November 24, 2008

Mr. Peter P. Sena, III
Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P. O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION– NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000334/2008008 AND 05000412/2008008

Dear Mr. Sena:

On October 10, 2008, The U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Beaver Valley Power Station (BVPS) Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on October 10, 2008, 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. In conducting the inspection, the team examined the adequacy of selected components and operator actions to mitigate postulated transients, initiating events, and design basis accidents. The inspection involved field walkdowns, examination of selected procedures, calculations and records, and interviews with station personnel.

This report documents one NRC-identified finding which was of very low safety significance (Green). The finding was determined to involve a violation of NRC requirements. However, because of the very low safety significance of the violation and because it was entered into your correction action program, the NRC is treating it as a non-cited violation (NCV) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspectors at the Beaver Valley Power Station.

In accordance with 10 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 the public inspection in the NRC Public Docket Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-334, 50-412
License No. DPR-66, NPF-73

Enclosure: Inspection Report 05000334/2008008 and 05000412/2008008
w/Attachment: Supplemental Information

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REGION 1

Docket Nos.:	50-334, 50-412
License Nos.:	DPR-66, NPF-73
Report No.:	05000334/2008008, 05000412/2008008
Licensee:	FirstEnergy Nuclear Operating Company (FENOC)
Facility:	Beaver Valley Power Station, Units 1 & 2
Location:	Shippingport, PA
Dates:	September 15 – October 10, 2008
Inspectors:	K. Mangan, Senior Reactor Inspector, Team Leader S. Pindale, Senior Reactor Inspector P. Kaufman, Senior Reactor Inspector J. Tifft, Reactor Inspector M. Balazik, Reactor Inspector W. Sherbin, NRC Mechanical Contractor J. Chiloyen, NRC Electrical Contractor
Approved by:	Lawrence T. Doerflein, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000334/2008008, 05000412/2008008; 09/15/2008 – 10/10/2008; Beaver Valley Power Station; Component Design Bases Inspection.

The report covers the Component Design Bases Inspection conducted by a team of five NRC inspectors and two NRC contractors. One finding of very low risk significance (Green) was identified, which was considered to be a non-cited violation. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

Green. The team identified a finding of very low safety significance involving a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, in that FENOC did not take adequate corrective action following the identification of a condition adverse to quality. Specifically, in 2004, 2005 and 2006, FENOC identified that if the Unit 1 river water (RW) system or the Unit 2 service water (SW) system was aligned to the suction of the auxiliary feedwater (AFW) pumps it could result in blockage of cooling water flow for the pumps, but did not take actions to correct the deficiency. FENOC entered the issue into their corrective action program to correct the non-conformance. In addition, FENOC developed Operations Department standing orders to limit the use of TS action statement 3.7.6.a which credited the use of the lineup, and formalized compensatory actions to address an Appendix R compliance deficiency.

The finding was more than minor because there was reasonable doubt as to the operability of the AFW system when supplied from RW or SW systems. In addition, the finding was associated with the design control attribute of the Mitigating Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since the finding represented a potential loss of safety function, the team conducted Significance Determination Process (SDP) Phase 2 and Phase 3 analyses which determined the finding was of very low safety significance (Green).

Finally, the finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program Component, because FENOC did not adequately evaluate this condition adverse to quality, including classifying, prioritizing, and evaluating for operability when it was identified in February 2004, and again in March 2005 and June 2006. (IMC 0305, Aspect P.1(c)). (Section 1R21.2.1.1)

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, Barrier Integrity

1R21 Component Design Bases Inspection (IP 71111.21) (samples 24)

.1 Inspection Sample Selection Process

The team selected risk significant components and operator actions for review using information contained in the Beaver Valley Power Station Probabilistic Risk Assessment (PRA) and the U. S. Nuclear Regulatory Commission's (NRC) Standardized Plant Analysis Risk (SPAR) model. Additionally, the Beaver Valley Power Station Unit 1 and 2 Significance Determination Process (SDP) Phase 2 Notebook, Revision 2.1a, was referenced in the selection of potential components and operator actions for review. In general, the selection process focused on components and operator actions that had a Risk Achievement Worth (RAW) factor greater than 1.3 or a Risk Reduction Worth (RRW) factor greater than 1.005. The components selected were located within both safety-related and non-safety related systems, and included a variety of components such as pumps, breakers, heat exchangers, electrical busses, transformers, and valves.

The team reviewed a list of components and operator actions based on the risk factors previously mentioned. Additionally, the team reviewed the previous component design bases inspection report (05000334/2006008 and 05000412/2006008) and excluded those components previously inspected. The team then performed a margin assessment to narrow the focus of the inspection to 24 samples including 18 components, 5 operator actions and 1 operating experience review. The team's evaluation of possible low design margin included consideration of original design issues, margin reductions due to modifications, or margin reductions identified as a result of material condition/equipment reliability issues. The assessment also included items such as failed performance test results, correction action history, repeated maintenance, maintenance rule (a)1 status, operability reviews for degraded conditions, NRC resident inspector insights, system health reports, and industry operating experience. Finally, consideration was also given to the uniqueness and complexity of the design and the available defense-in-depth margins. The margin review of operator actions included complexity of the action, time to complete the action, and extent-of-training on the action.

The inspection performed by the team was conducted as outlined in NRC Inspection Procedure (IP) 71111.21. This inspection effort included walkdowns of selected components, interviews with operators, system engineers and design engineers, and reviews of associated design documents and calculations to assess the adequacy of the components to meet design basis, licensing basis, and risk-informed beyond design basis requirements. A summary of the reviews performed for each component, operator action, operating experience sample, and the specific inspection findings identified are discussed in the subsequent sections of this report. Documents reviewed for this inspection are listed in the Attachment.

.2 Results of Detailed Reviews

.2.1 Results of Detailed Component Reviews (18 samples)

.2.1.1 Unit 2 Motor Driven Auxiliary Feedwater Pump (2FE-P23A)

a. Inspection Scope

The team inspected the motor driven auxiliary feedwater (MDAFW) pump to verify the pump was capable of performing its design basis function. The team reviewed drawings, calculations, hydraulic analyses, procedures, system health reports, and design basis documents (DBDs) to evaluate whether the maintenance, testing, and operation of the MDAFW pump was adequate to ensure the pump could deliver the design basis flow at the required pressure to the steam generators under transient and accident conditions. The team reviewed calculations for available net positive suction head, pump minimum flow, run-out protection, and temperature qualification of equipment to ensure the pump could operate under all design basis conditions. Surveillance test results were reviewed to determine if the pump was operating within established acceptable criteria, and the team also verified that the test acceptance critieria ensured the pump could meet the design requirements.

The team reviewed electrical calculations, drawings and equipment specifications to determine whether adequate voltage and current would be available at the pump motor terminals for starting and running under worst case voltage conditions and to determine if the motor capacity was adequate for the loading requirements. Protective relay settings, motor feeder cable ampacity and cable short circuit current capability were also reviewed to determine whether appropriate electrical protection coordination margins had been applied and whether the feeder cable had been properly sized for the maximum loading and short circuit current capability requirements.

The team reviewed the MDAFW lube oil cooling system to assess if the lube oil cooler would work under design basis conditions. In addition, the team reviewed the adequacy of water supply sources to the pump including an assessment of the potential for vortex conditions in the primary plant demineralized water storage tank (PPDWST), and the ability to transfer the pump suction to alternate water sources, including safety-grade river water. The team performed a walkdown of the MDAFW pump and supporting equipment to determine whether the alignment was in accordance with design basis and procedural requirements, and to assess the material condition of the pump. Finally, the team reviewed corrective action documents to ensure problems associated with the pump were appropriately identified and corrected.

b. Findings

Introduction: The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, in that FENOC did not properly evaluate and take adequate corrective actions for a condition adverse to quality. Specifically, FENOC identified that if the safety-related Unit 1 river water (RW) system or the Unit 2 service water (SW) system was aligned to the suction of the auxiliary feedwater (AFW) pumps it could result in blockage of cooling water flow for the pumps, but did not take actions to correct the deficiency.

Discussion: The team reviewed FENOC's response to NRC Information Notice (IN) 2004-01 that described the potential for failure of AFW systems due to plugging of orifices in the minimum flow recirculation line if the system is aligned to raw water. FENOC's evaluation concluded that the potential for clogging of AFW components due to supplying water from the Ohio River via the SW or RW systems did not present a challenge to plant safe shutdown capability because the lineup was an alternate source and only used if the safety related primary plant demineralized water storage tank (PPDWST) was unavailable. In addition, other non-safety related water sources would be preferentially used instead of the RW/SW system.

In 2005 (CR 05-01577), FENOC questioned whether the potential for this lineup to clog the AFW pump minimum flow recirculation line orifices and lube oil cooling line orifices was a concern in relation to regulatory requirements. FENOC's investigation concluded that there would be reasonable assurance that the AFW system would continue to function in the RW/SW lineup until the AFW was no longer required, and this lineup would only be used for beyond design basis event scenarios because it was only credited as a defense-in-depth system. In 2006 (CR 06-03595), another evaluation stated that the response to IN 2004-01 should be enhanced because it did not identify follow-up corrective actions to assess the effect on all plant procedures and analyses that may credit the RW/SW lineup. FENOC identified during this investigation that BVPS Unit 2 Updated Final Safety Analysis Report (UFSAR) describes assumptions used in the reliability analyses for AFW that specifically credited the SW source as a rationale for not modeling a pipe rupture in the piping from the PPDWST; and concluded that the turbine driven auxiliary feedwater (TDAFW) pump lube oil cooler orifices in Units 1 and 2, and Unit 1 TDAFW and MDAFW pump minimum flow paths may be susceptible to plugging if RW/SW lineup was used. Finally, in 2006, FENOC determined that RW lineup was credited for Appendix R shutdown to cold standby for Unit 1; however, because other sources of water were available no corrective or compensatory actions were required.

The team reviewed the design of the AFW system and determined that the safety grade PPDWST was the credited water source to meet Technical Specification (TS) operability requirements for both AFW systems. The team reviewed operating procedures and found they directed operators to use available water sources (non-safety related) to supply the AFW pumps if the PPDWST became unavailable and the final choice for a water supply to the pumps was the RW/SW lineup. The team then reviewed the TS, the TS bases, the UFSAR and associated Safety Evaluation Reports (SERs) to determine if the licensing and/or design bases credited this lineup. The team found that TS Action Statement 3.7.6.a credits the RW/SW lineup as the allowed water source if the PPDWST is not available to allow continued operation of the unit. In addition, the team found that the UFSAR describes the RW/SW lineup as a long term source of cooling water. The NRC SER Section 10.4.9 written to discuss how the AFW system meets Appendix A General Design Criteria credits the RW/SW lineup as the long term safety grade source of water for AFW. Finally, the team reviewed the SER associated with the Beaver Valley Unit 1 Appendix R and concluded that the RW lineup was part of the licensing basis for compliance with the Appendix. Therefore, the team concluded that this lineup was part of the design and licensing basis of the Beaver Valley Units 1 and 2.

The team then evaluated whether the water from the Ohio River could clog the AFW components. The team determined there was no impact on AFW pump operability

regarding the minimum flow recirculation line orifices. However, the team determined the orifices in the MDAFW and TDAFW lube oil cooler lines had cross-sectional opening of approximately 0.26 inches and 0.29 inches, respectively, and the RW/SW rotating screens openings had cross-sectional opening of approximately 0.5 inch. No other screens or strainers are in the system. Therefore, the team concluded that it was likely that debris large enough to block the orifice would pass through the screens and clog the orifices. The team determined FENOC had incorrectly concluded the RW/SW lineups were not a licensing and design bases requirement, and the AFW system would potentially be made inoperable if the RW/SW lineup was placed in service. Therefore, the team concluded FENOC had taken inadequate corrective measures to correct the deficiency. FENOC entered the issue into their corrective action program (08-47469 and 08-47692) in order to develop correct actions for the non-conformance. Additionally, FENOC developed Operations Department standing orders to limit the use of Technical Specification action statement 3.7.6.a and formalized compensatory actions to address the Appendix R compliance deficiency.

Analysis: The team determined that the failure to properly evaluate and take effective corrective measures to address a condition adverse to quality was a performance deficiency. The finding was more than minor because it was similar to Manual Chapter (MC) 0612 Appendix E question 3j in that as a result of this issue there was reasonable doubt as to the operability of the AFW system when supplied from RW or SW systems. In addition, the finding was associated with the design control attribute of the Mitigating Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function, and was not the result of any willful violation of NRC requirements. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," a Phase 1 SDP screening was performed which determined the finding was a design deficiency that could represent a loss of system safety function; therefore, a Phase 2 evaluation was required.

The internal events Phase 2 analysis for core damage frequency (CDF) was conducted using the Risk-informed Inspection Notebook for Beaver Valley Nuclear Power Plant Units 1 and 2, Revision 2.1a. Although the RW/SW lineup is mentioned in the comments of the notebook, it is not explicitly modeled. As a result, a Region I senior reactor analyst conducted a Phase 3 Risk Assessment, to evaluate the condition. The analysis used an updated Beaver Valley Units 1 and 2 SPAR model, Rev. 3 plus, dated July 11, 2008, with modifications to the model to include the respective RW/SW line-up. The baseline failure of the primary AFW water source was modeled with a failure probability of low E-8. The total failure of the AFW water supply would require a failure of both the primary and backup water supply. Assuming a complete failure of the backup water source, the likelihood of this occurrence would be low E-8. As a result, the finding represented very low safety significance (Green). Since the refined analysis resulted in a delta CDF of less then 1E-7, no further review of large early release or external events was needed to be considered.

The finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program Component, because FENOC did not adequately evaluate this condition adverse to quality, including classifying, prioritizing, and

evaluating for operability when it was identified in February 2004, and again in March 2005 and June 2006. (IMC 0305, Aspect P.1(c))

Enforcement: 10 CFR 50, Appendix B, Criteria XVI, "Corrective Action," requires, in part, that measures be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, between February 11, 2004 and October 10, 2008, FENOC identified that if the safety-related Unit 1 river water (RW) system or the Unit 2 service water (SW) system was aligned to the suction of the auxiliary feedwater (AFW) pumps it could result in blockage of cooling water flow for the pumps, but did not take actions to correct the deficiency. FENOC identified the potential problem in Condition Reports (CR) 2004-01276, 2005-01577, and 2006-03595; however, the associated evaluations were not adequate. Because this violation is of very low safety significance and has been entered into the licensee's corrective action program (CR 08-47469 and 08-47692), this violation is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: **(NCV 05000334/2008008, 05000412/2008008-001, Inadequate Corrective Action for Potential Blockage of AFW Pump Lube Oil Cooling System Orifices when supplied by RW/SW)**

.2.1.2 Unit 2 Turbine Driven Auxiliary Feedwater Pump (2FE-P22)

a. Inspection Scope

The team inspected the turbine driven auxiliary feedwater (TDAFW) pump to assess its ability to meet design basis head and flow requirements for injection into the steam generators. The team reviewed drawings, calculations, hydraulic analyses, procedures, DBDs, system health reports, preventive maintenance activities, and selected condition reports to evaluate whether the maintenance, testing, and operation of the TDAFW pump was adequate to ensure the pump performance would satisfy design basis requirements under transient and accident conditions. The team verified whether design inputs were properly translated into system procedures and tests, and reviewed completed surveillance tests associated with the demonstration of pump operability. The team also reviewed the design capacity of the PPDWST, and calculations that evaluated the potential for vortexing at the suction source to ensure the availability of the preferred water source. In addition, the team reviewed the adequacy of water supply sources to the pump including an assessment of the potential for vortex conditions, and the ability to transfer the pump suction to alternate water sources, including safety-grade river water.

The team reviewed the ability of the TDAFW pump for operation during the blackout (SBO) as described in the SBO analysis and procedures. This review included an assessment of room temperature heat up calculations and equipment thermal design requirements to assess whether the TDAFW pump would operate within design temperature limits. The team also reviewed the TDAFW pump and turbine lube oil cooling system to assure the oil cooler would operate under design basis conditions. Lastly, the team performed field walkdowns to assess the material condition of the TDAFW pump and supporting equipment.

b. Findings

No findings of significance were identified in addition to the finding identified in section .2.1.1.b.

2.1.3 Auxiliary River Water Pump (1WR-P-9A)

a. Inspection Scope

The team inspected the auxiliary river water pump to verify the pump was capable of performing its design basis function. The auxiliary river water system is relied upon to supply cooling water to plant equipment necessary for safe shutdown following a loss of the safety-related service water intake structure. The team reviewed design documents, including drawings, calculations, procedures, and the auxiliary river water system DBD. The team reviewed these documents to ensure the pump was capable of meeting its design basis requirements, with consideration of allowable pump degradation and pump submergence requirements to prevent vortexing at minimum river level. To assess the current condition of the pump, the team interviewed engineers, reviewed system health and related condition reports, and performed walkdowns of the auxiliary river water pump house area. Pump surveillance test results were reviewed to determine whether pump performance was acceptable to ensure design basis requirements could be achieved.

The team also reviewed electrical calculations, drawings and equipment specifications to determine whether adequate voltage and current would be available at the pump motor terminals for starting and running under worst case voltage conditions and to determine if the motor capacity was adequate for the loading requirements. The team reviewed protective relay settings, motor feeder cable ampacity and cable short circuit current capability to determine whether appropriate electrical protection coordination margins had been applied and whether the feeder cable had been properly sized for the maximum loading and short circuit current capability requirements. Finally, the auxiliary river water system operating procedures were reviewed to ensure the system was operated in accordance with its design basis assumptions.

b. Findings

No findings of significance were identified.

.2.1.4 Unit 1 Quench Spray Pump (QS-1B)

a. Inspection Scope

The team inspected the quench spray (QS) pump to verify the pump was capable of performing its design basis function. The team reviewed design basis documents, hydraulic calculations, technical specifications, accident analyses and drawings to ensure the QS pump was capable of meeting system functional and design bases requirements. Surveillance test results were reviewed to assess whether the pump was operated within established acceptable criteria, and the team verified that the test acceptance criteria ensured the pump could meet the design requirements. The team reviewed operating and emergency procedures to verify adequate reactor water storage

tank inventory was sprayed during a postulated accident. To assess the material condition of the pump, the team performed walkdowns of the QS pump area, and reviewed system health reports.

The team also reviewed electrical calculations, drawings and equipment specifications to determine whether adequate voltage and current would be available at the pump motor terminals for starting and running under worst case voltage conditions and to determine if the motor capacity was adequate for the loading requirements. The team reviewed protective relay settings, motor feeder cable ampacity and cable short circuit current capability to determine whether appropriate electrical protection coordination margins had been applied and whether the feeder cable had been properly sized for the maximum loading and short circuit current capability requirements. Finally, the team evaluated corrective action reports associated with the system to determine if problems were being appropriately identified and corrected.

b. Findings

No findings of significance were identified.

.2.1.5 Unit 1 Pressurizer Power Operated Relief Valve (PCV-1RC-455C)

a. Inspection Scope

The team inspected the pressurizer power operated relief valve (PORV) to verify the valve was capable of performing its design basis function. The team reviewed thermal/hydraulic analysis for feed and bleed to ensure sufficient relief capacity was available to remove the required heat load. Design calculations were also reviewed to determine the adequacy of lift settings of the PORV in order to protect the reactor coolant system while in the low temperature overpressure protection (LTOP) mode of operation. Plant operating procedures were reviewed to ensure LTOP operational controls were consistent with design basis assumptions. The team reviewed the adequacy of the backup nitrogen supply for the PORV, including sizing of the nitrogen accumulator, to verify the equipment was capable of cycling each PORV consistent with design basis analyses. Also, minimum voltage calculations were reviewed to ensure sufficient voltage would be available at the PORV for actuations when required. The team reviewed recent surveillance testing of the PORV and pneumatic accumulator to ensure test acceptance criteria were consistent with design basis assumptions on valve stroke timing, and accumulator sizing requirements. Finally, the team reviewed corrective action documents to ensure problems with the PORV were appropriately identified and corrected.

b. Findings

No findings of significance were identified.

.2.1.6 Unit 2 Station Battery (BATT 2-1)

a. Inspection Scope

The team inspected the Unit 2 station battery to verify it was capable of performing its design basis function. The team verified the battery was adequately sized to supply the design duty cycle of the 125 VDC system. The team reviewed calculations to verify that the sizing of the battery would satisfy the design requirements of the safety-related and risk significant DC loads, and that all operating loads on the battery were included in the calculation. In particular, the evaluation focused on voltage drop calculations to verify adequate voltage would remain available for the individual loads required to operate during design basis events. The team also reviewed the battery room hydrogen generation calculation to verify that the hydrogen concentration level would stay below acceptable levels during normal and accident conditions. The team reviewed battery surveillance test procedures and results to determine whether test acceptance criteria and frequency requirements satisfied technical specifications (TS) and the Institute of Electrical and Electronics Engineers (IEEE) standards. Finally, the team performed a walkdown of the battery and reviewed selected condition reports to verify that design and testing issues related to the batteries were appropriately identified and corrected, and to assess the overall material condition of the battery.

b. Findings

No findings of significance were identified.

.2.1.7 Unit 2 Station Battery Charger (#2/1)

a. Inspection Scope

The team inspected the Unit 2 station battery charger to verify it was capable of performing its design basis function. The team inspected the battery charger to verify its sizing would satisfy the amperage and voltage requirements of the DC loads during design basis events. The team reviewed the UFSAR, design basis documents, vendor drawings, and procedures to identify the design basis requirements for the charger. The team verified the battery charger was adequately sized to supply the design duty cycle of the 125 VDC system and that adequate voltage would be maintained for the individual load devices required to operate during design basis events. In addition, the team performed a walkdown to visually inspect the physical condition of the battery charger, and to verify the charger was properly aligned and the panels indicated acceptable voltage and current. The team interviewed design and system engineers to determine the design aspects and operating history for the battery chargers. The team reviewed battery charger surveillance test procedures and results to verify that applicable test acceptance criteria and test frequency requirements specified for the battery charger were in accordance with TS and design basis assumptions.

b. Findings

No findings of significance were identified.

.2.1.8 Unit 1 DC Switchboard (#1/2)

a. Inspection Scope

The team inspected the DC switchboard to verify that it could meet its design function requirements as the central distribution point of the DC subsystem. The team reviewed the UFSAR, design basis documents, vendor drawings, and procedures to identify the design basis and operational requirements for the switchboard. The team reviewed the DC protective breaker coordination study to verify that adequate protection existed for postulated faults in the DC system. A walkdown was performed to evaluate the material condition of the equipment and to determine if the environment conditions in the switchboard area were in accordance with design assumptions. The team reviewed surveillance test procedures and results to determine whether test acceptance criteria and frequency requirements were in accordance with TS and design basis assumptions. System and design engineers were interviewed regarding the design aspects and operating history of the switchboard, and condition reports were reviewed to verify that design and testing issues related to the DC system were appropriately identified and corrected.

b. Findings

No findings of significance were identified.

.2.1.9 Unit 1 Emergency Diesel Generator (EDG) Ventilation Fan (1VS-F-22A/B)

a. Inspection Scope

The team inspected the EDG ventilation fan to verify it was capable of performing its design basis function. The team reviewed the UFSAR, design basis documents, vendor drawings, and procedures to identify the design basis requirements for the fan. The team verified the fan would be able to ensure the EDG room temperature remained within component design assumption ranges for all design basis events. The team also reviewed drawings and calculations to verify the fan was capable of providing adequate air flow as required by the DBDs and that appropriate setpoints were established to ensure system design requirements were maintained. Additionally, the team reviewed the system interactions with the EDG carbon dioxide (CO2) system to ensure that neither system would interfere with the design function of the other. Finally, the team conducted a walkdown of the system, interviewed the system engineer, and reviewed condition reports in order to assess the material condition of the system and verify that issues were being appropriately addressed in the corrective action program.

b. Findings

No findings of significance were identified.

.2.1.10 Unit 1 4160 Vac Vital Bus (1AE)

a. Inspection Scope

The team inspected the 4160Vac vital bus to verify it was capable of performing its design basis function. The team reviewed the UFSAR, DBDs and electrical distribution calculations including load flow, voltage drop, short-circuit and electrical protection coordination. This review was to verify the adequacy and appropriateness of design assumptions; and to verify that bus capacity was not exceeded and bus voltages remained above minimum acceptable values under design basis conditions. The team reviewed the electrical overcurrent, undervoltage and ground protective relay settings for selected circuits to verify that the trip setpoints would not interfere with the ability of the supplied equipment to perform its safety function as assumed in the design basis, and yet ensure the trip setpoints provided for adequate bus protection. The loss of voltage and degraded voltage relay surveillances, calibration results, and setpoint calculations were also reviewed to verify that they satisfied the requirements of the associated TSs.

The 4160 Vac emergency bus 1AE voltage calculation profiles were reviewed to verify adequate voltage was available to the bus consistent with the design basis assumptions during worst case offsite grid voltage assumptions. The control logic design drawings of the 4kV supply breaker to Vital Bus 1AE were reviewed to verify adequate breaker closing and opening circuit interlocks. In addition, the 125 Vdc voltage drop calculations were reviewed to ensure that adequate voltage would be available to the breaker control circuit as well as for the breaker opening and closing coils under all design basis conditions. The team reviewed system maintenance test results, interviewed system engineers and conducted field walkdowns to verify that equipment alignment, nameplate data, and breaker positions were consistent with design drawings, and to assess the material condition of the bus. Finally, the team reviewed test results of automatic and manual transfers of AC power sources to verify that they satisfy the design basis timing and voltage requirements.

b. Findings

No findings of significance were identified.

.2.1.11 Unit 1 4160 Vac to 480 Vac Transformer (1-8N)

a. Inspection Scope

The team inspected the 4160 Vac to 480 Vac transformer to verify it was capable of performing its design basis function. The team reviewed the system one-line diagram, nameplate data and design basis descriptions to verify that the loadings of Unit 1 480V substation transformer 1-8N, and the associated 4160V and 480V circuit breakers were within the corresponding transformer and switchgear design ratings. The team reviewed the design assumptions and calculations related to short-circuit currents, voltage drops and protective relay settings associated with transformer 1-8N and its feeder cables to verify that the settings were appropriate and output voltage was adequate to meet design assumptions. The team reviewed a sample of completed maintenance activities and functional verification test results to verify that the high and low voltage cable feeders associated with transformer 1-8N had sufficient capacity to supply the current

and voltage requirements of the 480 V substation during normal and postulated accident conditions. The team reviewed a sample of independent short-circuit and voltage drop calculations to verify that voltage values assumed in design basis documents were available during design basis events. The team reviewed maintenance test results, interviewed system engineers and conducted field walkdowns to verify that equipment alignment and nameplate data were consistent with design drawings, and to assess the material condition of the transformer.

b. Findings

No findings of significance were identified.

.2.1.12 Unit 2 138 kV to 4.16 kV Station Service Transformer (TR-2A)

a. Inspection Scope

The team inspected the 138 kV to 4.16 kV transformer to verify it was capable of performing its design basis function. The team reviewed the design basis descriptions, equipment specifications, drawings, equipment nameplate data, voltage drop calculations, and short-circuit and load flow studies to evaluate the capability of the system station service transformer to supply the minimum design voltage and maximum current requirements of Unit 2 station safeguard loads. The review was also conducted to verify that the 138kV and 4.16kV feeder cables associated with transformer TR-2A were adequately sized. Protective relay trip setting calculations were reviewed to verify adequate electrical protection coordination was provided. Transformer relay settings were reviewed to verify they protected the transformer from sudden pressure increases, differential voltage conditions, and phase-to-phase and phase-to-ground over current conditions. The team also reviewed the rating of the transformer neutral grounding resistor to verify that the ground relay trip settings were coordinated with the 4.16kV feeder ground relays to ensure selective tripping. The team reviewed the results of completed transformer preventive maintenance and relay calibrations to verify that the test results were within design assumptions. Finally, the team performed a visual inspection of the observable portions of transformer TR-2A including its neutral grounding resistor bank to assess the installation configuration and material condition.

b. Findings

No findings of significance were identified.

.2.1.13 Unit 1 Primary Plant Demineralized Water Storage Tank (1WT-TK-10)

a. Inspection Scope

The team inspected the Unit 1 primary plant demineralized water storage tank (PPDWST) to verify it could meet its design function. The team reviewed the Unit 1 AFW system design basis documents which described PPDWST design requirements, including capacity, level setpoint basis and minimum/maximum temperature limits. The team also reviewed the UFSAR to obtain an overall understanding of the design function of the Unit 1 PPDWST. The team evaluated the PPDWST ability to function as the preferred safety related water supply for the auxiliary feedwater pumps and determine if

the tank had sufficient capacity for reactor decay heat removal and cool down of the unit to hot standby condition for at least 9 hours without makeup during a design basis event. In addition, level instrumentation calibration records, operator surveillance verification log records for channel checks for level indicators, the tank capacity curve, and vortex calculations were reviewed to verify sufficient inventory existed for assumed AFW system design requirements. The team also reviewed level instrumentation uncertainty analysis calculations to verify appropriate corrections to indicated PPDWST level were made to ensure Technical Specification requirements were met.

The team also inspected the capability of the tank's external enclosure to protect the tank during design bases external events such as tornados. The team reviewed auxiliary feedwater system surveillance tests and operating procedures, mechanical system calculations, VT-2 visual examination reports, and pipe stress calculations to verify the tank was capable of meeting design requirements. Finally, the team reviewed a sample of condition reports, completed system engineer walkdown checklists, and the Unit 1 AFW system health reports, performed a field walkdown, and interviewed the system engineer to assess the material condition of the tank, associated attached piping and level instrumentation, and to verify that deficiencies were being appropriately identified and corrected.

b. Findings

No findings of significance were identified.

.2.1.14 Unit 2 High Head Safety Injection Pump Suction Valve (2SIS-MOV-863A) and Normal Charging Line Isolation Valve (2CHS MOV-310)

a. Inspection Scope

The team inspected the high head safety injection pump suction motor operated valve (MOV) and the normal charging line isolation MOV to verify both could meet their design function. The team reviewed the UFSAR, design basis documents, vendor drawings, and procedures to identify the design basis requirements for the valves. The team performed a review of system operating procedures to assess whether component operation and alignments were consistent with design and licensing bases assumptions. Valve testing procedures and valve specifications were also reviewed to verify the design bases requirements, including worst case system and environmental conditions, were incorporated into the test acceptance criteria and component design. The team reviewed periodic verification diagnostic test results and stroke test documentation to verify acceptance criteria were met, and that the valves safety function, torque switch settings, performance capability, and design margins were adequately monitored and maintained in accordance with GL 89-10 guidance and that test frequencies were correctly determined based on the results as described in GL 96-05. The review included verifying the valve analysis used the maximum differential pressure expected across the valves during worst case operating conditions.

The team also evaluated if the valve motors could perform their design function under worst case design conditions. The team reviewed motor data, electrical control and schematic diagrams, degraded voltage calculations, thermal overload settings, and voltage drop calculations to confirm that the motor operated valves would have sufficient

voltage and power available to perform its safety function at worst case degraded voltage conditions. The team interviewed the MOV program and design engineer to gain an understanding of maintenance issues and overall reliability of the valves and conducted walkdowns to assess their material condition, and to verify the installed valve configurations were consistent with the design bases and plant drawings. Previous component corrective action reports, system health reports, and system engineer walkdown checklists, were reviewed to verify that deficiencies were appropriately identified and resolved, and that the valves were properly maintained. Finally, the team reviewed design changes to assess potential component degradation, and impact on design assumptions and valve performance.

b. Findings

No findings of significance were identified.

.2.1.15 Unit 2 Recirculation Spray Heat Exchanger (E21C)

a. Inspection Scope

The team inspected the Unit 2 recirculation spray heat exchanger to ensure that it was capable of removing the required containment heat loads during design basis events. The team reviewed design basis documents, specification data, the tube plugging limit evaluation along with current tube plugging status, thermal performance results, service water full flow tests, heat exchanger cleaning and inspection reports, and the water hammer analysis calculation to verify that the heat exchanger maintained adequate heat removal capability and system integrity during all design basis events. Additionally, the team conducted a walkdown of the heat exchanger, interviewed system and component engineers, and reviewed system health and condition reports to assess the material condition of the heat exchanger and overall system health, and to verify issues entered into the corrective action program were being appropriately addressed. The team also reviewed Fenoc's response to Generic Letter 89-13, Service Water System Problems Affecting Safety-Related Equipment, to verify that commitments made in the GL response were being maintained.

b. Findings

No findings of significance were identified.

.2.1.16 Unit 1 Quench Spray Isolation Valve (MOV-1QS-101B) and Unit 2 Charging Pump Suction Valve (2CHS-LCV-115B)

a. Inspection Scope

The team inspected the Unit 1 quench spray discharge isolation valve and the Unit 2 charging pump suction valve to verify they were capable of meeting their design functions. The team reviewed MOV calculations, including the weak link analysis, maximum thrust/torque, maximum differential pressure, and degraded voltage assumptions, to verify the valves would operate during design basis conditions. The team interviewed the MOV program and design engineers, and conducted a walkdown

to assess the physical condition of the MOVs and to verify nameplate data. To assess the capability of the valves to operate as required, the team reviewed system health reports, design basis documents, drawings, condition reports, and work orders.

The team also evaluated if the valve motors could perform their design function under worst case design conditions. The team reviewed motor data, electrical control and schematic diagrams, degraded voltage calculations, thermal overload settings, and voltage drop calculations to confirm that the motor operated valves would have sufficient voltage and power available to perform their safety function at worst case degraded voltage conditions. Inservice testing results were reviewed to verify that the stroke time acceptance criteria were in accordance with the UFSAR and accident analysis assumptions. To ensure valve performance during design basis events, the team reviewed the most recent diagnostic testing results. Also, the team reviewed FENOC's response to Generic Letter 96-05, Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves, to verify that commitments applicable to the valves were being maintained.

b. Findings

No findings of significance were identified.

.2.2 Detailed Operator Action Reviews (5 samples)

The team assessed manual operator actions and selected a sample of five operator actions for detailed review based upon risk significance, time urgency, and factors affecting the likelihood of human error. The operator actions were selected from a PRA ranking of operator action importance based on RAW and RRW values. The non-PRA considerations in the selection process included the following factors:

- Margin between the time needed to complete the actions and the time available prior to adverse reactor consequences;
- Complexity of the actions;
- Reliability and/or redundancy of components associated with the actions;
- Extent of actions to be performed outside of the control room;
- Procedural guidance to the operators; and
- Amount of relevant operator training conducted.

.2.2.1 Unit 1 Operators Initiate Bleed and Feed After a Loss of Feedwater

a. Inspection Scope

The team inspected the operator actions associated with initiating reactor coolant system (RCS) bleed and feed following a total loss of main and auxiliary feedwater. The team reviewed FENOC's Human Reliability Analysis (HRA) to determine when and how quickly this action should be accomplished. The team interviewed operators and training staff, observed operator responses during a simulator run, reviewed emergency and operating procedures, and walked down applicable panels in the main control room. The team also reviewed maintenance history and a sample of condition reports associated with components necessary to complete the operator action to assess the overall health of the affected components.

b. Findings

No findings of significance were identified.

.2.2.2 Unit 1 Operators Initiate a Cooldown and Depressurization After a Small Break Loss-of-Coolant Accident and High Head Safety Injection System Failure

a. Inspection Scope

The team inspected the operator action to initiate an RCS cooldown and depressurization after a postulated small break loss-of-coolant accident. The team reviewed FENOC's HRA to determine when and how quickly this action should be accomplished. The team interviewed operators and training staff, observed operator responses during a simulator run, reviewed emergency and operating procedures, and walked down applicable panels and components in the main control room and in the plant. In addition, the team reviewed maintenance history and a sample of condition reports associated with components necessary to complete the operator action to assess the overall health of the affected components.

b. Findings

No findings of significance were identified.

.2.2.3 Unit 1 Operators Start an Auxiliary River Water (ARW) Pump After a Failure of Both River Water Pumps

a. Inspection Scope

The team reviewed the operator action to start the Unit 1 ARW pumps, RW-P-1A or RW-P-1B, when normal river water cooling pumps have failed. The team reviewed the HRA and PRA studies to determine when and how quickly operators are credited with establishing auxiliary river water flow to various components, specifically the emergency diesel generators and reactor coolant pump seals. The team interviewed licensed operators, reviewed various operating and surveillance procedures and associated annunciators on the main control room panels, and performed a field walked down of the ARW pumps and local alarm annunciator panels in the alternate intake structure to evaluate the ability of the operators to perform the required procedural actions. The team also observed a simulator scenario to verify that appropriate alarms and procedures existed to allow the operators to take appropriate action in the required time to prevent damage to the equipment that is cooled by auxiliary river water. Finally, the team reviewed maintenance history and a sample of condition reports associated with components necessary to complete the operator action to assess the overall health of the affected components.

b. Findings

No findings of significance were identified.

.2.2.4 Unit 2 Operators Align Makeup to the Refueling Water Storage Tank, Given a Steam Generator Tube Rupture with Secondary Leakage

a. Inspection Scope

The team inspected the operator actions associated with aligning makeup to the refueling water storage tank (RWST), given a steam generator tube rupture. In particular, the team focused on providing RWST makeup from the spent fuel pool via the spent fuel pool purification system. The team reviewed FENOC's HRA and design basis documents to determine when and how quickly this action should be accomplished. The team interviewed operators and engineering staff, reviewed emergency and operating procedures, reviewed drawings, and walked down applicable components in the plant to ensure this remote action could be performed as credited. The team also reviewed maintenance history and a sample of condition reports associated with components necessary to complete the operator action to assess the overall health of the affected components.

b. Findings

No findings of significance were identified.

.2.2.5 Unit 2 Operators Align Spare Battery Charger, Given a Normal Battery Charger Failure and a Station Battery is Supplying the DC Bus

a. Inspection Scope

The team inspected the operator actions associated with aligning a spare battery charger, given that the normal battery charger has failed and the associated station battery is supplying the DC bus. The team reviewed FENOC's HRA and design basis documents to determine when and how quickly this action should be accomplished. The team interviewed operators and engineering staff, reviewed emergency and operating procedures, and walked down applicable components in the plant to ensure this action could be performed as credited. The team also reviewed the maintenance history associated with the normal and spare battery chargers to assess overall component health.

b. Findings

No findings of significance were identified.

.2.3 Review of Industry Operating Experience and Generic Issues (1 sample)

.2.3.1 NRC Information Notice (IN) 2002-29, Recent Design Problems in Safety Functions of Pneumatic Systems

a. Inspection Scope

The team reviewed FENOC's disposition of IN 2002-29 - Recent Design Problems in Safety Functions of Pneumatic Systems. This IN discussed recent industry events where it was discovered that the controls or designs of safety related systems

incorporating non-safety related air operated controls were less than adequate. The team reviewed the disposition of the IN as documented by FENOC in CR 02-09460, for both units. In this CR, FENOC had evaluated each plant system that has safety related pneumatic components for adequacy of design. The corrective actions determined that the design was adequate and additional design modifications were not required. The team reviewed the corrective actions and determined that the pneumatic components were identified and handled appropriately.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (IP 71152)

a. Inspection Scope

The team reviewed a sample of problems that FENOC had identified and entered into their corrective action program. The team reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions. In addition, CRs written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problem into the corrective action system. The specific corrective action documents that were sampled and reviewed by the team are listed in the attachment.

b. Findings

No findings of significance were identified.

4OA6 Meetings, including Exit

The inspectors presented the inspection results to Mr. Peter Sena, Site Vice President, and other members of FENOC staff at an exit meeting on October 10, 2008. The inspectors verified that none of the information in this report is proprietary.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

P. Sena	Site Vice President
K. Ostrowski	Director, Site Operations
R. Brosi	Director, Performance Improvement
C. Mancuso	Manager, Design Engineering
C. Keller	Manager, Regulatory Compliance
R. Bologna	Manager, Plant Engineering
R. Mueller	Operations Support Shift Manager
B. Murtagh	Supervisor, Design Engineering
J. Mauck	Compliance Engineer

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

NCV	05000334-412/2008008-001	Inadequate Corrective Action for Potential Blockage of AFW Pump Lube Oil Cooling System Orifices when Supplied by RW/SW

LIST OF DOCUMENTS REVIEWED

Calculations:

10080-DMC-0056, SBO Steady State Temperature Calculations, Unit 2, Rev. 0
10080-DMC-0757, PPDWST Inventory Requirements for EPU, Rev. 0
10080-E-068, Station Service Voltage and Load Analysis, Rev. 4
10080-E-074, Station Service Fault Analysis, Rev. 4
10080-E-201-1, DC System Management Battery 2-1/Battery Charger 2-1, Rev. 1
10080-E-221, 4160 and 480 VAC Load Management and Voltage Profile Calculations Relating to Bus 2AE, Rev. 0
10080-E-221, 4160 and 480 Volt AC Load Management and Voltage Profile Calculations Relating to Bus 2AE, Rev. 0A9
10080-E-222, 4160 and 480 VAC Load Management and Voltage Profile Calculations Relating to Bus 2DF, Rev. 0
10080-N-574, Determination of Maximum Differential Pressure Across the QA Category I Motor Operated Valves in the BVPS-2 Charging System, Rev. 4
10080-N-642, Torque Calculations for 2CHS-LCV115B, 2CHS-LCV115D, Rev. 10A1
10080-N-645, Torque Calculations for 2CHS-MOV310, Rev. 8
10080-N-659, Torque Calculation for 2SIS-MOV863A, Rev. 8
10080-N-676, Addendum No. 8, Maximum Torque Output for Degraded Voltage in Selected SIS Motor Operated Valves, Rev. 7

10080-N-677, Addendum No. 7, Maximum Torque Output Accounting for Degraded Voltage for Selected Charging System Motor Operated Valves, Rev. 3
10080-N-677, Maximum Torque Output Accounting for Degraded Voltage for Selected CHS Motor Operated Valves, Rev. 3A8
10080-N-684, Auxiliary Feedwater Pump Minimum Operating Curves, Rev. 1
10080-E-74.R3, Attachment AB, Design Analysis Transformer Data, 9/3/96
10080-N-779, Main Intake Bay Silt Buildup Limits, Rev. 0
10080-N-797, Documentation of Miscellaneous Unit 2 Containment Conversion Inputs, Rev. 4
10080-N-824, Recirculation Spray Heat Exchanger Inputs for MAAP, Rev. 0
10080-SP-2FWE-004, PPDWST Low and High Levels and Controls, Rev. 6
11700.26-N-122, RWST Volumes, Rev. 0
11700-ESK-130A, 125 VDC System Time-Current Characteristic Curves, dated 2/22/99
12241-B-7A, Service Building-Ventilation, Cooling Loads and Air Flow Rates, Rev. 4A2
12241-B-88, Alternate Intake Structure-Heat Gains and Required Airflow Rates, Rev. 1
12241-NP(B)-381-FA, Service Water System Water Hammer due to Flow into Initially Empty Recirculation Spray System Coolers, Rev. 1
2706.450-001-003, Motor Operated Gate Valve Weak Link Analysis and Valve Data for GL 89-10, Rev. D
8700-06.048-0185, Operating Load Condition Weak Link Analysis, Rev. E
8700-DEC-0230, Beaver Valley Unit 1 LTOPS Setpoint Calculation, Rev. 2
8700-DEC-181, Setpoint Inaccuracy Calculation for Emergency Bus Degraded Grid, Rev. 2
8700-DMC-1352, EDG Operating Time with Loss of RW, Rev. 0
8700-DMC-2275, Torque Calculation for MOV-QS-101B, Rev. 6
8700-DMC-2651, Aux Feedwater Pump Room Temperature Transient, Rev. 1
8700-DMC-2783, Determination of Maximum Differential Pressure Across the QA Category I Motor Operated Valves in the BVPS-1 Containment Quench Spray System, Rev. 2
8700-DMC-2800, Diesel Generator Building Ventilation Adequacy with One of Two Inlet Air Dampers Closed, Rev. 0
8700-DMC-2806, Maximum Torque Outputs Accounting for Degraded Voltage for Selected Quench Spray Motor Operated Valves, Rev. 6
8700-DMC-3173, Auxiliary River Water Pump Minimum Operating Point, Rev. 0
8700-DMC-3439, Impact of 3/4 inch Tubing on OPPS Operation, Rev. 0
8700-DMC-3429, PORV Nitrogen Accumulator Pressure in Modes 1-3, Rev. 0
8700-DMC-3523, Quench Spray System Performance, Rev. 2
8700-E-068, Transformer Data, Attachment D, Rev. 4
8700-E-068, Load Flow Report, Attachment J8E, Rev. 4
8700-E-20, 5KV and 480V Cable Size Evaluation for Short Circuit, Rev. 0
8700-E-201, D.C. System Management-Bat-1/Bat-Chg-1, Rev. 1
8700-E-207, Short Circuit Analysis, 125 VDC Class-1E DC System, Rev. 2
8700-E-221, 4160 and 480 Volt AC Load Management and Voltage Profile Calculations Relating to Bus 1AE, Rev. 1
8700-E-222, 4160 and 480 Volt AC Load Management and Voltage Profile Calculations Relating to Bus 1DF, Rev. 1A5
8700-E-223, 4160 and 480 Volt AC Load Management and Voltage Profile Calculations Relating to Non-1E Bus 1A, Rev. 0
8700-E-261, Qualification of Cable Sizing Calculation Program, Rev. 0
8700-E-271, Station Service System Dynamic Stability Study, Rev. 3
8700-E-308, Protective Relay Setting Calculations for 480V Emergency Bus 1N1, Rev. 0
8700-E-309, 480V Emergency Bus 1N Ground Alarm Relay, Rev. 0A6
8700-E-310, Att.4 QS-P-1B 200HP Quench Spray Pump Motor Feeder Breaker 9P5, Rev. 0A5

8700-E-342, Att. 11, Electrical Protective Device Settings Calculation, 4160V Emergency Bus 1AE, Feeder to Emergency Sub 1-8, 1000/1333KVA Transformer 1-8N, Rev. 0
8700-E-68, Station Service Voltage and Load Analysis, Rev. 4
8700-E-74, Station Service Fault Analysis, Rev. 2
8700-SP-1HV-04, Local Temperature Switch Setpoints for the Diesel Generator Building Exhaust Fans, Rev. 0
8700-SP-1QS-10, Beaver Valley Unit 1 RWST Low-Low Level Uncertainty Calculation, Rev. 2
8700-SP-1WT-01, Unit 1 Primary Plant Demineralized Water Storage Tank (WT-TK-10) Low Level, Low-Low Level and Indication Uncertainty Calculation, Rev. 3
B-211, Hydrogen Evaluation in Battery Rooms, Rev. 1
Calculation 254, Surface and Buried Pipe Stress Calculation, Demineralized Water to 2FWE-TK210, Rev. 1
DMC-2219, Water Volume (PDDWST) Required for 9hrs at Hot Standby Following a LOOP, Rev. 2
SCE-785-2, Issue 2, Stress Analysis For Small Bore Pipe And Supports, 8/15/86

Completed Surveillance and Modification Acceptance Testing:

1/2-PMP-E-75-202, 480 VAC Motor Inspection and Lubrication, Rev. 8, performed 10/25/04
1/2-CMP-39BYS/DC-BATTERY-1E, Station Battery Corrective Maintenance, Rev. 8, performed 5/05/08
1/2-CMP-39DC-BAT-1-2-3-4-4E, Charging Individual Battery Cells, Rev. 2, performed 5/04/08
1/2-CMP-75-480V-MOTOR-TERM-1E, 480V Motor/Miscellaneous Equipment Termination, Rev. 9, performed 3/09/06
1/2-CMP-75-MCB-1E, Testing of Westinghouse and Cutler-Hammer Molded Case Circuit Breakers, Rev. 8, performed 3/09/06
1/2-CMP-75-MCC-OHR-1E, Inspection, Verification, and Calibration Testing of Westinghouse 480V MCC Overload Heater Relays, Rev. 1, performed 3/09/06
1/2-CMP-E-39-366, Station Battery Jumper Installation and Restoration, Rev. 4, performed 9/28/07
1/2-CMP-E-75-021, Testing of Motor Operated Valves, Rev. 6, performed 02/20/06 & 04/23/08
1/2-OST-30.19E, Alternate Intake Structure “A” Bay Silt Check and Bay Cleaning, performed 6/15/08, 01/15/08, 04/4/07 & 01/28/07
1/2-OST-30.19F, Alternate Intake Structure “B” Bay Silt Check and Bay Cleaning, performed 6/19/08, 04/23/07 & 01/30/07
1/2-PMP-75VS-VNT-3M, Ventilation System Damper Maintenance, Rev. 12, performed 3/16/06, 3/24/06, & 4/06/06
1/2-PMP-75VS-VNT-4M, Ventilation System Fire Damper Maintenance and Trip Check, Rev. 10, performed 9/25/06
1BVT 1.47.5, Type C leak Test, Issue 1, Rev. 16, performed 11/07/04, 04/04/05, 02/21/06, 10/02/06, 04/29/07 & 04/14/08
1BVT-1.44.8, Diesel Generator Building Ventilation Test, Rev. 4, performed 8/07/06
1MSP-36.41-E, 1AE 4KV Emergency Bus Degraded Voltage Relays, 27-VE2100AB and 27-VE2100BC Test, Rev. 21, performed 7/22/08
1MSP-36.45-E, 1AE 4KV Emergency Bus Loss of Voltage, Rev. 22, performed 7/22/08
1MSP-36.47B-E, 1AE 4KV Emergency Bus Loss of Voltage, Time Delay Relay 62-VE2100, Rev. 7, performed 10/17/07
1MSP-36.49A-E, 1AE 4KV Emergency Bus Degraded Voltage Relays, 27-VE2100AB and 27-VE2100BC Calibration, Rev. 13, performed 10/17/07

1MSP-36.81-E, Functional Test of 1AE 4KV Emergency Bus Loss of Voltage Relay 27-VE-100 and Diesel Start Loss of Voltage Relay 27-VE-1100, Rev. 7, performed 7/22/08
1OST-13.2, Quench Spray Pump Test, performed 07/16/08
1OST-24.1, SG Aux Feed Pumps Discharge Valves Exercise, Rev. 14, performed 9/16/08
1OST-30.1A, Auxiliary River Water Pump Test, performed 08/01/08
1OST-30.1B, Auxiliary River Water Pump Test, performed 06/22/08
1OST-33.13C, Ten Ton CO2 Fire Protection System Test, Rev. 9, performed 3/01/08
1OST-36.5A, Emergency Switchgear Operation Test, Rev. 6, performed 9/23/07
1OST-39.3, 125 VDC Distribution Panels Check, Rev. 4, performed 9/28/08
1OST-6.12, Power Operated Relief Valve Test, performed 10/18/07, 03/21/06, & 10/18/04
1PMP-39DC-BKR-1E, Battery Air Circuit Breaker Inspection, Rev. 14, performed 4/20/07
2BVT-1.39.01, Station Battery Service Test, Rev.6, performed 5/06/08
2BVT-1.39.06, Station Battery Performance Discharge Test, Rev. 3, performed 4/06/05
2BVT-1.39.13, Spare Battery Charger Load Test, Rev. 6, performed 4/10/08
2BVT-1.39.14, Battery Charger Load Test, Rev. 4, performed 5/07/08
2CMP-13RSS-E-21A-B-C-D-1M, Recirculation Spray Heat Exchanger Maintenance, Rev. 4, performed 05/05/08 & 10/14/06
2LCP-24-L104A1, PPDWST 2FWE-TK210, Level Loop Calibration, performed 07/23/07
2LCP-24-L104A2, PPDWST 2FWE-TK210, Level Loop Calibration, performed 08/15/08
2MSP-39.05-E, Battery No. 2-1 Inspection and Interconnection Resistance Check, Rev. 6, performed 7/29/07
2MSP-E-39-001, Vital Bus Batteries, Test and Inspection, Rev. 18, performed 6/23/08
2-MSP-E-39-300, Vital Bus Weekly Battery Inspection, Rev. 19, performed 8/27/08
2OST-24.2, Motor Driven Aux Feedwater Pump (2FWE*P23A) Test, performed 06/20/08
2OST-24.4, Steam Driven Aux Feedwater Pump (2FWE-P22) Quarterly Test, performed 10/17/08
2OST-24.4A, Steam Driven AFW Pump Full Flow Test, performed 04/05/08
2OST-24.6A, 23A AFW Pump Check Valves and Flow Test, performed 04/22/08
2OST-24.9, Overspeed Trip Test of TDAFW Pump, performed 05/11/08
2OST-30.13B, Train A Service Water System Full Flow Test, Rev. 24, performed 04/03/08
2OST-30.20A, Train A RSS Heat Exchanger's and Supply Header Dry Layup Check, Rev. 3, performed 08/27/08
2OST-39.1A, Weekly Station Battery Check, Rev. 18, performed 9/15/08
2OST-39.5, Station Battery Check, Rev. 4, performed 3/07/08
2PMP-39BYS-BAT-5-6-5E, Station Battery Inspection and Interconnection Resistance Check, Rev. 4, performed 8/23/08
BV-L-1WT-104A1, Primary Plant Demineralized Water Storage Tank Level Loop Calibration, performed 3/18/08
BV-L-1WT-104A2, Primary Plant Demineralized Water Storage Tank Level Loop Calibration, performed 3/22/08

Corrective Action Documents:

02-09460	04-09194	05-07274	06-02800	07-13491
03-12509	05-00382	05-07971	06-03041	07-15302
04-01276	05-01577	05-08084	06-03527	07-17078
04-03210	05-02265	06-00231	06-03595	07-17292
04-06804	05-05496	06-00618	06-03595	07-23490
04-07609	05-05799	06-01112	06-03610	07-23540
04-08896	05-06712	06-02770	06-93990	07-23874

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07-24330	08-36944	08-44446	08-46554*	08-47505*
07-26192	08-37313	08-44733	08-46560*	08-47514*
07-26632	08-37924	08-44734	08-47121*	08-47517*
08-33220	08-38792	08-45220	08-47159*	08-47519*
08-33408	08-39480	08-46379*	08-47175*	08-47544*
08-34360	08-40050	08-46381*	08-47247*	08-47552*
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600461117
60049445*

* Identified during inspection

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LIST OF ACRONYMS

AC	Alternating Current
AFW	Auxiliary Feedwater
ARW	Auxiliary River Water
BVPS	Beaver Valley Power Station
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CO2	Carbon Dioxide
CR	Condition Report
DC	Direct Current
DBD	Design Basis Document
DBE	Design Basis Event
EDG	Emergency Diesel Generator
FENOC	FirstEnergy Nuclear Operating Company
GL	Generic Letter
HRA	Human Reliability Analysis
IEEE	Institute of Electrical and Electronics Engineers
IMC	Inspection Manual Chapter
IN	Information Notice
IST	Inservice Testing
kV	Kilo-volts
LTOP	Low Temperature Overpressure Protection
MOV	Motor Operated Valve
MDAFW	Motor Driven Auxiliary Feedwater
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
PORV	Power Operated Relief Valve
PPDWST	Primary Plant Demineralized Water Storage Tank
PRA	Probabilistic Risk Assessment
QS	Quench Spray
RAW	Risk Achievement Worth
RCS	Reactor Coolant System
RRW	Risk Reduction Worth
RW	River Water
RWST	Refuel Water Storage Tank
SBO	Station Blackout
SDP	Significance Determination Process
SER	Safety Evaluation Report
SPAR	Standardized Plant Analysis Risk
SW	Service Water
TDAFW	Turbine Driven Auxiliary Feedwater
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
Vac	Volts, Alternating Current
Vdc	Volts, Direct Current