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

August 2, 2016

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

SUBJECT: BEAVER VALLEY POWER STATION – INTEGRATED INSPECTION REPORT 05000334/2016002 AND 05000412/2016002

Dear Mr. Richey:

On June 30, 2016, 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 July 19, 2016, with you, 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 three findings of very low safety significance (Green). Two of these findings involved violations of NRC requirements. However, because of the very low safety significance, and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations, consistent with Section 2.3.2.a of the NRC Enforcement Policy. If you contest the non-cited violations 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 05000334/2016002
and 05000412/2016002 w/Attachment
Supplementary Information

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In accordance with 10 CFR 2.390 of the NRCs "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).

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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 Nos.	05000334/2016002 and 05000412/2016002
Licensee:	FirstEnergy Nuclear Operating Company (FENOC)
Facility:	Beaver Valley Power Station, Units 1 and 2
Location:	Shippingport, PA 15077
Dates:	March 1, 2016 to June 30, 2016
Inspectors:	J. Krafty, Senior Resident Inspector B. Reyes, Resident Inspector T. Fish, Senior Operations Inspector T. Hedigan, Operations Engineer P. Kaufman, Senior Reactor Inspector
Approved By:	Silas R. Kennedy, Chief Reactor Projects Branch 6 Division of Reactor Projects

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SUMMARY

IR 05000334/2016002 and 05000412/2016002; 03/01/2016 – 06/30/2016; Beaver Valley Power Station, Units 1 and 2; Operability Determinations and Functionality Assessments, Problem Identification and Resolution.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. Inspectors identified three findings of very low safety significance (Green), two of which were non-cited violations (NCVs). 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" (SDP), 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: Initiating Events

- Green. A self-revealing finding of NOP-OP-1002, "Conduct of Operations," was identified for FENOC's failure to adequately implement operator fundamentals. Specifically, operators did not appropriately utilize multiple and diverse indications when making the decision to isolate electro-hydraulic control (EHC) to a Unit 1 main turbine governor valve. This resulted in an unanticipated reactor power reduction of 2.7 percent. FENOC's immediate corrective actions included re-opening the governor valve, verifying proper system response, and entering this issue into their corrective action program (CAP) as CR 2015-08263.

  The performance deficiency is more-than-minor because if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Additionally, example 4.b from IMC 0612 Appendix E details that a performance deficiency is more-than-minor if it causes a reactor trip or other transient. This finding was determined to be of very low safety significance (Green) since it did not cause both a reactor trip and the loss of mitigation equipment relied upon to transition the plant to a stable shutdown condition. This finding has a cross-cutting aspect in Human Performance, Challenge the Unknown, because individuals did not consult the system expert when confronted with an unexpected condition [H.11]. (Section 4OA2)

Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of Title 10 of the *Code of Federal Regulations* (CFR) 50, Appendix B, Criterion III, "Design Control," for FENOC's failure to assure that the regulatory requirements and design basis for the Unit 2 service water system were correctly translated into procedures. Specifically, FENOC implemented a procedure revision in 2002 that inappropriately removed the step to declare the Unit 2 service water system inoperable while the non-seismic standby service water system is aligned to it. FENOC's immediate corrective actions included issuing instructions that prohibit planned testing of or swapping to the standby service water system and revising procedure 2OST-30.1A. FENOC entered the issue into their CAP as condition report (CR) 2016-01710.

  The performance deficiency is more-than-minor because it is associated with the Design Control 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 revision to 2OST-30.1A in 2002 resulted in reduced reliability of the service water system while connected to the standby service water system for over ten hours on February 1, 2016, and nine hours on April 3, 2014. This finding was of very low safety significance (Green) because it did 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 does not have a cross-cutting aspect because it is not representative of current performance. The inadequate review of revision 17 to 2OST-30.1A was an isolated instance that occurred over 14 years ago. Furthermore, the most recent NRC inspection of Changes, Tests, or Experiments and Permanent Plant Modifications, performed in 2013, and the Component Design Basis Inspection, performed in 2014 did not document any findings related to procedure changes. (Section 1R15)

Cornerstone: Emergency Preparedness

- Green. The inspectors identified an NCV of 10 CFR 50.54(q)(2) for FENOC's failure to follow and maintain the effectiveness of an emergency plan that meets the planning standards of 10 CFR 50.47(b)(4). Specifically, following the failure of the area radiation monitor (ARM) for the Unit 2 primary auxiliary building 773' elevation on April 23, 2016, FENOC did not establish adequate compensatory measures to ensure the effectiveness of the emergency action level (EAL) for loss of control of radioactive material, RU2. FENOC's immediate corrective actions included establishing appropriate compensatory measures for RU2, communicating the standards of EAL compensatory measures to radiation protection technicians verbally and via narrative logs, and entering this issue into their CAP as CR 2016-05975.

  The performance deficiency is more-than-minor because it is associated with the Facilities and Equipment attribute of the Emergency Preparedness cornerstone, and adversely affected the cornerstone objective to ensure that FENOC is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, FENOC's failure to establish adequate compensatory measures for an out-of-service ARM could have resulted in exceeding a NOUE EAL threshold for a loss of control of radioactive material without the condition being recognized until further degradation in the level of plant safety occurs. This finding was determined to be of very low safety significance (Green) since it was example of an ineffective EAL, such that a notification of unusual event (NOUE) would not be declared or would be declared in a degraded manner. This finding has a cross-cutting aspect in Human Performance, Documentation, because FENOC did not ensure that plant activities are governed by comprehensive procedures [H.7]. (Section 4OA2)

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 at 100 percent power and operated at or near full power until June 4, 2016, when the power was reduced to 82 percent to repair waterbox tube leaks. Operators returned the unit to 100 percent power on June 8, 2016, 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 high temperatures. The review focused on the river water and service water systems and the heat exchangers cooled by them. The inspectors reviewed the seasonal readiness procedure, summer readiness work orders, heat exchanger preventive maintenance frequencies, intake bay cleanings, and heat exchanger biocide treatments to ensure FENOC personnel had adequately prepared for these challenges. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during hot 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

Partial System Walkdowns (71111.04 – 4 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 2 'B' low head safety injection (LHSI) train and nitrogen system following maintenance on the 'B' LHSI pump and filling of the 'C' safety injection accumulator on May 3, 2016
- Unit 1 'A' service water header to 'A' train recirculation spray system (RSS) heat exchangers when the 'B' train RSS heat exchangers were out of service for chemical addition on May 6, 2016

- Unit 1 'A' LHSI train following motor and discharge valve maintenance on May 24, 2016
- Unit 1 'A' motor-driven auxiliary feedwater pump train following testing on June 20, 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, 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.

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 1 Auxiliary Feedwater and Quench Spray Pump Room, Fire Area QP-1, on April 8, 2016
- Unit 2 Cable Spreading Area, Fire Area CB-2, on May 9, 2016
- Unit 2 Personnel Air Lock and Purge Duct Rooms, Fire Area CV-5, on May 24, 2016
- Unit 1 Auxiliary Building General Area, Fire Area PA-1E, on May 24, 2016
- Unit 1 Auxiliary Building General Area, Fire Area PA-1C, on May 24, 2016

b. Findings

No findings were identified.

1R07 Heat Sink Performance (IP 71111.07T - 4 samples)

a. Inspection Scope

Triennial Heat Sink and Heat Exchanger Sample Selection

Based on FENOC's risk ranking of safety-related heat exchangers, a review of past triennial heat sink inspections, recent operational experience, and resident inspector input, the inspectors selected the following four heat exchangers for detailed review: Unit 1 recirculation spray heat exchangers, 1RS-E-1A and 1RS-E-1D; and Unit 1 diesel generator heat exchangers, 1EE-E-1A and 1EE-E-1B. The inspectors further reviewed some aspects of the Unit 1 river water system.

For the samples selected the inspectors reviewed program/system health reports, self-assessments, and the methods (inspection, cleaning, maintenance, and performance monitoring) used to ensure heat removal capabilities for the safety-related heat exchangers and compared them to Beaver Valley Power Station (BVPS) commitments in response to Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

Unit 1 River Water System

The inspectors performed walkdowns of the intake structure to verify the instrumentation that operators rely on for decision making was available and functional. The inspectors reviewed the BVPS river water pipe inspection and monitoring program to assess the condition and structural integrity of the piping. The inspectors reviewed a sample of river water system health reports, nondestructive examination records, maintenance history, performance testing, river water pump curve calculations, and in-service testing (IST) results to determine whether component or piping degradation issues were being appropriately identified and dispositioned and to verify that the minimum calculated river water system flow rates were properly maintained to essential safeguards equipment and met the acceptance criteria in updated final safety analysis report (UFSAR).

The inspectors reviewed BVPS established maintenance and chemistry procedures to verify that the procedures are able to control, detect, and prevent system degradation due to macrofouling of the river water system. The inspectors reviewed the associated chemistry procedures, macrofouling trending reports, river/service water system control and monitoring program, closed loop and raw water systems strategic water plan, and interviewed the responsible chemistry personnel. The inspectors verified on a sampling basis that biocide treatments were monitored, trended and evaluated to ensure adequate biotic control.

Heat Exchangers Directly Cooled by River Water

For the 1RS-E-1A, 1RS-E-1D, 1EE-E-1A, and 1EE-E-1B heat exchangers, the inspectors reviewed testing, inspection, maintenance, and monitoring of biotic fouling and macrofouling programs to verify that they were singularly, or in combination, adequate to ensure proper heat transfer. The inspectors reviewed the procedures and programs for maintaining the safety functions of the heat exchangers that were monitored by means of cleaning and inspection, and discussed the activities with station personnel.

The inspectors reviewed the most recent inspections and cleaning results of the selected heat exchangers, the trending of tube plugging, and engineering calculations of tube plugging limits. The inspectors walked down accessible portions of piping, pumps, valves, and heat exchangers to assess the material condition of the components.

The inspectors reviewed select inspection/cleaning work orders to verify that the as-found and as-left condition of the heat exchangers was bounded by assumptions in the engineering analyses and provided reasonable assurance of continued operability. The inspectors compared surveillance test data to the established acceptance criteria to verify that the results were acceptable and that operation was consistent with the plant design basis. The inspectors reviewed the river water flow balance calculation to verify the minimum calculated flowrate, in conjunction with the heat transfer capability of the heat exchangers, supported the minimum heat transfer rates assumed during accident and transient conditions described in the UFSAR.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Licensed Operator Requalification Testing and Training (71111.11Q - 1 sample)

a. Inspection Scope

The inspectors observed licensed operator Unit 2 simulator training on April 19, 2016, which included a primary component cooling pump trip, load rejection, pressurizer level transmitter failure, instrument air compressor trip, medical emergency, and a reactor coolant pump locked rotor coincident with a steam generator tube rupture. 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 Licensed Operator Performance in the Main Control Room (71111.11Q – 1 sample)

a. Inspection Scope

The inspectors observed and reviewed Unit 1 main turbine governor valve and throttle valve testing on April 9, 2016. The inspectors observed the evolution briefing and reactivity control briefing to verify that the briefings met the criteria specified in NOP-OP-1002, "Conduct of Operations" Revision 11. Additionally, the inspectors observed operator performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

.3 Licensed Operator Requalification Program (71111.11A – 2 samples)

a. Inspection Scope

Unit 1 and Unit 2 requalification examination results for year 2016 were reviewed to determine if pass/fail rates were consistent with the guidance of NRC Manual Chapter 0609, Appendix I, "Operator Requalification Human Performance Significance Determination Process (SDP)". The review was conducted to verify that the failure rate (individual or crew) did not exceed 20 percent.

b. Findings

No findings were identified.

.4 Licensed Operator Requalification Program (71111.11B – 1 sample)

a. Inspection Scope

The following inspection activities of the Unit 1 licensed operator requalification program were performed:

Unit 1 Written Examination Quality

The inspectors reviewed a sample of comprehensive written examinations that facility staff administered to Unit 1 operators in May and June 2016.

Unit 1 Operating Test Quality

The inspectors reviewed Unit 1 operating tests (scenarios and Job Performance Measures (JPMs)) associated with the on-site examination week.

Licensee Administration of Unit 1 Operating Tests

The inspectors observed facility training staff administer Unit 1 dynamic simulator examinations and JPMs during the week of April 11, 2016. These observations included facility evaluations of crew and individual operator performance during the simulator examinations and individual performance of JPMs.

Examination Security

The inspectors assessed whether facility staff properly safeguarded examination material, and whether test item repetition was excessive.

Conformance with License Conditions

License reactivation and license proficiency records were reviewed to ensure that 10 CFR 55.53 license conditions and applicable program requirements were met. The inspectors also reviewed a sample of records for requalification training attendance, and a sample of medical examinations for compliance with license conditions and NRC regulations.

Unit 1 Simulator Performance

Simulator performance and fidelity were reviewed for conformance to the reference plant control room. A sample of simulator deficiency reports was also reviewed to ensure facility staff addressed identified modeling problems.

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, 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 (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 2 structures on April 14, 2016
- Unit 2 containment on June 6, 2016

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 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 1 yellow probabilistic risk assessment (PRA) risk for auxiliary river water pumps being out of service for planned maintenance on April 11, 2016
- Unit 2 emergency diesel generator 2-1 out of service for emergent work on the voltage regulator motor-operated controller on April 29, 2016
- Unit 2 solid state protection system testing with the 'B' service water pump out of service for planned maintenance on June 2, 2016
- Unit 1 yellow PRA risk for 'B' and 'C' river water pump breaker maintenance on June 10, 2016
- Unit 2 emergency diesel generator 2-1 out of service for maintenance and main generator output breaker, PCB-362, out of service on June 21, 2016

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 6 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions:

- Unit 2 standby service water connected to service water on April 14, 2015
- American Society of Mechanical Engineers Class 2 piping leak on Unit 2 'A' atmospheric dump valve drain line on April 15, 2016
- Unit 2 emergency diesel generator 2-1 voltage spike on April 27, 2016
- Unit 1 and Unit 2 operator workarounds on May 5, 2016)
- Unit 1 'B' steam generator feedwater bypass flow-control valve (FCV-1FW-489) slow stroke times on June 7, 2016
- Unit 2 emergency diesel generator 2-1 sequencer relay replacement without required varistor for surge protection on June 22, 2016

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

Introduction. The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion III, Design Control, for FENOC's failure to assure that the regulatory requirements and design basis for the Unit 2 service water system were correctly translated into procedures. Specifically, FENOC implemented a procedure revision in 2002 that inappropriately removed the step to declare the Unit 2 service water system inoperable while the non-seismic standby service water system is aligned to it.

Description. The standby service water system is a non-safety related, non-seismic backup to the safety related service water system. Its purpose is to provide a source of service water in the event that the main intake structure and service water pumps are damaged by a postulated river barge collision. On February 1, 2016, FENOC was scheduled to perform 2OST-30.1A, "Standby Service Water Pump (2SWE-P21A) Test," followed by maintenance on the service water pump strainers. During a control room tour, the inspectors observed that the standby service water system remained coupled to the 'A' service water train following the surveillance test. The inspectors questioned the operability of the 'A' service water train since the non-seismic standby service water system was aligned to it. The shift manager stated that the 'A' service water train was operable in accordance with 2OST 30.1A and referenced CR 2002-02865 as the basis for his conclusion.

The inspectors reviewed CR 2002-02865 and the referenced assessment of operability dated December 3, 2001, and discussed their operability concerns with FENOC engineering. FENOC engineering stated that the assessment was used to address a safety system functional failure reporting question in 2001 and should not have been used to allow the deliberate degrading of the safety-related service water system by aligning the non-seismic standby service water system to it. FENOC subsequently concluded that the respective service water train should be declared inoperable while the standby service water system is aligned to it.

On February 5, 2016, FENOC issued instructions that prohibited planned testing of or swapping to the standby service water system until the operability concerns with the service water system were addressed. On March 30, 2016, 2OST-30.1A was revised to declare the respective train of service water inoperable while coupled to the standby service water system.

Operator logs documented that the standby service water system was aligned to the 'A' service water train at 9:32 a.m. on February 1, 2016. The 'A' train of service water was not declared inoperable until 8:05 p.m., when the 'A' train service water pump strainer was removed from service for maintenance.

The inspectors determined that FENOC should also have declared the 'A' train of service water inoperable during the period from 9:32 a.m. until 8:05 p.m., since the standby service water system was aligned to it for the entire timeframe. The inspectors' discussion with the shift manager indicated that there was no operational necessity to have the 'A' train of service water coupled to the standby service water system for the ten-hour duration. The inspectors concluded that, during this period, the ability of the service water system to perform its safety function during or after a seismic event was degraded since service water was being supplied from the non-seismic standby service water system. A review of operator logs for the past three years revealed that for a period of nine hours on April 3, 2014, FENOC failed to declare a train of service water inoperable when coupled to the standby service water system.

The inspectors' review of previous revisions of 2OST-30.1A showed that revision 17, effective May 3, 2002, inappropriately removed the requirement to declare the respective service water train inoperable when coupled to the standby service water system. The inspectors concluded that FENOC failed to correctly translate the design basis of the service water system into revision 17 of 2OST-30.1A.

Analysis. The inspectors determined that the failure to assure that the design basis for the Unit 2 service water system was maintained while revising 2OST-30.1A 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 Design Control 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 revision to 2OST-30.1A in 2002 resulted in the reduced reliability of the service water system while connected to the standby service water system for over ten hours of on February 1, 2016, and nine hours on April 3, 2014.

In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued June 19, 2012, 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 was of very low safety significance (Green) because it did 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 does not have a cross-cutting aspect because it is not representative of current performance. The inadequate review of revision 17 to 2OST-30.1A was an isolated instance that occurred over 14 years ago. Furthermore, the most recent NRC inspection of Changes, Tests, or Experiments and Permanent Plant Modifications, performed in 2013, and the Component Design Basis Inspection, performed in 2014, did not document any findings related to procedure changes.

Enforcement. 10 CFR 50 Appendix B, Criterion III, "Design Control," requires, in part, that the regulatory requirements and design basis for structures, systems, and components are correctly translated into procedures. Contrary to the above, FENOC failed to correctly translate the service water system design basis into a procedure. Specifically, from May 3, 2002 until February 5, 2016, FENOC failed to ensure that procedure 2OST-30.1A adequately addressed the operability of the service water system when coupled to the standby service water system. FENOC's immediate corrective actions included issuing instructions that prohibit planned testing of or swapping to the standby service water system and the revising procedure 2OST-30.1A. Because this finding is of very low safety significance (Green) and the issue was entered into FENOC's corrective action program, CR 2016-01710, this violation is being treated as a NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy.
(NCV 5000412/2016002-01, Procedure Change Results in Failure to Maintain the Design Basis for the Service Water System)

1R18 Plant Modifications (71111.18 – 1 sample)

a. Inspection Scope

The inspectors evaluated a modification to the Unit 2 emergency diesel generator 2-1 sequencer implemented by engineering change package 11-0154, "Replacements for EDG 2-1 and 2-2 ATC Co. Model 365A/365B Relays." 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 design change, including work orders, drawings and spare parts. The inspectors interviewed engineering and maintenance personnel to ensure the appropriate qualification testing of the relays was completed. The inspectors also walked down the installed relays to verify that the relays were properly installed.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 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 1 'B' charging pump inboard/outboard mechanical seals and bearing replacement on April 22, 2016
- Unit 2 emergency diesel generator 2-1 voltage regulator motor-operated controller testing on April 29, 2016
- Unit 2 'A' LHSI pump motor and discharge valve maintenance on May 23, 2016

- Unit 1 'B' steam generator feedwater bypass flow control valve maintenance on May 25, 2016
- Unit 2 'B' service water pump motor replacement on June 7, 2016
- Unit 1 MOV-1RW-102A2, 1A river water pump discharge valve to 'A' header, maintenance on June 16, 2016

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 6 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:

- 1OST-24.2, Motor Driven Auxiliary Feed Pump Test [1FW-P-3A], Revision 53 on April 7, 2016 (IST)
- 2OST-36.2, Emergency Diesel Generator [2EGS*EG2-2] Monthly Test, Revision 72 on April 15, 2016
- 1OST-13.7E, 2A Recirculation Spray Pump Auto Start Test, Revision 7 on April 19, 2016 (IST)
- 1BVT1.39.14, Station Battery Charger (BAT-CHG1-1A and BAT-CHG1-1B) Load Test, Revision 5 on May 16, 2016
- 1MSP-1.04-I, Reactor Protection System Train A Test, Revision 51 on May 19, 2016
- 1/2RCP-38B-PC, Calibration of ITE/ABB Three Phase Overcurrent Relays Type 51 with SCR Outputs, Revision 8 and 1/2RCP-11-PC, Calibration of Ground Fault Relays, Types ITE/ABB GR-5 and GR-200, Revision 7 on the Unit 2 'A' Service Water Pump breaker on June 23, 2016

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06 – 1 sample)

Training Observations

a. Inspection Scope

The inspectors observed a simulator training evolution for Unit 2 licensed operators on April 19, 2016, which required emergency plan implementation by an operations crew. FENOC planned for this evolution to be evaluated and included in performance indicator data regarding drill and exercise performance. The inspectors observed event classification and notification activities performed by the crew. The inspectors also attended the post-evolution critique for the scenario. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's performance and ensure that FENOC evaluators noted the same issues and entered them into the corrective action program.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures (2 samples)

a. Inspection Scope

The inspectors sampled FENOC's submittals for the Safety System Functional Failures performance indicator for both Unit 1 and Unit 2 for the period of April 1, 2015, to March 31, 2016. To determine the accuracy of the performance indicator data reported during those periods, inspectors used definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, and NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73." The inspectors reviewed FENOC's operator narrative logs, operability assessments, CRs, event reports and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Reactor Coolant System (RCS) Specific Activity and RCS Leak Rate (4 samples)

a. Inspection Scope

The inspectors reviewed FENOC's submittal for the RCS specific activity and RCS leak rate performance indicators for both Unit 1 and Unit 2 for the period of April 1, 2015, to March 31, 2016. 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 RCS sample analysis and control room logs of daily measurements of RCS leakage, and compared that information to the data reported by the performance indicator. Additionally, the inspectors observed surveillance activities that determined the RCS identified leakage rate, and chemistry personnel taking and analyzing an RCS sample.

b. Inspection 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 CR screening meetings.

b. Findings

Introduction. The inspectors identified a Green NCV of 10 CFR 50.54(q)(2) for FENOC's failure to follow and maintain the effectiveness of an emergency plan that meets the planning standards of 10 CFR 50.47(b)(4). Specifically, following the failure of the ARM for the Unit 2 primary auxiliary building 773' elevation on April 23, 2016, FENOC did not establish adequate compensatory measures to ensure the effectiveness of the EAL for loss of control of radioactive material, RU2.

Description. On April 23, 2016, an ARM for the Unit 2 primary auxiliary building 773' elevation was taken out-of-service due to a loss of communications failure. On April 25, 2016, the inspectors performed a walkdown of FENOC's compensatory measures for the out-of-service ARM. The inspectors noted that a portable radiation detector (AMP-50) was placed in the proximity of the ARM that read .017 millirem/hour (mR/hr). The inspectors reviewed compensatory measures specified in procedure BVRM-EP-5003, "Equipment Important to Emergency Response," and determined that the alarm setpoint for the AMP-50 is required to be placed at 1000 times background radiation levels in the proximity of the failed ARM, approximately 17 mR/hr. The inspectors questioned the alarm setpoint of the AMP-50 and a radiation protection technician determined that the detector was set at 50 mR/hr, almost 3000 times background. The technician measured background radiation levels of .01 to .02 mR/hr with another portable radiation detector (Fluke 451B), and set the alarm setpoint of the AMP-50 to 10 mR/hr (the AMP-50 interface allowed the user to select alarm setpoints of 10, 20, and 50 mR/hr).

The inspectors reviewed procedure A5.735A, Section 4, “Emergency Conditions,” and noted that EAL RU2 requires an NOUE emergency classification level if an unplanned radiation monitor or radiation survey is greater than 1000 times normal levels. RU2 addresses increases in plant radiation levels that represent a loss of control of radioactive material resulting in a potential degradation in the level of safety of the plant. The term “normal levels” in A5.735A, Section 1, “Definitions,” is defined as the highest reading in the past 24 hours excluding the current peak value. The inspectors determined that FENOC used a radiation survey from January 12, 2016, to set the AMP-50 alarm setpoint at 50 mR/hr on April 23, 2016. The highest measured radiation level documented in the proximity of the ARM on January 12, 2016, was .05 mR/hr. The inspectors concluded that FENOC failed to meet the requirements of BVRM-EP-5003 and A5.735A from April 23, 2016, to April 25, 2016, when the alarm setpoint of the AMP-50 was not set at 1000 times the highest background radiation levels measured in the past 24 hours.

Analysis. The inspectors determined that failure to establish adequate compensatory measures to ensure the effectiveness of the EAL for loss of control of radioactive material, RU2, 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 because it was associated with the Facilities and Equipment attribute of the Emergency Preparedness cornerstone, and adversely affected the cornerstone objective to ensure that FENOC is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, FENOC’s failure to establish adequate compensatory measures for an out-of-service ARM could have resulted in exceeding a NOUE EAL threshold for a loss of control of radioactive material without the condition being recognized until further degradation in the level of plant safety occurs.

In accordance with IMC 0609, Attachment 4, “Initial Characterization of Findings,” issued June 19, 2012, and Figure 5.4-1 of IMC 0609, Appendix B, “Emergency Preparedness Significance Determination Process,” issued September 22, 2015, the inspectors determined that this finding was of very low safety significance (Green) since it was an example of an ineffective EAL, such that a NOUE would not be declared or would be declared in a degraded (untimely) manner.

The inspectors determined that this finding has a cross-cutting aspect in Human Performance, Documentation, because FENOC did not ensure that plant activities are governed by comprehensive procedures. Specifically, FENOC’s procedure for implementing compensatory measures, BVRM-EP-5003, failed to specify that radiation protection technicians shall set the alarm setpoint of compensatory portable radiation detectors based on a radiation survey completed within the past 24 hours [H.7].

Enforcement. 10 CFR 50.54(q)(2) requires that FENOC follow and maintain the effectiveness of an emergency plan that meets the planning standards of 10 CFR 50.47(b)(4). 10 CFR 50.47(b)(4) requires, in part, that emergency response plans include a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters. Contrary to the above, FENOC failed to follow and maintain the effectiveness of an emergency plan that meets the planning standards of 10 CFR 50.47(b)(4). Specifically, from April 23, 2016, to April 25, 2016, FENOC did not establish adequate compensatory measures for an out-of-service ARM for the Unit 2 primary auxiliary building 773’ elevation. This resulted in RU2 being rendered ineffective such that a NOUE for loss of control of radioactive material would be declared in a degraded manner. FENOC’s immediate corrective actions included

establishing appropriate compensatory measures for RU2, communicating the standards of EAL compensatory measures to radiation protection technicians verbally and via narrative logs, and entering this issue into their CAP. Because this finding was of very low safety significance (Green) and was entered into FENOC's CAP as CR 2016-05975, this violation is being treated as a NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (**NCV 05000412/2016002-02, Inadequate Compensatory Measures to Ensure the Effectiveness of an EAL**)

.2 Annual Sample: Unit 2 Heater Drain System Malfunction Caused 40 Percent Power Reduction

a. Inspection Scope

The inspectors performed an in-depth review of FENOC's apparent cause analysis and corrective actions associated with CR 2015-05088, Unit 2, Heater Drain System Malfunction Caused 40 Percent Power Reduction. Specifically, the first point heater normal and high level control valve setpoints were improperly adjusted which resulted in diverging oscillations in the 'A' first point feedwater heater level due to cycling of the normal and high level control valve. This reduced flow into the 'A' heater drain receiver tank and tripped the 'A' heater drain pump when the tank level reached the lo-lo level setpoint. Operations reduced power to 60 percent and stabilized the plant. 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 corrective action program. 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.

The inspectors determined that the apparent cause evaluation was performed in accordance with the FENOC Cause Analysis procedure, NOBP-LP-2011. FENOC determined the apparent cause was a lack of sensitivity in the organization related to the overall impact of adjustments to feedwater heater level controllers. The focus was on preventing the high level control valve from opening and avoiding level alarms rather than properly adjusting the level controllers. Contributing causes were improper level control valve controller setpoints, a controller in need of tuning, inadequate work order instructions, and no work was scheduled to address adverse 'A' first point heater level conditions identified in two CRs. Corrective actions included operations, engineering, and maintenance training, industry benchmarking on feedwater heater adjustments, and revising maintenance plans and procedures for adjusting feedwater heater controllers. The inspectors determined that the corrective actions assigned were appropriate to address the apparent cause and contributing causes.

The inspectors determined that the apparent cause evaluation was performed in accordance with the FENOC Cause Analysis procedure, NOBP-LP-2011. FENOC determined the apparent cause was a lack of sensitivity in the organization related to the overall impact of adjustments to feedwater heater level controllers. The focus was on preventing the high level control valve from opening and avoiding level alarms rather than properly adjusting the level controllers. Contributing causes were

improper level control valve controller setpoints, a controller in need of tuning, inadequate work order instructions, and no work was scheduled to address adverse 'A' first point heater level conditions identified in two CRs. Corrective actions included operations, engineering, and maintenance training, industry benchmarking on feedwater heater adjustments, and revising maintenance plans and procedures for adjusting feedwater heater controllers.

At the time of the review, all corrective actions associated with CR 2015-05088 were complete. The inspectors concluded that, in general, the implemented corrective actions adequately addressed the causes with the exception of corrective actions assigned to instrumentation and controls (I&C). The I&C corrective action was to review the condition report during the 2015 continuing training class. The review consisted of two slides and covered a brief summary of the event and the causes. The inspectors found it unusual that key learnings were not made into presentation slides. From the review of the apparent cause evaluation, the inspectors concluded that the organization's lack of sensitivity to the impact of adjustments to the feedwater heater level controllers indicated that there were gaps in either knowledge or standards for both the I&C technicians and supervision. These gaps were not directly addressed as part of the corrective action. The inspectors concluded that the training implemented for I&C did not adequately address the apparent and contributing causes. FENOC entered the issue into the corrective action process as CR 2016-08275.

.3 Annual Sample: Operations Crew Decision Making

a. Inspection Scope

The inspectors performed an in-depth review of FENOC's apparent cause analysis and corrective actions associated with CR 2015-12027, "Improvement Opportunities Identified in Operations Crew Decision Making." This apparent cause analysis is a roll-up to determine the common theme of three events: a Unit 2 manual reactor trip due to meeting pre-determined steam generator water level trip criteria (CR 2014-09256), a Unit 1 manual reactor trip due to a condensate pump trip (CR 2015-05256), and the inadvertent closure of a Unit 1 main turbine governor valve (CR 2015-08263). Specifically, FENOC identified several opportunities following each event where operations crews could have better utilized available resources (process, personnel, and management involvement) to improve crew decision making. 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 corrective action program. In addition, the inspectors interviewed training personnel to assess the effectiveness of the implemented corrective actions.

b. Observations

FENOC determined that the apparent cause was the use of an intuitive rather than a logical decision-making processes. Specifically, FENOC determined that in each of the three events, the crew's decision-making was based on previous experiences, leading to a more intuitive approach to the decision, rather than a logical, process-driven approach.

FENOC's corrective action was for the operations department to benchmark industry decision-making leadership training approaches. FENOC altered this corrective action and instead of the proposed corrective action, the training department performed research outside of the nuclear power industry, developed training material, and presented the training to each operations crew. FENOC's decision-making training involved a discussion of the operations crew decision-making process for each of the three events, an interactive discussion of how information is processed by the human brain to arrive at a decision, a critique of past decisions, and a review of FENOC's decision-making processes and procedures. The inspectors concluded that, in general, the implemented corrective action adequately addressed the apparent cause.

The inspectors noted that for one of the events, the Unit 1 manual reactor trip due to a condensate pump trip, the training material focused on the decisions leading up to the reactor trip but failed to cover the errors that were identified with the operations crew decision making during the reactor trip response. Following the reactor trip, the crew completed the immediate operator actions and entered emergency operating procedure (EOP) ES-0.1, "Reactor Trip Response." The inspectors noted that while in EOP ES-0.1, the crew made the decision to violate EOP rules-of-usage stated in 1/2OM-53B.2, "User's Guide." The inspectors determined that the EOP rules-of-usage were violated when the crew inappropriately returned to a step that was not designated as a continuous action step (step 8 in ES-0.1), after having already completed the step, nine minutes prior. While in step 8 for the second time, the crew again made the decision to violate the EOP rules-of-usage when they inappropriately answered the step as "response not obtained" and initiated emergency boration even though the crew had indications that the expected response could be obtained. The inspectors determined that the performance deficiencies associated with EOP rules-of-usage were minor violations since the crew's decisions were based on the presumption that their actions were conservative, and the emergency boration was of no consequence to the reactor. The inspectors noted that, although the operations crew's decision process was not covered in the roll-up CR, corrective actions in CR 2015-05422 addressed this issue

c. Findings

Introduction. A Green self-revealing finding of NOP-OP-1002, "Conduct of Operations," was identified for FENOC's failure to adequately implement operator fundamentals. Specifically, operators did not appropriately utilize multiple and diverse indications when making the decision to isolate EHC to a Unit 1 main turbine governor valve. This resulted in an unanticipated reactor power reduction of 2.7 percent.

Description. On June 15, 2015, Unit 1 was at 49 percent power when operators transferred Unit 1 main turbine control from first stage IN to first stage OUT to support flux mapping following an outage. In first stage IN control, the valves that control steam to the main turbine, the governor valves, are positioned by the EHC system using a signal from first stage pressure. In first stage OUT control, the EHC system positions the governor valves using an electrical reference signal that corresponds to desired valve position. Following the transfer from first stage IN to first stage OUT control, operators noted that first stage pressure increased by approximately 5 psig. The 5 psig change in first stage pressure is not unusual for a transfer of turbine control at 49 percent power, however, operators typically transfer turbine control close to 100 percent power where the transfer has much less of an effect on first stage pressure; therefore, the expected change in first stage pressure was not included in the power ascension brief.

An increase in first stage pressure is indicative of more steam being admitted to the main turbine (governor valves opening more); however, operators misdiagnosed this indication as governor valve GV-1 failing closed. An operator was dispatched to verify local position of GV-1, without a peer check, and reported to the main control room that GV-1 was closed when it was actually approximately one inch open. A diverse valve position in the main control room indicated that GV-1 was 6 percent open, but operators did not believe the indication to be accurate. Operators isolated EHC to GV-1 causing the valve to close. This resulted in an unanticipated reactor power reduction of 2.7 percent. However, under normal full-power conditions, the consequences of GV-1 closure would have been more significant in that it would have resulted in a more significant plant transient and could have challenged plant equipment and operators. FENOC classified this issue as a Level 3 reactivity management event, which is a reactivity management event that represents a failure to follow process or procedures.

NOP-OP-1002, step 4.2.3, "Operator Fundamentals," requires, in part, that operators use multiple and diverse indications to make operational decisions, and believe and respond promptly to indications unless proven incorrect. The inspectors concluded that FENOC failed to meet the requirements of NOP-OP-1002 when operators did not appropriately utilize multiple and diverse indications when making the decision to isolate EHC to GV-1.

Analysis. The inspectors determined that failure to adequately implement operator fundamentals, in accordance with NOP-OP-1002, 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 because, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Specifically, if the inadvertent closure of a main turbine governor valve had occurred at a higher reactor power, it would have resulted in a more significant plant transient and could have challenged plant equipment and operators. Additionally, example 4.b from IMC 0612 Appendix E, "Examples of Minor Issues," issued August 11, 2009, details that a performance deficiency is more-than-minor if it causes a reactor trip or other transient.

In accordance with IMC 0609, Attachment 4, "Initial Characterization of Findings," issued June 19, 2012, and Exhibit 1 of IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, the inspectors determined that this finding was of very low safety significance (Green) since it did not cause both a reactor trip and the loss of mitigation equipment relied upon to transition the plant to a stable shutdown condition.

The inspectors determined that this finding has a cross-cutting aspect in Human Performance, Challenge the Unknown, because individuals did not consult the system expert when confronted with an unexpected condition. Specifically, the operations crew failed to advise the main turbine system engineer of the main control room indications and obtain recommendations prior to isolating EHC to GV-1 [H.11].

Enforcement. NOP-OP-1002 is not a procedure recommended by Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2, and the human performance error did not involve a safety-related SSC. Therefore, the inspectors did not identify a violation of regulatory requirements associated with this finding. FENOC's immediate corrective actions included re-opening the governor valve, verifying proper system response, and entering this issue into their CAP as CR-2015-08263.

Because this finding did not involve a violation and was of very low safety significance (Green), it is identified as a FIN. (**FIN 05000334/2016002-03, Failure to Appropriately Utilize Multiple and Diverse Indications Results in Plant Transient**)

4OA6 Meetings, Including Exit

On July 19, 2016, the inspectors presented the inspection results to Mr. M. Richey, Site Vice President, 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

Licensee Personnel

M. Richey	Site Vice President
C. McFeaters	General Plant Manager
G. Caccani	10 CFR 50.59 Program Manager
W. Cothen	Regulatory Assurance Manager
A. Delmonico	Maintenance Supervisor
J. Detray	Instrumentation and Controls Supervisor
D. DiCicco	Training Instructor
R. Egolf	Service Water System Engineer
M. Enos	Unit 2 Supervisor of Plant Operations
J. Flaherty	Electrical Design Engineer
C. Flaim	Work Management Consultant
T. Gaydosik	Fleet Exam Development Lead
D. Gibson	Training Manager
M. Gorham	4 Kilovolt System Engineer
P. Hartig	Unit 1 Shift Manager
J. Iliff, Supervisor	Licensed Operator Continuing Training (incumbent)
M. Jansto	Emergency Diesel Generator System Engineer
D. Jones	System Engineer, In-service Testing
M. Kienzle	System Engineer
R. Kristophel	Unit 1 Operations Superintendent
J. Kunz	Training Special Assignment
J. Martin	Instrumentation and Controls Training Coordinator
E. McFarland	Supervisor, Simulator Group
J. Miller	Fire Marshall
J. Ostrowski	GL 89-13 Site Program Owner
J. Patterson	Reactor Coolant System Engineer
B. Paul	Design Engineer
K. Rogers	Work Week Manager
J. Sheetz	Work Week Management Risk Specialist
M. Stoner	Instrumentation and Controls Superintendent
E. Thomas	Supervisor, Regulatory Compliance
D. Tiberio	Operations Instructor
K. Tiefenthal	Shift Manager
J. Tolbert	Supervisor, Licensed Operator Continuing Training (outgoing)
D. Wacker	Compliance Engineer
Z. Warchol	System Engineering Supervisor
M. Wimmel	Motor-Operated Valve Engineer
T. Winfield	Electrical Relay Supervisor
D. Wertz	Operations Simulator Instructor
D. Wilson	Air-Operated Valve Engineer
R. Winters	Chemistry Specialist

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000412/2016002-01	NCV	Procedure Change Results in Failure to Maintain the Design Basis for the Service Water System (Section 1R15)
05000412/2016002-02	NCV	Inadequate Compensatory Measures to Ensure the Effectiveness of an EAL (Section 4OA2.1)
05000334/2016002-03	FIN	Failure to Appropriately Utilize Multiple and Diverse Indications Results in Plant Transient (Section 4OA2.3)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures
½-ADM-2106, River/Service Water System Control and Monitoring Program, Revision 5
NOP-WM-2001, Work Management Scheduling, Assessment and Seasonal Readiness Process, Revision 19

Condition Reports
2015-08696
2015-08708
2015-10186
2015-12597
2015-15527
2016-06622
2016-06978

Miscellaneous
2016 Summer Readiness Work Order Spreadsheet
Site Certification Letter for Summer Readiness, dated May 31, 2016

Section 1R04: Equipment Alignment

Procedures
1OM-11.3.B.1, Valve List – 1SI, Revision 20
1OM-11.3.C, Power Supply and Control Switch List, Revision 8
1OM-24.3.B.1, Valve List – 1FW, Revision 21
1OM-24.3.C, Power Supply and Control Switch List, Revision 14
1OM-30.3.B.1, Valve List – 1RW, Revision 53
2OM-11.3.B.1, Valve List – 2SIS, Revision 16
2OM-11.3.B.2, Valve List – 2GNS, Revision 11

Drawings
RM-0411-001, Piping & Instrumentation Diagram Safety Injection System, Revision 27
RM-0424-002, Valve Oper No Diagram Feedwater System, Revision 19
RM-0430-003, Piping & Instrumentation Diagram River Water System, Revision 29

Section 1R05: Fire Protection

Miscellaneous
1PFP-AXLB-735, Auxiliary Building General Area, Fire Area PA-1E, Revision 2
1PFP-AXLB-752, Auxiliary Building General Area, Fire Area PA-1C, on Revision 3
1PFP-SFGB-735, AUX FW & QS Pumps, Fire Area QP-1, Revision 0
2PFP-CNTB-725, Cable Spreading Area, Fire Area 2-CB-2, Revision 5
2PFP-MSCV-773, Personnel Air Lock and Purge Duct Rooms, Fire Area CV-5, Revision 0
BVPS-2 Fire Protection Safe Shutdown Report Addendum 38

Section 1R07: Heat Sink Performance

Procedures:
1/2-ADM-2106, River/Service Water System Control and Monitoring Program, Revision 6
1BVT 01.13.05, Inside Recirculation Spray Pump Test, Revision 28
BVPM-CHEM-0003, Closed Loop and Raw Water Systems Strategic Water Plan, Revision 2
NOP-ER-2006, Service Water Reliability Management Program, Revision 3
NOP-OP-3602, Microbiologically Influenced Corrosion Monitoring Program, Revision 0

Condition Reports:
2015-05842
2016-00603
2016-01093
2016-03098

Work Orders:
200542305
200544758
200546744
200587681
200587678
200587561
200587577

Miscellaneous:
10080-DMC-0080, Heat Exchanger Performance at River Water Temperature of 89 °F, Revision 0
8700-DMC-1432, Emergency Diesel Generator Jacket Water Heat Exchanger Minimum Tube Wall and Maximum Tube Plugging Calculation, Revision 1
8700-US(B)-263, Beaver Valley Unit 1 Containment Response for Design Basis Accidents for Containment Atmospheric Conversion Project, Revision 4
1BVT 01.13.05, Inside Recirculation Spray Pump Test, Revision 28, completed May 19, 2015
ASME Boiler and Pressure Vessel Code Case N-513-2, Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1
Beaver Valley Program Manual, Closed Loop and Raw Water Systems Strategic Water Plan, Revision 0
Beaver Valley Response to Generic Letter 89-13, January 29, 1990
ECP 13-0499-001, Repair of pipe line 24”-WR-20-151-Q3

EPRI NP-7552, Heat Exchanger Performance Monitoring Guidelines, December 1991
EPRI TR-1025318, Open Cooling Water Guideline, September 17, 2012
EPRI TR-103403, Service Water System Corrosion and Deposition Sourcebook, December 1993
EPRI TR-107397, Service Water Heat Exchanger Testing Guidelines, March 1998
Generic Letter 89-13, ServiceWater System Problems Affecting Safety-Related Equipment
Generic Letter 89-13, Supplement 1, Service Water System Problems Affecting Safety-Related Equipment
River Water System Health Reports 2014-2 and 2015-02
River Water/ Service Water Action Plan, Revision 1, February 5, 2013
Self-Assessment Snapshot, Beaver Valley 89-13 Program Assessment, SN-SA-2015-0349, February 4, 2016

Section 1R11: Licensed Operator Requalification Program

Procedures
1/2-ADM-1351, Licensed Operator Continuing Training Program
1/2-ADM-1362, Security Provisions for Licensed Operator Examinations
1OM-26.4.AK, Recovering Governor Valves from the Limiter, Revision 7
1OM-52.4.B, Load Following, Revision 53
2016 LOR Annual Operating Exam Sample Plan
BVBP-TR-0008, Licensed Operator Requalification Exam Development and Administration
NOBP-TR-1112, FENOC Conduct of Simulator Training and Evaluation, Revision 2
NOP-LP-5011, Emergency Response Drill and Exercise Program, Revision 7
NOP-OP-1002, Conduct of Operations, Revision 11
NOP-OP-1004, Reactivity Management, Revision 13
NORM-OP-1002, Conduct of Operations, Revision 5

Job Performance Measures
1AD-016 and 019
1CR-596
1CR-660
1PL-041
1PL-153

Comprehensive Written Exams
2016U1C3E2
2016U1C3E3
2016U1C3E4

Simulator Scenarios
1DRLS-FR-H.1.002
1DRLS-E-3.008
1DRLS-FR-S.1.005

Simulator Testing
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Procedures
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LIST OF ACRONYMS

AC	alternating current
ADAMS	Agencywide Documents Access and Management System
ARM	area radiation monitor
BVPS	Beaver Valley Power Station
CAP	corrective action program
CFR	*Code of Federal Regulations*
CR	Condition Report
EAL	emergency action level
EHC	electro-hydraulic control
EOP	emergency operating procedure
FENOC	FirstEnergy Nuclear Operating Company
GL	[NRC] Generic Letter
GV	governor valve
I&C	instrument and controls
IMC	Inspection Manual Chapter
IST	in-service testing
JPM	Job Performance Measures
LHSI	low head safety injection
mR/hr	millirem/hour
NCV	non-cited violation
NOUE	notification of unusual event
NEI	Nuclear Energy Institute
PRA	Probabilistic Risk Assessment
NRC	Nuclear Regulatory Commission
RCS	reactor coolant system
RSS	recirculation spray system
SSC	structure, system, or component
UFSAR	Updated Final Safety Analysis Report