MGP APM-100, S/N 5005-061, dated 7/12/16  
 Calibration, MGP Telepole, S/N 6609-058, dated 6/25/16  
 Calibration, Model 89-400, S/N 8216, dated 12/7/15  
 Calibration, Model 89-400, S/N 8246, dated 12/3/15  
 Calibration, Model E-520, S/N 3187, dated 9/16/14  
 Calibration, Model E-520, S/N 5007, dated 9/9/14  
 Calibration, PCM-2, S/N 355, dated 8/24/15  
 Calibration, SAM-11, S/N 140, dated 9/18/15  
 Calibration, SPM-906, S/N 906030, dated 1/19/16

Certificate of Calibration, Electrometer models 2026C, 20X6-180, 20X6-6, S/N's 26-1209, 31839, 31739, dated 10/30/2015  
 Certification and NRC license for Chad S. Gunther, Gamma Irradiator Service, LLC  
 ERS-HHM-87-014, Unit 1 / Unit 2 ODCM Gaseous Effluent Monitor Set points, Revision 5  
 ERS-MPD-93-007, BVPS – U1 Gaseous Radioactivity Monitor Emergency Action Levels, Revision 10.  
 ERS-SFL-91-041, Unit 1 and Unit 2 Containment Monitor Readings due to LOCAs with Various Source Terms, Revision 3  
 ERS-SFL-94-021, Process Safety Limit and Trip Set points for 1RM-RM-219 A & B, Revision 3  
 ERS-SFL-94-022, Process Safety Limit and Trip Set points for 2RMMR-RQ206, 207, Revision 3  
 Portable radiation protection instrumentation inventory list, Beaver Valley Units 1 and 2  
 QA Assessment, PA-BV-15-02: 2S15 Radiation Protection, dated 2/29/2016  
 Snapshot Self-Assessment, Review of RP Instrumentation Program, dated 5/31/2016  
 Source certificates for S/N's 7357, 84-884, CS-S-113, KR7533, 040/88, 035/88, KR-4101, 20182, and 03146GY

## **Section 2RS6: Radioactive Gaseous and Liquid Effluent Treatment**

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1/2 ENV-01.03, Monthly Release Permit for Continuous Vent Pathways, Revision 2  
 1/2 ENV-05.04, Radioactive Waste Discharge Authorization-Liquid, Revision 7  
 1/2 ENV-05.05, Radioactive Waste Discharge Authorization-Gas, Revision 6  
 1/2 ENV-05.26, Catch Basin Sampling, Revision 7  
 1/2 ENV-07.01, Groundwater Remediation Pump Operation and Sampling, Revision 2  
 1/2 ODC-1.01, ODCM: Index, Matrix and History of ODCM Changes, Revision 22  
 1/2 ODC-2.01, ODCM: Liquid Effluents, Revision 16  
 1/2 ODC-2.02, ODCM: Gaseous Effluents, Revision 7  
 1/2 ODC-2.03, ODCM: Radiological Environmental Monitoring Program, Revision 4  
 1/2 ODC-2.04, ODCM: Information Related to 40CFR190, Revision 2  
 1/2 ODC-3.01, ODCM: Dispersion Calculations Procedure and Source Term Inputs, Revision 1  
 1/2 ODC-3.02, ODCM: Bases for ODCM Controls, Revision 3  
 1/2 ODC-3.03, ODCM: Controls for RETS and REMP Programs, Revision 13  
 1/2-ADM-0606, Effluent Control Program, Revision 4  
 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual, Revision 7  
 1/2-ADM-1730, Laboratory Quality Assurance and Instrument Quality Control Program, Revision 33  
 1/2-CHM-ANA-5.11A, Determination of Carbon-14 Activity, Revision 4  
 1/2-HPP-3.06.001, Liquid Waste Holdup Tank Sampling, Revision 10  
 1-CHM-SAM-3.100R, Unit No. 1 Pump Station, Revision 6  
 1-CHM-SAM-3.30, Reactor Plant Component Cooling Water, Revision 25  
 1-CHM-SAM-3.43, Auxiliary Steam Condensate Receiver [1AS-TK-1,5,7], Revision 2  
 1-CHM-SAM-3.48, Steam Generator Feed Pump Suction/Discharge, Revision 29  
 1-CHM-SAM-3.49, Steam Generator Blowdown, Revision 46  
 1-CHM-SAM-3.53, Chilled Water, Revision 6  
 1-CHM-SAM-3.54, Turbine Plant Component Cooling Water (CCT),” Revision 17  
 1-CHM-SAM-3.71, Auxiliary Demineralizer Water Tank [1WT-TK-26], Revision 11  
 1-CHM-SAM-3.76, Reactor Plant River Water System, Revision 16  
 1-CHM-SAM-3.77, Turbine Plant River Water System, Revision 18  
 1-CHM-SAM-3.82, Gaseous Waste Discharges and Gaseous Effluent Monitor Releases, Revision 18

1-HPP-3.06.003, Unit 1 Gaseous Waste Tank Sampling, Revision 3  
 1-HPP-3.06.003, Unit 1 Gaseous Waste Tank Sampling, Revision 3  
 1-HPP-3.10.009, Breathing Air Quality Analysis, Revision 0  
 1-HPP-4.02.008, SA-9/SA-10 Noble Gas Monitors, Revision 4  
 1-HPP-4.02.044, Weekly PING Change-out, Revision 2  
 2-CHM-SAM-3.21, Gaseous Waste Discharges and Gaseous Effluent Monitor Releases,  
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 2-CHM-SAM-3.33, Primary Plant Component Cooling (CCP), Revision 24  
 2-CHM-SAM-3.44, Steam Generator Blowdown, Revision 53  
 2-CHM-SAM-3.51, Auxiliary Steam Condensate Receiver [2ASS-TK-21,TK23, TK25],  
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 2-CHM-SAM-3.68, Steam Generator Feed Pump Suction/Discharge, Revision 30  
 2-CHM-SAM-3.79C, Service Water System, Revision 25  
 2-HPP-3.06.004, Unit 2 Gaseous Waste Tank Sampling, Revision 4  
 2-HPP-4.02.040, Weekly DRMS Change-Out, Revision 1  
 3BVT 11.60.11, Air Flow Measurements Methods, Revision 0  
 3BVT 11.60.8, In-Place Filter Monitoring, Revision 3  
 NOP-OP-3202, FENOC Radiochemistry Quality Control, Revision 4

#### Condition Reports

2014-10483	2015-09851	2016-08774
2015-06087	2015-11081	2016-08777
2015-09725	2015-14496	2016-08789
2015-09731	2016-02430	

#### Work Orders

200476605	200508807	200557066
200488872	200513237	200558022
200494979	200520385	200587653
200495029	200520486	200648947
200506288	200545884	

#### Miscellaneous

2015 REMP Land Use Census and Evaluation for ODCM Control 3. 12.2, December 23, 2015  
 Beaver Valley Unit 1 System Health Report 2016-1: System 43 Unit 1 Radiation Monitoring  
 System, July 12, 2016  
 Beaver Valley Unit 2 System Health Report 2015-2: System 43 Unit 2 Radiation Monitoring  
 System, January 15, 2016  
 FENOC Beaver Valley Power Station - 2014 Radioactive Effluent Release Report,  
 April 30, 2015  
 FENOC Beaver Valley Power Station - 2015 Radioactive Effluent Release Report,  
 April 28, 2016  
 FirstEnergy Calculation No. 8700-UR(B)-223 – Impact of Atmospheric Containment Conversion,  
 Power Uprate, & Alternate Source Term on Alarm Set points for Radiation Monitor at  
 BVPS-1, April 26, 2012  
 Form 1/2-ADM-1611.F28, Revision 2 - Radiation Protection Technical  
 Position/Evaluation/Calculation, Calc. No.: ERS-HHM-87-014, Unit 1/ Unit 2 ODCM  
 Gaseous Effluent Monitor Set points, February 1, 2015  
 Form 1/2-ADM-1611.F28, Revision 2 - Radiation Protection Technical  
 Position/Evaluation/Calculation, Calc No.: ERS-ATL-93-021, Process Alarm Set points  
 for Liquid Effluent Monitors, April 24, 2012

Form 1/2-ENV-01.04.F01, Revision 6 – RMS Weekly Checklist Part 1, Verification of Sampling and Analysis for July 4 – 11, 2016  
GEL Laboratories, 10CFR50/61 Certificate of Analysis, FENOC/BVPS1-P61 U 1 LW Resin Sample, January 8, 2014  
GEL Laboratories, 10CFR50/61 Certificate of Analysis, FENOC/BVPS2-2208(3)SGC-IOE-21B Resin, February 12, 2016  
MGP Instruments Document No. 12-00023, Primary Calibration Report for Noble Gas Monitor NGM 203, April 17, 2004  
MGP Instruments Document No. 12-00034, Primary Calibration Report for Particulate Monitor ABPM 201, May 27, 2003  
MGP Instruments Document No. 12-00036, Primary Calibration Report for Iodine Monitor IM 201, May 16, 2003  
MGP Instruments Document No. 12-00038, Primary Calibration Report for Noble Gas Monitor NGM 204, May 27, 2003  
NPD3NRE:0404, BVPS Applicability of IE Bulletin 80-10, IE Information Notice 88-22 and IE Information Notice 2006-013, March 20, 2007  
Proposal for Groundwater Protection Program Technical Support, Environmental Resources Management, November 14, 2014  
Results of Radiochemistry Cross Check Program, First Energy Beaver Valley 1<sup>st</sup> Quarter 2016, April 11, 2016

#### **Section 40A1: Performance Indicator Verification**

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NOBP-LP-4012, NRC Performance Indicators, Revision 5

##### Condition Reports

2016-09566

##### Miscellaneous

BVRM-RAS-0001, Mitigating System Performance Index Basis Document Unit 1, Revision 7  
BVRM-RAS-0002, Mitigating System Performance Index Basis Document Unit 2, Revision 10  
LER 05000334-2015-001, Manual Reactor Trip and Automatic Auxiliary Feedwater Actuation due to Condensate Pump Motor Failure, Revision 0  
Unit 1 Auxiliary Feedwater System Health Report, 2014-2  
Unit 1 Containment Depressurization System Health Report, 2015-2  
Unit 1 MSPI Heat Removal System (AFW), July 2015 through June 2016  
Unit 1 MSPI Residual Heat Removal, July 2015 through June 2016  
Unit 1 MSPI Support Cooling System River Water, July 2015 through June 2016  
Unit 1 Narrative Logs for Various Days between July 2015 and June 2016  
Unit 1 River Water System Health Report, 2015-2  
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Unit 2 Auxiliary Feedwater System Health Report, 2015-2  
Unit 2 Containment Depressurization System Health Report, 2015-2  
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Unit 2 MSPI Residual Heat Removal, July 2015 through June 2016  
Unit 2 MSPI Support Cooling System Service Water, July 2015 through June 2016  
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Unit 2 Service Water System Health Report, 2015-2

## **Section 40A2: Problem Identification and Resolution**

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½-ADM-2036, ASME XI Pressure Testing Program, Revision 4  
 ½-ADM-2098, System Walkdowns, Revision 2  
 1MSP-36.41-E, 1AE 4KV Emergency Bus Degraded Voltage Relays 27-VE2100AB and 27-VE2100BC Test, Revision 24  
 1MSP-36.42-E, 1DF 4KV Emergency Bus Degraded Voltage Relays 27-VF2100AB and 27-VF2100BC Test, Revision 25  
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 1MSP-36.44-E, 1P 480 Volt Emergency Bus Degraded Voltage Relays 27-RP2100AB and 27-RP2100BC Test, Revision 27  
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 1MSP-36.50A-E, 1DF 4KV Emergency Bus Degraded Voltage Relays 27-VF2100AB and 27-VF2100BC Calibration, Revision 18  
 1MSP-36.51A-E, 1N 480 Volt Emergency Bus Degraded Voltage Relays 27-RN2100AB and 27-RN2100BC Calibration, Revision 18  
 1MSP-36.52A-E, 1P 480 Volt Emergency Bus Degraded Voltage Relays 27-RP2100AB and 27-RP2100BC Calibration, Revision 19  
 1OST-11.1, 26 Safety Injection Pump Test-[1SI-P-1A], Revision 26  
 2MSP-36.03-E, 2AE 4KV Emergency Bus Degraded Voltage Relays 27-VE3200AB and 27-VE3200BC Calibration, Revision 19  
 2MSP-36.07-E, 2DF 4KV Emergency Bus Degraded Voltage Relays 27-VF3200AB and 27-VF3200BC Calibration, Revision 21  
 2MSP-36.33-E, 2AE 4KV Emergency Bus Degraded Voltage Relays 27-VE3200AB and 27-VE3200BC Test, Revision 19  
 2MSP-36.37-E, 2DF 4KV Emergency Bus Degraded Voltage Relays 27-VF3200AB and 27-VF3200BC Test, Revision 19  
 2MSP-37.01-E, 2N 480 Volt Emergency Bus Degraded Voltage Relays 27-RN200AB and 27-RN200BC Calibration, Revision 20  
 2MSP-37.02A-E, 2P 480 Volt Emergency Bus Degraded Voltage Relays 27-RP200AB and 27-RP200BC Calibration, Revision 22  
 2MSP-37.03-E, 2N 480 Volt Emergency Bus Degraded Voltage Relays 27-RN200AB and 27-RN200BC Test, Revision 21  
 2MSP-37.04-E, 2P 480 Volt Emergency Bus Degraded Voltage Relays 27-RP200AB and 27-RP200BC Test, Revision 22  
 BVBP-MNT-0007, Planning Work Orders that affect ASME Section XI Boundary Components, Revision 3  
 NDE-VT-502, Leakage Examination Requirements, Revision 10  
 NOB-LP-2011, FENOC Cause Analysis, Revision 18  
 NOB-LP-2011, FENOC Cause Analysis, Revision 19  
 NOBP-ER-3003, FENOC System Performance Monitoring Program, Revision 7  
 NOBP-LP-2023, Performance Assessment, Revision 18  
 NOP-LP-2001, Corrective Action Program, Revision 38

Condition Reports

2009-65043	2014-05255	2016-01155
2009-65329	2014-09232	2016-02200
2011-07156	2014-09414	2016-03199
2011-90416	2014-09760	2016-08490
2011-90417	2015-03159	2016-08921
2011-96471	2015-04798	2016-10607
2012-02223	2015-14454	2016-10626
2013-00032	2015-15523	2016-10858
2013-19514	2015-15669	2016-10861

Maintenance Rule (a)(2) Evaluations

2008-32843	2009-66329	2013-17597
2008-40485	2009-68543	2014-00175
2008-45036	2010-74713	2014-00448
2008-47886	2011-01208	2014-01092
2009-51627	2012-01872	2014-04455
2009-52936	2013-00222	2014-05590
2009-60763	2013-05929	2014-10394
2009-64040	2013-07104	
2009-64040	2013-12602	

Miscellaneous

200590730

ASME Code Case N-513-2

ASME XI NIS-2 List, Completed, this RFO, next RFO and for on line completion

Fleet Oversight Audit Report MS-C-15-01-09, Control of Special Processes, 2/13/2015

Fleet Oversight Audit Report MS-C-16-05-07, Maintenance/Work management Program,  
6/17/2016Maintenance Rule Periodic Assessments, September 24, 2012 to April 18, 2014 and  
April 19, 2014 to June 30, 2015

NIS-2 Owners report No 3873 dated 7/30/2016.

RM-0430-003, Unit 1, River Water P&amp;ID, OP Manual Fig No 30-3, Revision 30

Summary 100157, Procedure NDE-VT-502 for PT-1-Leakage Package 44A-outside

Summary 100164, Procedure NDE-VT-502 for PT-1-Leakage Package 44A-inside

Summary 200123, Procedure NDE-VT-502 for PT-2-Leakage Package 32

Unit 1 Radiation Monitoring System Health Report 2015-2

Unit 2 Radiation Monitoring System Health Report 2015-2

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1/2OM-53C.4A.75.1, Acts of Nature - Severe Weather, Revision 18

1/2OM-53C.4A.75.2, Acts of Nature – Flood, Revision 32

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2015-09517

Miscellaneous

15-0357-000, Barrier Installation at Exterior Plant Doors, Revision 0

211-EN-OL-048, Determination of the Maximum Leakage Through Door Gaps During Local PMP Event Using HMR 33, Revision 0

211-N-505, Maximum Internal Flood Level on the 730' 6" Elevation of the Service Building Due to Local PMP Events, Revision 0

8700-RA11A, Floor & Roof Plans Fuel & Diesel Gen. Bldgs., Revision 12

8700-RC27A, Plans at EI 727'-4" & EI 735'-6" Fuel Bldg., Revision 9

Beaver Valley Power Station, Unit 1, Updated Final Safety Analysis Report, Revision 26

Beaver Valley Power Station, Unit 2, Updated Final Safety Analysis Report, Revision 18

DSC-0368, 10 CFR 50.54(f) Beyond Design Basis Local Intense Precipitation Event Internal Effects, Revision 0

Flood Hazard Reevaluation Report (ML16063A288)



**LIST OF ACRONYMS**

AC	alternating current
ADAMS	Agencywide Documents Access and Management System
ASME	American Society of Mechanical Engineers
CAP	corrective action program
CFR	<i>Code of Federal Regulations</i>
CR	condition report
FENOC	FirstEnergy Nuclear Operating Company
GPI	Groundwater Protection Initiative
IMC	Inspection Manual Chapter
kV	kilovolt
NCV	non-cited violation
NEI	Nuclear Energy Institute
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
PI	performance indicator
PRA	probabilistic risk assessment
REMP	Radiological Environmental Monitoring Program
TS	technical specifications
UFSAR	Updated Final Safety Analysis Report
UT	ultrasonic testing
VAC	volts alternating current