



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I**
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

March 29, 2016

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

**SUBJECT: BEAVER VALLEY POWER STATION – INTEGRATED INSPECTION
REPORT 05000334/2015004 AND 05000412/2015004**

Dear Mr. Richey:

On December 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Beaver Valley Power Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on January 27, 2016, with Mr. M. Richey, site vice president, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents one finding of very low safety significance (Green). The finding involved a violation of NRC requirements. However, because of the very low safety significance, and because it has been entered into your corrective action program, the NRC is treating the finding as a non-cited violation, consistent with Section 2.3.2.a of the NRC 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 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 NRC Resident Inspector at Beaver Valley Power Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding, 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 NRC Resident Inspector at Beaver Valley Power Station.

In accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records component of the NRC's Agencywide Documents Access Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

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 05000334/2015004
and 05000412/2015004
w/Attachment: Supplementary Information

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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.: 05000334/2015004 and 05000412/2015004

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Shippingport, PA 15077

Dates: October 1, 2015 to December 31, 2015

Inspectors: J. Krafty, Senior Resident Inspector
B. Reyes, Resident Inspector
T. Lamb, Acting Resident Inspector
P. Kaufman, Senior Reactor Inspector
R. Rolph, Health Physicist
J. DeBoer, Emergency Preparedness Inspector
H. Gray, Senior Reactor Inspector

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

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SUMMARY

IR 05000334/2015004, 05000412/2015004; 10/01/215 – 12/31/2015; Beaver Valley Power Station, Units 1 and 2; Maintenance Effectiveness.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. Inspectors identified a finding of very low safety significance (Green) which was a non-cited violation (NCV). 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 February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of Title 10 of the *Code of Federal Regulations* (CFR) 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," for FENOC's failure to monitor the performance of the Unit 1 auxiliary feedwater (AFW) system against licensee-established goals. Specifically, FENOC did not identify and properly account for a maintenance preventable functional failure (MPFF) of the turbine driven auxiliary feedwater (TDAFW) pump, which demonstrated that performance of the Unit 1 AFW system was not being effectively controlled through appropriate preventive maintenance. FENOC's immediate corrective actions included entering this issue into their corrective action program, re-evaluating and classifying the TDAFW pump failure as a MPFF, performing a 10 CFR 50.65 (a)(1) evaluation of the Unit 1 AFW system, and placing the system in (a)(1) status.

The performance deficiency was determined to be more-than-minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, example 7.d from IMC 0612 Appendix E details that a performance deficiency is more than minor if equipment performance problems were such that effective control of performance through appropriate preventive maintenance under (a)(2) could not be demonstrated. This finding was determined to be of very low safety significance (Green) since it was not a deficiency affecting the design or qualification of a mitigating structure, system, or component (SSC), it did not represent the loss of a system and/or function, it did not represent an actual loss of function of at least a single train or two separate safety systems out-of-service for greater than its technical specifications allowed outage time, and it did not represent an actual loss of a non-technical specification equipment designated as high safety-significant in accordance with the licensee's maintenance rule program for greater than 24 hours. This finding has a cross-cutting aspect in Human Performance, Avoid Complacency, because FENOC failed to consider the extent of condition and their causes following the failure of the Unit 1 TDAFW pump on January 6, 2014 [H.12]. (Section 1R12)

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near 100 percent power for the entire inspection period.

Unit 2 began the inspection period shutdown in refueling outage 2R18. Following the completion of refueling and maintenance activities, operators commenced a reactor startup on October 29, 2015, and reached 100 percent power on November 2, 2015, and 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)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of FENOC's readiness for the onset of seasonal cold temperatures. The review focused on the Unit 1 and Unit 2 intake structures and the equipment in the Unit 2 safeguards building. The inspectors reviewed the technical specifications, and the corrective action program to determine what temperatures or other seasonal weather could challenge these systems, and to ensure FENOC personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including FENOC's seasonal weather preparation procedure and applicable operating procedures. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during cold weather conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns (71111.04 – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 2 No. 1 emergency diesel generator while the No. 2 emergency diesel generator was out of service for scheduled maintenance on October 9, 2015
- Unit 2 recirculation spray system following the performance of a full-flow surveillance test on October 20, 2015
- Unit 2 charging system following maintenance on the 'C' charging pump on December 2, 2015

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, the Updated Final Safety Analysis Report (UFSAR), technical specifications, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted system performance of their 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's staff had properly identified equipment issues and entered them into the corrective action program for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

.2 Full System Walkdown (71111.04S – 1 sample)

a. Inspection Scope

On October 19 through 23, 2015, the inspectors performed a complete system walkdown of accessible portions of the Unit 2 low head safety injection system to verify the existing equipment lineup was correct. The inspectors reviewed drawings and equipment line-up check-off lists to verify the system was aligned to perform its required safety functions. The inspectors also reviewed electrical power availability and hanger and support functionality. The inspectors performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. Additionally, the inspectors reviewed system health reports and a sample of related condition reports and work orders to ensure FENOC appropriately evaluated and resolved any deficiencies.

b. Findings

No findings were identified.

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 2 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 East Cable Vault, Fire Area CV-2, on October 26, 2015
- Unit 2 Cable Tunnel Fan Room, Fire Area CT-1, on December 2, 2015

b. Findings

No findings were identified.

1R07 Heat Sink Performance (711111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the Unit 2 'A' component cooling heat exchanger to determine its 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 Problems Affecting Safety-Related Equipment." The inspectors reviewed the results of the recent inspection of the heat exchanger and compared it to a previous inspection in order to determine if there was a degrading trend. The inspectors discussed the results of the inspection with engineering staff and reviewed pictures of the as-found 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.

1R08 In-service Inspection - Beaver Valley Unit 2 (71111.08 – 1 sample)

a. Inspection Scope

The inspectors conducted a review of FENOC's implementation of in-service inspection (ISI) program activities for monitoring degradation of the reactor coolant system (RCS) boundary, risk significant piping and components, and containment systems during the Beaver Valley Power Station (BVPS), Unit 2 refueling outage 2R18) The sample selection was based on the inspection procedure objectives and risk priority of those pressure retaining components in these systems where degradation would result in a significant increase in risk. The inspectors observed in-process non-destructive examinations (NDE), reviewed documentation, and interviewed FENOC personnel to verify that the NDE activities performed as part of the BVPS Unit 2 ISI program were being conducted, in accordance with the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI, 2001 Edition, 2003 Addenda.

NDE and Welding Activities (IMC Section 02.01)

The inspectors performed observations of NDE and reviewed records of the NDE activities listed below:

- Ultrasonic test (UT) - pressurizer nozzle-to-vessel welds 2RCS*PRE21-N-10 and 2RCS*PRE21-N-12, RCS 2RCS-007-F03 valve to pipe weld, RCS safe-end to elbow weld 2RCS-007-F04
- Visual inspection of Unit 2 containment liner coating;

The inspectors reviewed a sample of NDE technician certifications and verified the inspections were performed in accordance with approved procedures and the results were reviewed and evaluated by a certified Level III NDE individual.

The inspectors reviewed UT examination data records of RCS hot and cold leg safety injection system piping welds 2SIS-006-24-1 and 2SIS-006-15-1 conducted to implement an industry initiative in accordance with the MRP-146, "Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines," to verify the examinations were conducted in conformance with FENOC procedures.

Repair/Replacement Consisting of Welding Activities

The inspectors reviewed the welding activity and weld data sheets associated with replacement of 2-inch Kerotest globe valve BV-RCS-5 to verify that the welding and applicable NDE activities were performed in accordance with ASME Code requirements.

Pressurized Water Reactor Reactor Pressure Vessel Upper Head Penetration Inspection Activities

The inspectors observed portions of the remote bare metal visual examination (VT-2) of the exterior surface of the Unit 2 reactor pressure vessel upper head penetration to confirm appropriate inspection coverage was achieved and to verify that no boric acid leakage or wastage had been observed. The inspectors directly observed remotely portions of the Unit 2 reactor pressure vessel upper head penetration control rod drive mechanism (CRDM) nozzle J-groove weld UT examinations to verify that they were being performed in accordance with requirements of 10 CFR Part 50.55a(g)(6)(ii)(D) and ASME Boiler and Pressure Vessel Code Case N-729-1, "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads," to ensure the structural integrity of the reactor vessel head pressure boundary.

The inspectors reviewed the recordable indications identified by UT of CRDM nozzle penetrations No. 37 and No. 53 J-groove welds on the Unit 2 reactor pressure vessel upper closure head during refueling outage 2R18 that had been accepted by evaluation for continued service. The inspectors verified that the dye-penetrant examinations confirmed that the indications were not surface connected.

Boric Acid Corrosion Control (BACC) Inspection Activities

The inspectors reviewed the BACC program and implementing BVPS procedures, discussed the program with the boric acid program owner and sampled photographic and visual inspection records of boric acid observed on safety significant piping and components inside the containment structure during walk downs conducted by FENOC personnel to verify that boric acid leakage was being appropriately identified and non-conforming conditions of boric acid leaks were documented in the corrective action program with a focus on areas that could cause degradation of safety significant components. The inspectors reviewed a sample of boric acid evaluations to verify that they were properly dispositioned consistent with the requirements of the ASME Code and 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action."

Steam Generator (S/G) Tube Inspection Activities

The inspectors observed a sample of the BVPS S/G eddy current tube examinations to verify that they were performed in accordance with Unit 2 Technical Specification 5.5.5.2 and the Steam Generator Program and reviewed a sample of the indications identified in the S/G tubes to verify that they were consistent with the potential degradation mechanisms documented in the Beaver Valley Unit 2 2R18 Steam Generator Degradation Assessment Report SG-SGMP-15-14, dated August 17, 2015.

The inspectors reviewed the S/G tube eddy current test results to verify that no primary-to-secondary leakage occurred over the operating cycle, in-situ pressure testing was properly performed, and tubes which exhibited degradation and did not meet the acceptance criteria were properly plugged using the alternate repair criteria per Generic Letter 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking." The inspectors verified that the S/G tube examination screening criteria was in accordance with the Electric Power Research Institute (EPRI) Steam Generator Guidelines and flaw sizing was in accordance with the EPRI examination technique specification sheet.

b. Findings

No findings were identified.

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

.1 Quarterly Review of Licensed Operator Regualification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on November 19, 2015, which included a loss of an offsite source of electrical power, a letdown leak, spurious turbine trip causing a reactor trip, failure of select components to automatically start or open as required, and loss of heat sink. 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 and the technical specification action statements entered 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 the draining of the Unit 2 RCS to six inches below the reactor vessel flange on October 1, 2015. The inspectors observed infrequently performed test or evolution briefing to verify that the briefing met the criteria specified in FENOC's procedure NOBP-OP-0007, "Conduct of Infrequently Performed Tests or Evolutions," Revision 5. Additionally, the inspectors observed test performance to verify that procedure use and crew communications met established expectations and standards.

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 SSC performance and reliability. The inspectors reviewed system health reports, corrective action program 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 SSC 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 SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs 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.

- Unit 1 AFW system on November 22, 2015
- Unit 1 and 2 periodic assessment of maintenance rule program on December 14, 2015

b. Findings

Introduction. The inspectors identified a Green NCV of 10 CFR 50.65 for FENOC's failure to monitor the performance of the Unit 1 AFW system against licensee-established goals. Specifically, FENOC did not identify and properly account for an

MPFF of TDAFW pump, which demonstrated that performance of the Unit 1 AFW system was not being effectively controlled through appropriate preventive maintenance.

Description. On March 23, 2015, the inspectors were performing a routine review of FENOC's maintenance rule program for the Unit 1 AFW system. The inspectors noted a potential discrepancy when a failure of the TDAFW pump was classified as a condition monitoring failure (CMF) rather than a MPFF.

The TDAFW pump was started during the performance of a surveillance test on November 1, 2013, following a Unit 1 refueling outage. After approximately two minutes, the TDAFW pump was shutdown from the main control room due to excessive condensate leakage reported by the field operators. Condensate was drained from the steam lines and the TDAFW surveillance test was re-performed on November 2, 2013. The TDAFW pump was shutdown from the main control room, this time after one hour and 22 minutes due to excessive hunting of the governor observed in the field. Operations removed a clearance that they believed was the source of water intrusion into the steam lines. Again, on November 2, 2013, the surveillance test for the TDAFW pump was performed and the pump was declared operable after 18 minutes of operation. FENOC classified the failure of the TDAFW pump on November 2, 2013, as a CMF.

Following a Unit 1 reactor trip on January 6, 2014, the TDAFW pump automatically tripped after one hour and 49 minutes of operation due to governor oscillations. FENOC launched an investigation to determine the cause of the TDAFW pump failure. The licensee determined that the cause of the TDAFW pump oscillations and subsequent failure was due to an improperly set governor needle valve. The needle valve was incorrectly adjusted during installation of a new TDAFW pump governor in the refueling outage just prior to the pump being declared operable on November 2, 2013. The TDAFW pump failure on January 6, 2014, was classified as a MPFF.

The inspectors concluded that the TDAFW pump failure on November 2, 2013, should have been re-evaluated and classified as a MPFF rather than a CMF because the cause of the TDAFW pump failures, the improperly set governor needle valve, was present during the failures on November 2, 2013, and on January 6, 2014. The inspectors discussed this observation with FENOC engineering personnel on March 23, 2015. On August 26, 2015, as a result of the inspectors' observation, FENOC re-evaluated the TDAFW pump failure that occurred on November 2, 2013, and determined that the failure was a MPFF. The two failures exceeded FENOC's performance criteria and on September 21, 2015, FENOC concluded that the AFW system would be placed in (a)(1) status for a combination of TDAFW pump MPFFs, motor-driven AFW pump MPFFs, and CMFs. The inspectors concluded that FENOC should have evaluated the AFW system for (a)(1) status upon the second TDAFW pump failure occurring on January 6, 2014.

Analysis. The inspectors determined that failure to identify that the performance of the Unit 1 AFW system was not being effectively controlled through appropriate preventive maintenance and failure to monitor the equipment against licensee-established goals in accordance with 10 CFR 50.65 was a performance deficiency that was within the capability of FENOC to foresee and correct and should have been prevented. The performance deficiency was determined to be more-than-minor in accordance with IMC 0612 Appendix B, "Issue Screening," because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone, and adversely affected the

cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, FENOC did not properly classify the November 2, 2013, failure of the TDAFW pump, which when properly classified, caused the maintenance rule performance criteria for the AFW system to be exceeded. As a result, the AFW system was evaluated and placed in 10 CFR 50.65 (a)(1) status for a combination of TDAFW pump MPFFs and motor-driven AFW pump MPFFs and CMFs. Additionally, example 7.d from IMC 0612 Appendix E, "Examples of Minor Issues," details that a performance deficiency is more than minor if equipment performance problems were such that effective control of performance through appropriate preventive maintenance under (a)(2) could not be demonstrated.

In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued June 19, 2012, and Exhibit 2 of IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors determined that this finding is of very low safety significance (Green) since it was not a deficiency affecting the design or qualification of a mitigating SSC, it did not represent the loss of a system and/or function, it did not represent an actual loss of function of at least a single train or two separate safety systems out-of-service for greater than its technical specifications allowed outage time, and it did not represent an actual loss of a non-technical specification equipment designated as high safety-significant in accordance with the licensee's maintenance rule program for greater than 24 hours.

This finding has a cross-cutting aspect in Human Performance, Avoid Complacency, because FENOC failed to consider the extent of the condition and their causes following the failure of the Unit 1 TDAFW pump on January 6, 2014 [H.12].

Enforcement. 10 CFR 50.65 (a)(1), requires, in part, that the holders of an operating license shall monitor the performance of SSCs within the scope of the rule as defined by 10 CFR 50.65 (b), against licensee-established goals, in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions. 10 CFR 50.65 (a)(2) states, in part, that monitoring as specified in 10 CFR 50.65 (a)(1) is not required where it has been demonstrated that the performance of an SSC is being effectively controlled through appropriate preventive maintenance, such that the SSC remains capable of performing its intended function. Contrary to the above, from January 6, 2014 until September 21, 2015, FENOC failed to monitor the equipment against licensee-established goals when the performance of the Unit 1 AFW system had not been effectively controlled through appropriate preventive maintenance. Specifically, FENOC did not identify and properly account for a MPFF of the TDAFW pump occurring on November 2, 2013. FENOC's immediate corrective actions included entering this issue into their corrective action program, re-evaluating and classifying the TDAFW pump failure as a MPFF, performing a 10 CFR 50.65 (a)(1) evaluation of the Unit 1 AFW system, and placing the system in (a)(1) status. Because this finding was of very low safety significance (Green) and was entered into FENOC's corrective action program as condition report (CR) 2016-00884, this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000334/2015004-01, Inadequate Maintenance Rule Monitoring of the Auxiliary Feedwater System)**

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 3 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.

- Unit 2 yellow shutdown risk (decay heat removal) due to natural circulation not available on October 1, 2015
- Unit 2 yellow shutdown risk (containment closure controls) due to supplemental leak collection and release system not available on October 12, 2015
- Unit 1 yellow online risk due to alternate intake structure bay cleaning on November 23, 2015

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:

- Unit 2 power operated relief valve (2RCS-PCV456) heat tracing non-functional on October 28, 2015
- Unit 2 gas voids in emergency core cooling system piping on November 10, 2015
- Unit 1 and 2 control room air in-leakage exceeded acceptance criteria on December 4, 2015
- Unit 2 pressurizer power-operated relief valves (2RCS-PCV456 and 2RCS-PCV455D) lifting during surveillance testing on December 17, 2015

The inspectors selected these issues based on the risk significance of the associated components and systems. 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. 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. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modifications for cooling to the Unit 2 battery rooms 2-1, 2-2, 2-3, and 2-4 to determine whether the modifications affected the safety functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications to verify that the temporary modifications did not degrade the design bases, licensing bases, and performance capability of the affected systems.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure was consistent with the information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed test data to verify that the test results adequately demonstrated restoration of the affected safety functions.

- Unit 2 No. 2 emergency diesel generator following planned maintenance on October 12, 2015
- Unit 2 diverse and flexible coping strategies piping modifications to the service water system and primary plant demineralized water storage tank on October 14, 2015
- Unit 2 'A' service water pump discharge valve, 2SWS*MOV102A, following valve and actuator replacement on October 26, 2015

- Unit 2 'B' power operated relief valve, 2RCS*PCV456, following valve overhaul on October 30, 2015
- Unit 1 '1A' river water pump following overhaul of pump on December 22, 2015

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20 – 1 sample)

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 2 maintenance and refueling outage 2R18, which was conducted September 26 through October 30, 2015. The inspectors reviewed FENOC's development and implementation of outage plans and schedules to verify that risk, industry experience, previous site-specific problems, and defense-in-depth were considered. During the outage, the inspectors observed portions of the shutdown and cooldown processes and monitored controls associated with the following outage activities:

- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable technical specifications when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and that equipment was appropriately configured to safely support the associated work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting
- Status and configuration of electrical systems and switchyard activities to ensure that technical specifications were met
- Monitoring of decay heat removal operations
- Impact of outage work on the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss
- Activities that could affect reactivity
- Maintenance of secondary containment as required by technical specifications
- Refueling activities, including fuel handling and fuel receipt inspections
- Fatigue management
- Tracking of startup prerequisites, walkdown of the primary containment to verify that debris had not been left which could block the emergency core cooling system suction strainers, and startup and ascension to full power operation
- Identification and resolution of problems related to refueling outage activities

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 2 samples)a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs 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:

- 2BVT 1.21.2, Trevitest Method for Main Steam Safety Valve Setpoint Check, Revision 12 on October 8, 2015
- 2BVT 1.47.5, Type C Leak Test (2SIS*MOV842), Revision 20 on December 16, 2015 (containment isolation valve)

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness1EP4 Emergency Action Level and Emergency Plan Changes (IP 71114.04 – 1 Sample)a. Inspection Scope

The inspectors performed an in-office review of all Emergency Action Level and Emergency Plan changes submitted by FENOC as required by 10 CFR 50.54(q)(5), including the changes to lower-tier emergency plan implementing procedures, to evaluate for any potential reductions in effectiveness of the Emergency Plan. This review by the inspectors was not documented in an NRC Safety Evaluation Report and does not constitute formal NRC approval of the changes. Therefore, these changes remain subject to future NRC inspection in their entirety. The requirements in 10 CFR 50.54(q) were used as reference criteria.

b. Findings

No findings were identified

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03 – 1 sample)

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity through the use of engineering controls, respiratory protection devices, and self-contained breathing apparatus (SCBA) to verify airborne concentrations are being controlled consistent with as low as is reasonably achievable (ALARA) and that the use of respiratory protection does not pose an undue risk to the wearer. The inspectors reviewed operability and use of both permanent and temporary ventilation systems; and the adequacy of airborne radioactivity radiation monitoring in the plant based on location, sensitivity, and alarm setpoints. The inspectors reviewed the adequacy of FENOC's use of respiratory protection devices in the plant to include applicable ALARA evaluations, respiratory protection device certification, respiratory equipment storage, air quality testing records, and individual qualification records. The inspectors reviewed the following: status and surveillance records for three SCBAs staged for use during emergencies, SCBA procedures and maintenance test records, procedures for refilling and transporting of SCBA air bottles, SCBA mask size availability, and the qualifications of personnel performing service and repair of this equipment.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04 – 1 sample)

a. Inspection Scope

The inspectors reviewed the monitoring, assessment, and reporting of occupational dose. The inspectors used the requirements in 10 CFR 20, Regulatory Guides, technical specifications, and procedures required by technical specifications as criteria for determining compliance.

Internal Dosimetry

The inspectors reviewed: internal dosimetry procedures; whole body counter measurement sensitivity and use, adequacy of the program for whole body count monitoring of plant radionuclides, adequacy of the program for dose assessments based on air sample monitoring and the use of respiratory protection, and internal dose assessments for any actual internal exposures.

Special Dosimetric Situations

The inspectors reviewed: FENOC's worker notification of the risks of radiation exposure to the embryo/fetus; the dosimetry monitoring program for declared pregnant workers; external dose monitoring of workers in large dose rate gradient environments; and dose

assessments performed since the last inspection that used multi-badging, skin dose or neutron dose assessments.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (REMP) (71124.07 - 1 sample)

a. Inspection Scope

The inspectors reviewed the REMP to validate the effectiveness of the radioactive gaseous and liquid effluent release program. The inspectors reviewed or observed the following items in order to determine compliance.

- BVPS 2013 and 2014 annual radiological environmental operating reports
- REMP program audits
- Sample collection, monitoring, and dose measurement stations (e.g., thermoluminescent dosimeter, air monitoring, vegetation, milk)
- Calibration and maintenance records for air sample and dosimetry measurement equipment
- Environmental sampling of the effluent release pathways specified in the Offsite Dose Calculation Manual (ODCM)
- Meteorological tower instrument local and control room data readouts
- Meteorological instrument operability status and calibration results
- Missed and anomalous environmental samples reported in the annual radioactive environmental monitoring report
- Positive environmental sample results
- Groundwater monitoring program of selected potential leaking SSCs
- 10 CFR 50.75(g) records of leaks, spills, and remediation since the previous inspection
- Changes to the ODCM due to changes to the land use census, long-term meteorological conditions, and modifications to the environmental sample stations
- Environmental sample laboratory analysis results, and measurement detection sensitivities
- Results of the laboratory quality control program audit, and the inter-and intra-laboratory comparison program results

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index (4 samples)

a. Inspection Scope

The inspectors reviewed FENOC's submittal of the Mitigating Systems Performance Index for the following systems for the period of October 1, 2014, through September 30, 2015:

- Unit 1 emergency alternating current (AC) power system
- Unit 2 emergency AC power system
- Unit 1 high pressure injection system
- Unit 2 high pressure injection System

To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in nuclear energy institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed FENOC's 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.

.2 Radiological Effluent Technical Specifications/ODCM Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The inspectors reviewed FENOC's submittals for the radiological effluent technical specifications/ODCM radiological effluent occurrences performance indicator for the 1st quarter 2014 through the 4th quarter 2014. To determine the accuracy of the performance indicator 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 condition reports, public dose assessments, gaseous and liquid effluent summary data and the results of associated offsite dose calculations to validate the accuracy of the submittals.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 2 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 that FENOC entered issues into the corrective action program 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 corrective action program and periodically attended condition report screening meetings.

b. Findings

No findings were identified.

.2 Annual Sample: Maintenance Rule Program Implementation Corrective Actions

a. Inspection Scope

The inspectors performed an in-depth review of FENOC's apparent cause analysis and corrective actions associated with CR 2015-00267 for FENOC's failure to adequately implement risk management actions (RMAs). Specifically, FENOC's failure to implement a contingency plan resulted in an increase in the duration of an elevated risk condition.

The inspectors assessed FENOC's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, 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 corrective action program and 10 CFR 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

FENOC determined the apparent cause to be a failure of NOP-OP-1007, "Risk Management," to assign clear ownership and responsibility for completion of the RMAs. FENOC's corrective action plan consisted of eight corrective actions. The first four corrective actions included the preparation of a communication package addressing the RMAs and controls requirements of NOP-OP-1007 and discussion of the package with maintenance and construction, operations, and work management departments. Corrective action five included a revision of NOP-OP-1007 to define the process and ownership for identifying RMAs that need to be implemented and corrective actions six through eight included a discussion of the changes to the departments previously listed.

Corrective actions five through eight were not performed and closed in June and July of 2015, when FENOC determined that station procedure 1/2-ADM-0804, "On-Line Risk Assessment and Management," sufficiently identifies the process and ownership for identifying RMAs and concluded that changes to fleet procedure NOP-OP-1007 were not necessary. 1/2-ADM-0804 states in part, "The following are examples that should be performed by the work groups (work centers) to reduce the duration of the work activity," and lists several RMAs. The inspectors determined that the guidance in 1/2-ADM-0804 does not sufficiently address the implementation of RMAs. Specifically, 1/2-ADM-0804 does not identify who in the work group is responsible nor does the procedure establish a process for the implementation of RMAs.

The inspectors concluded that the corrective actions for CR 2015-00267 did not adequately address the apparent cause; however, a revision to NOP-OP-1007, effective December 15, 2015, was made outside of the corrective actions for the condition report. Changes included a requirement for the lead work group to develop a risk management plan, for yellow and orange risk activities, that has to be reviewed by the work week senior reactor operator and approved by the manager of site operations prior to the commencement of work. The inspectors concluded that the revision to NOP-OP-1007 adequately assigns ownership and responsibility for the completion of RMAs.

.3 Annual Sample: Units 1 and 2 Service Water and River Water Systems, Current Status, Maintenance and Upgrade Plans

a. Inspection Scope

The inspectors performed an in-depth review of the FENOC staff's problem identification, evaluation and corrective actions related to the Unit 1 river water and Unit 2 service water systems. The inspectors assessed the problem identification threshold, extent of condition reviews, and the prioritization and timeliness of corrective actions to determine whether FENOC personnel were appropriately identifying, characterizing, and correcting problems associated with these heat removal systems and whether the planned or completed corrective actions were appropriate. The inspector reviewed procedure NOP-OP-1009, Rev 5, for control, evaluation and correction of pressure boundary degradation in these systems, and the related operability determination process, for comparison to Appendix C.12 and Appendix C.13 of NRC IMC 0326, "Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety."

The inspectors observed the river intake structure and areas in both units where river or service water systems provide heat removal capability, including the Unit 1 component cooling and Unit 2 component cooling primary heat exchangers to exchange heat from closed cooling systems, the emergency diesel generators, and a chemical addition monitoring station. The recent and updated methods and effectiveness of the chemical addition program to the river and service water systems were reviewed.

The inspectors discussed the status of system components with cognizant technical personnel to assess the effectiveness of the planned, scheduled, and completed corrective actions to resolve identified deficiencies. The inspectors compared the actions taken to verify compliance with FENOC's corrective action program procedure and 10 CFR 50, Appendix B requirements.

b. Findings and Observations

No findings were identified.

The inspectors determined that the condition reports reviewed were written to document conditions that required evaluation and corrective actions of maintenance, repair or replacement. The inspectors determined that corrective actions taken were effective to repair or replace the deficient components.

The inspectors determined the extent-of-condition reviews, previous occurrence, generic implications, and common cause evaluations were adequately performed and technically

accurate. The inspectors also found that FENOC's technical staff had procedures and processes in place to properly address component wall thinning and thru wall leakage of service water and river water systems pressure boundary components. The inspectors verified that if an inoperability decision was reached as a result of a degraded condition it was adequately addressed.

The inspectors determined FENOC's overall response to identify the causes of degradation of either system, evaluate the significance of the condition, and initiate corrective actions met the standards in FENOC's corrective action program. The scope and timing of the corrective actions was determined to be commensurate with the safety significance of the problems. No issues were identified with the timing for the scope of planned work.

4OA6 Meetings, Including Exit

On January 27, 2016, the inspectors presented the inspection results to Mr. M. Richey, site vice president, and other members of the BVPS 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

Licensee Personnel

M. Richey	Site Vice President
E. Larson	Site Vice President
C. McFeaters	Director, Site Operations
N. Adams	Plant Operator
G. Alberti	Steam Generator Project
M. Banko	Environmental Supervisor
G. Buck	ISI/NDE, Level III Contractor
G. Cacciani	Safety Analysis Engineer
C. Casto	Advance Nuclear Specialist
E. Crosby	Radiation Protection Manager
T. DiLeo	Supervisor, Fuel Handling
R. Dinello	Environmental Field Specialist
A. Dometrovich	Regulatory Compliance
R. Egolf	System Engineer
J. Fontaine	ALARA Supervisor
J. Gallagher	Maintenance Rule Coordinator
E. Grabski	Radiation Protection Technician (Trainee)
D. Hardaway	Radiation Protection Technician
R. Hayward	Design Engineer
D. Heck	Staff Engineer, Technical services
T. Heimel	ISI/NDE, Level III Contractor
M. Jansto	System Engineer
D. Jones	IST Engineer
M. Kienzle	System Engineer
M. Manoleras	Director, Engineering
J. Miller	Fire Marshall
T. Miller	Fleet Access Authorization Specialist
L. Musgrave	Staff Nuclear Engineer, ISI
J. Ostrowski	Heat Exchanger Program Engineer
M. Ressler	Design Engineer
C. Sacha	Supervisor Radiation Protection Services
J. Saska	Radiation Protection Technician (Trainee)
S. Sawtschenko	Emergency Preparedness Manager
C. Scarpone	Radiation Protection Technician
P. Seidel	Nuclear Specialist (Trainee)
H. Tremblay	Auxiliary Feedwater System Engineer
E. Thomas	Supervisor, Regulatory Compliance
D. Wacker	Regulatory Compliance
Z. Warchol	Supervisor, Plant Engineering
G. Woolsey	Shift Manager

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000334/2015004-01	NCV	Inadequate Maintenance Rule Monitoring of the Auxiliary Feedwater System (Section 1R12)
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LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

1OST-45.11A, Cold Weather Protection Verification – Performed in September and October, Revisions 1 and 2

2OM-45D.3.C, Power Supply and Control Switch List, Revision 12

2OST-45.11A, Cold Weather Protection Verification – Performed in September and October, Revision 3

Section 1R04: Equipment Alignment

Procedures

2OM-11.3.B.1, Valve List – 2SIS, Revision 16

2OM-11.3.C, Power Supply and Control Switch List, Revision 9

2OM-13.1.B, Summary Description, Revision 3

2OM-13.1.C, Major Components, Revision 4

2OM-13.1.D, Instrumentation and Control, Revision 4

2OM-13.3.B.2, Valve List – 2RSS, Revision 8

2OM-13.3.C, Power Supply and Control Switch List, Revision 9

2OM-36.3.B.1, Valve List – 2EDG, Revision 7

2OM-36.3.B.1, Valve List – 2EDG, Revision 7

2OM-36.3.B.2, Valve List – 2EGA, Revision 15

2OM-36.3.B.3, Valve List – 2EGF, Revision 10

2OM-36.3.B.4, Valve List – 2EGO, Revision 9

2OM-36.3.B.5, Valve List – 2EGS, Revision 11

2OM-36.3.C.8, Power Supply and Control Switch List, Diesel Generator 2-1, Revision 12

2OM-7.3.B.1, Valve List – 2CHS, Revision 33

Condition Reports

2012-17121

2014-07156

2015-12933

2015-14269

2013-04884

2014-18414

2015-13292

Drawings

RM-0411-001, Valve Oper No Diagram, Low/High Head Safety Injection, Revision 23

RM-0413-001, Valve Oper No Diagram, Recirculation Spray System, Revision 12

RM-0436-001, Valve Oper No Diagram Diesel Fuel Oil, Revision 7

RM-0436-002, Valve Oper No Diagram Diesel Air Intake, Exh & Vacuum, Revision 4

RM-0436-003, Valve Oper No Diagram Diesel Starting Air, Revision 20

RM-0436-004A, Valve Oper No Diagram Diesel Cooling System, Revision 12

RM-0436-005A, Valve Oper No Diagram Diesel Generator Lube Oil, Revision 7

Miscellaneous

ECP 14-0734-002, Remove the Temporary system that Added Fluid from 2CHS-TK21A/B to 2SIS-TK21B, Revision 3
Maintenance Rule System Basis Document, Unit 2, System 11, Revision 5
Unit 2 Safety Injection System Health Report 2015-1

Section 1R05: Fire Protection

Procedures

1/2-ADM-1906, Control of Transient Combustible and Flammable Materials, Revision 1
2OM-44A.1.B, Area Ventilation Systems - Control Area Description, Summary Description, Revision 1
2OM-44A.1.C, Area Ventilation Systems - Control Area Description, Major Components, Issue 4 Revision 0

Condition Reports

2015-16806 2015-16817

Drawings

10080-RM-444A-1, Valve Oper No Diagram Control Bldg Ventilation System, Revision 8

Miscellaneous

2701.620-000-026, Detailed Fire Modeling Report – Fire Compartment 2-CB-1, Revision B
2701.620-000-051, Fire Risk Evaluation of Instrument and Relay Room (2-CB-1), Revision A
2PFP-AXLB-773, Cable Tunnel Fan Room, Fire Area CT-1, Revision 1
2PFP-MSCV-735, East Cable Vault, Fire Area CV-2, Revision 3

Section 1R07: Heat Sink Performance

Work Order

200581440

Miscellaneous

1/2-ADM-2106.F01, Heat Exchanger Inspection Report, Revision 6

Section 1R08: In-service Inspection - Beaver Valley Unit 2

Procedures

1/2-ADM-2036, BVPS ASME XI Pressure Testing Program, Revision 3
1/2-ADM-2039, BVPS ISI Ten-Year Plans, Revision 15
1/2-ADM-2051, BVPS Control of NDE Calibration Standards, Revision 0
1/2-ADM-2096, Alloy 600/690 Management Program, Revision 13
1/2-ADM-2099, Primary Containment ISI Program, Revision 3
ISIE-ECP-2, Steam Generator Examination Program, Revision 23
NDE-GP-105, Evaluation of PSI/ISI Flaw Indications, Revision 10
NDE-VT-502, Leakage Examination Requirements, Revision 10
NDE-VT-510, Visual Inspection for Evidence of Boric Acid, Revision 17
NOBP-CC-5761, Conduct of Dissimilar Metal Weld Ultrasonic Examinations, Revision 0
NOP-CC-5710, ASME Section XI Inservice Inspection (ISI) Program, Revision 1
NOP-CC-5714, Review, Evaluation and Reporting of ISI or PSI NDE Data, Revision 0

NOP-ER-2001, Boric Acid Control Program, Revision 11
PCI Energy Services Procedure Specification 43 MN-GTAW/SMAW, Revision 8
WesDyne Procedure WDI-SSP-1236, Reactor Vessel Head Penetration Remote Visual Inspection for Beaver Valley Unit 2, Revision 0
Wesdyne Procedure WDI-SSP-1237, Liquid Penetrant Examination of CRDM Penetration Nozzle Weld Overlays at Beaver Valley, Revision 0
WesDyne Procedure WDI-STD-1040, Procedure for Ultrasonic Examination of Reactor Vessel Head Penetrations, Revision 11
WesDyne Procedure WDI-STD-1041, Reactor Vessel Head Penetration Ultrasonic Examination Analysis, Revision 11

NDE Records

Liquid Penetrant Examination Report, Unit 2 Reactor Vessel Head CRDM J-Groove Weld Reports, CRDM Penetrations #37 and #53, dated October 12, 2015
UT Examination Report No. UT-15-1076, Reactor Coolant System Loop 'B' Hot Leg InjectionWeld 2SIS-006-24-1, dated October 8, 2015
UT Examination Report No. UT-15-1080, Reactor Coolant System Loop 'B' Cold Leg InjectionWeld 2SIS-006-15-1, dated October 8, 2015
UT Examination Report No. UT-15-1087, Reactor Coolant System, Valve to Pipe Weld 2RCS-007-F03, dated October 8, 2015
UT Examination Report No. UT-15-1089, Reactor Coolant System, Safe-End to Elbow Weld2RCS-007-F04, dated October 8, 2015
UT Examination Report No. UT-15-1092, Pressurizer Nozzle-to-Vessel Weld 2RCS*PRE21-N-10, dated October 8, 2015
UT Examination Report No. UT-15-1094, Pressurizer Nozzle-to-Vessel Weld 2RCS*PRE21-N-12, dated October 8, 2015
UT Report Data Sheet, DMW-R18-CP02-037-01, Reactor Vessel Upper Head Penetration #37, dated October 13, 2015
UT Report Data Sheet, DMW-R18-OH01-53-01, Reactor Vessel Upper Head Penetration #53, dated October 13, 2015
WDI-SSP-1236, Reactor Vessel Head Penetration Remote Visual Inspection for Beaver Valley Unit 2, Revision 0, dated October 9, 2015

Miscellaneous

Beaver Valley Unit 2 2R18 Steam Generator Degradation Assessment SG-SGMP-15-14, dated August 17, 2015
EPRI Report, IR-2015-640, Independent Evaluation of Beaver Valley Unit 2 Reactor Vessel Closure Head Penetrations 37 & 53, dated October 2015
FENOC Letter, BVPS Unit 2 Request for Relief Relating to 10 CFR Part 50.55a Alternative Examination for Reactor Vessel Safe-End Welds, March 11, 2013
Westinghouse Letter LTR-PAFM-15-07, Engineering Assessment of Indication in Beaver Valley Unit 2, Penetrations 37 and 53, dated October 16, 2015

Condition Reports

2015-12034	2015-12682	2015-12842	2015-13347
2015-12656	2015-12695	2015-13345	

Section 1R11: Licensed Operator Requalification ProgramProcedures

2LOCT-FR.H.1.001, E-0 Reactor Trip or SI, FR-H.1 Loss of Secondary Heat Sink, ES-0.1
 Reactor Trip Response, Revision 0
 2OM-6.4.I, Draining the RCS for Refueling, Revision 27

Section 1R12: Maintenance EffectivenessProcedures

NOP-ER-3004, FENOC Maintenance Rule Program, Revision 2

Condition Reports

2012-06833	2013-17723	2013-17800	2014-00177
2014-02358	2015-07158	2015-07271	2015-08401
2015-09612	2015-10184	2015-11285	2015-11854

Miscellaneous

1DBD-24B, Design Basis Document for Auxiliary Feedwater System, Revision 5
 Periodic Assessment of Maintenance Rule Program, Beaver Valley Power Station,
 September 24, 2012 through April 18, 2014
 Unit 1 System 24B Maintenance Rule System Basis Document, Revision 7

Section 1R13: Maintenance Risk Assessments and Emergent Work ControlProcedures

1/2-ADM-0804, On-Line Risk Assessment and Management, Revision 13
 NOP-OP-1005-03, Beaver Valley Key Shutdown Defense-in-Depth Turnover Checklist,
 Revision 13
 NOP-OP-1005-04, Key Shutdown Defense in Depth Function Status, Revision 7
 NOP-OP-1007, Risk Management, Revision 21

Miscellaneous

Beaver Valley Key Shutdown Defense-in-Depth Turnover Checklist
 Defense-in-Depth Protected Equipment List, 10/12/2015
 Weekly Maintenance Risk Summary for the Week of November 23, 2015, Revision 1

Section 1R15: Operability Determinations and Functionality AssessmentsProcedures

2OM-6.4.Q, Isolation of a Power Operated Relief Valve, Revision 21
 2OM-6.4.R, Restoring an Isolated Power Operated Relief Valve to Service, Revision 18
 2OST-6.6, PORV Isolation Valve Test and Position Check, Revision 22
 3BVT 1.44.05, Control Room Envelope Air In-Leakage Test, Revision 4
 3BVT01.11.04, Void Monitoring, Revision 12

Condition Reports

2015-14539	2015-14668	2015-16299	2015-16435
2015-16499	2015-16557	2015-16779	2015-17132
2015-17162			

Miscellaneous

- 10080-N-757, Beaver Valley Piping Void Determination, Revision 0
- 10080-UR(B)-487, Site Boundary, Control Room and Emergency Response Facility Doses Following a Loss-of-Coolant Accident based on Core Uprate, an Atmospheric Containment and Alternate Source Terms, Revision 1
- 2506.510-001-006, Operation and Maintenance Instructions for Solenoid Power Operated Relief Valve, Revision 4
- BVPS Engineering Memorandum 115614, Unit #2 PORV Block Valve Testing Results in PORV Cycling Under Certain Conditions, February 16, 1998
- ERS-JTL-99-008, Safety Analysis of the Radiological Consequences of a Waste Gas System Rupture DBA at BVPS Unit 2, Control Room, EAB, and LPZ Doses, Revision 2
- ERS-JTL-99-014, Safety Analysis of the Radiological Consequences of a Waste Gas System Rupture DBA at BVPS Unit 1, Control Room, EAB, and LPZ Doses, Revision 1

Section 1R18: Plant Modifications

Procedures

- NOP-CC-2003, Engineering Changes, Revision 20

Miscellaneous

- ECP 12-0180-000 – Temporary Cooling for Unit 2 Battery Rooms 2-1, 2-3, 2-2, and 2-4, Revision 4
- Unit 2 Area Ventilation Systems – Misc. System Health Report 2015-01

Section 1R19: Post-Maintenance Testing

Procedures

- 1/2CMP-75-MCB-1E, Testing of Westinghouse and Cutler Hammer molded Case Circuit Breakers, Revision 15
- 1BVT 2.30.1, River Water Pump (1WR-P-1A) Head Capacity Curve, Revision 17
- 1OST-30.2, Reactor Plant River Water Pump 1A Test, Revision 55
- 2OST-30.13A, Train A Service Water System Full Flow Test, Revision 38
- 2OST-6.8, Pressurizer PORV Stroke Test, Revision 18

Condition Reports

- | | | |
|------------|------------|------------|
| 2015-13244 | 2015-14014 | 2015-14462 |
| 2015-14465 | 2015-14552 | 2015-14630 |

Maintenance Orders/Work Orders

- | | | | |
|-----------|-----------|-----------|-----------|
| 200418384 | 200584749 | 200585204 | 200607740 |
| 200607741 | 200609878 | 200610169 | |

Miscellaneous

- ECP-11-0618-000, Unit 2 Service Water System Replacement Motor Operated Butterfly Valve – 2SWS-MOV102A, Revision 9
- ECP-11-0618-001, Unit 2 Service Water System Replacement Motor Operated Butterfly Valve – 2SWS-MOV102A, Revision 4

Section 1R20: Refueling and Other Outage ActivitiesProcedures

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 2OM-20.4.H, Draining the Refueling Cavity to the RWST, Revision 26
 2OM-52.4.R.1.F, Station Shutdown from 100% Power to Mode 5, Revision 30
 2OM-6.4.I, Draining the RCS for Refueling, Revision 27
 2OST-47.2B, Containment Close Out Inspection, Revision 16
 2RST-2.1, Initial Approach to Criticality after Refueling, Revision 15
 2RST-2.2, Core Design Check Test, Revision 17

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2015-13255	2015-13256	2015-13413
2015-13439	2015-13440	2015-14522

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 Fire Brigade Member, Unit Reactor Operator and Senior Reactor Operator

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2015-14460	2015-14501
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Section 1EP4: Emergency Action Level and Emergency Plan ChangesEmergency Plan

Beaver Valley Emergency Preparedness Plan, Appendix B Revision 16
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 Beaver Valley Emergency Preparedness Plan, Appendix G Revision 29
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 Beaver Valley Emergency Preparedness Plan/Implementing Procedures – Effective Index
 Revision 160

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 1/2-EPP-I-3, Alert, Revision 40
 1/2-EPP-I-4, Site Area Emergency, Revision 40
 1/2-EPP-I-5, General Emergency, Revision 41
 1/2-EPP-IP-1.1, Notifications, Revision 51
 1/2-EPP-IP-1.7, Emergency Response Organizations Teams, Revision 24
 1/2-EPP-IP-2.6, Environmental Assessment and Dose Projection Controlling Procedure,
 Revision 51

1/2-EPP-IP-4.1, Offsite Protective Actions, Revision 31
 EPP-I-1a, Recognition and Classification of Emergency Conditions, Revision 17

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

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 BVBP-RP-0016, Survey Requirements during Plant Transients, Revision 1
 NOP-OP-4001, Radiation Protection Program, Revision 3
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 NOP-OP-4101, Access Controls for Radiologically Controlled Areas, Revision 11
 NOP-OP-4104, Job Coverage, Revision 6
 NOP-OP-4107, Radiation Work Permit (RWP), Revision 14
 NOP-OP-4114, Radiological Controls for Highly Radioactive and Irradiated Components of Materials, Revision 1
 NOP-OP-4502, Control of Radioactive Material, Revision 3
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Condition Reports

2014-11720	2015-06389	2015-07641
2015-10204	2015-10410	2015-10416

Section 2RS2: Occupational ALARA Planning and Controls

Procedures

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Miscellaneous

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Section 2RS3: In-plant Airborne Radioactivity Control and Mitigation

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1/2-HPP-3.09.009, "Portable High Efficiency Particulate Air (HEPA) Filter Units", Revision 11
 1/2-HPP-4.06.012, "Eberline, AMS-4 Continuous Air Monitor, Revision 9
 1/2-HPP-7.03.001, "HEPA Vacuum Cleaner and Portable HEPA Filtration Unit Monitor Test", Revision 3
 NOP-OP-4310, "FIREHAWK M7 Self Contained Breathing Apparatus", Revision 7
 NOP-OP-4702, "Air Sampling", Revision 5

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2015-07630	2015-07729	2015-09895	2015-10006	2015-11405
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2015-06490 2015-08174

Section 2RS7: Radiological Environmental Monitoring Program

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1/2-ENV-02.01, Radiological Environmental Monitoring Program, Revision 14
 1/2-ENV-03.01, Environmental Sampling, Revision 9
 1/2-ENV-03.02, Maintenance and Calibration of Automatic Water Sampling Equipment, Revision 3
 1/2-ENV-03.03, Maintenance and Calibration of AVS-28A Environmental Sampler, Revision 2
 1/2-ENV-03.04, Land Use Census, Revision 2
 1/2-ODC-1.01, ODCM: Index, Matrix and History of ODCM Changes, Revision 21
 1/2-ODC-2.01, ODCM: Liquid Effluents, Revision 15
 1/2-ODC-2.02, ODCM: Gaseous Effluents, Revision 6
 1/2-ODC-2.03, ODCM: Radiological Environmental Monitoring Program, Revision 6
 1/2-ODC-2.04, ODCM: Information Related to 40 CFR 190, Revision 2
 1/2-ODC-3.01, ODCM: Dispersion Calculation Procedure an 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

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2013-00160	2013-00777	2013-03554	2013-05707
2013-06015	2013-09908	2013-10952	2013-12495
2013-15774	2014-00685	2014-11925	2014-15056

Miscellaneous

MIS-C-14-08-02, Fleet Oversight Audit Report, October 16, 2014 "Annual Report for the Beaver Valley Power Station Meteorological Program for January through December 31, 2014," ABS Consulting, July 2015

Air Sampler Maintenance and Calibration Records

Station #	Air Sampler Pump Serial #	Date/Time
32	6127 022-33	April 15, 2013 / 0911
46.1	6121 022-33	April 12, 2013 / 1229
47	6118 022-33	April 12, 2013 / 1356
32	6127 022-33	October 21, 2013 / 0902
46.1	6121 022-33	October 21, 2013 / 1408
47	6125 022-33	October 16, 2013 / 1624
32	6127 022-33	April 14, 2014 / 0908
46.1	6121 022-33	April 9, 2014 / 1332
47	6118 022-33	April 9, 2014 / 1332
32	6127 022-33	October 13, 2014 / 0908
46.1	6121 022-33	October 13, 2014 / 0844
47	6118 022-33	October 17, 2014 / 0950

Section 4OA1: Performance Indicator VerificationCondition Reports

2014-15809 2015-00212 2015-00893 2015-05847 2015-11473

Miscellaneous

Mitigating System Performance Index Basis Document Beaver Valley Power Station Unit 1
 Mitigating System Performance Index Basis Document Beaver Valley Power Station Unit 2
 Unit 1 Chemical and Volume Control System Health Report 2015-1
 Unit 1 Emergency Diesel Generators System Health Report 2015-1
 Unit 2 Chemical and Volume Control System Health Report 2015-1
 Unit 2 Emergency Diesel Generators System Health Report 2015-1

Section 4OA2: Problem Identification and ResolutionProcedures

NOP-LP-2001, Corrective Action Program, Revision 37
 NOP-OP-1007, Risk Management, Revision 21
 NOP-OP-1007, Risk Management, Revision 22
 NOP-OP-1009, Operability Determinations and Functionality Assessments, Revision 5
 NOP-WM-0001, Work Management Process, Revision 9

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2013-09813	2014-02424	2014-10282	2014-10358
2014-12354	2015-00267	2015-01708	2015-04793
2015-05842	2015-07001	2015-07188	2015-08623
2015-08837	2015-13004		

Maintenance Orders/Work Orders

200450273 200517968

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BV-2015-0179, LOCT CRC Review of CR-2015-04793, Revision 0
 BV-2015-712, CR-2015-04793 Increase Risk Awareness/Risk Perception, Revision 0
 Engineering Evaluation Request (EER) 600955166
 Motor Operated Valve (MOV) Program Health Report 2015-1
 OTGC-201505OER_BV3, 2015 Cycle 5 Operating Experience Review, Revision 0
 River and Service water work items listing for 2013-2018
 Unit 1 River Water System Health Report, 2015-1
 Unit 1 River Water System and the Unit 2 Service Water System Action Plan, Revision 6
 Unit 2 Service Water System Health Report, 2015-1

LIST OF ACRONYMS

AC	alternating current
ADAMS	Agencywide Documents Access and Management System
AFW	auxiliary feedwater
ALARA	as low as is reasonably achievable
ASME	American Society of Mechanical Engineers
BACC	boric acid corrosion control
BVPS	Beaver Valley Power Station
CFR	Code of Federal Regulations
CMF	condition monitoring failure
CR	condition report
CRDM	control rod drive mechanism
EPRI	Electric Power Research Institute
FENOC	FirstEnergy Nuclear Operating Company
IMC	Inspection Manual Chapter
ISI	in-service inspection
MPFF	maintenance preventable functional failure
NCV	non-cited violation
NDE	non-destructive examination
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
ODSCC	outside diameter stress corrosion cracking
RCS	reactor coolant system
REMP	radiological environmental monitoring program
RMA	risk management actions
S/G	steam generator
SCBA	self-contained breathing apparatus
SSC	structure, system, or component
TDAFW	turbine driven auxiliary feedwater
UFSAR	Updated Final Safety Analysis Report
UT	ultrasonic test
VT	visual test