August 29, 2006

Mr. James Lash
Site Vice President, Beaver Valley Power Station
FirstEnergy Nuclear Operating Company
Post Office Box 4
Shippingport, Pennsylvania 15077

SUBJECT: BEAVER VALLEY POWER STATION - NRC INSPECTION REPORT 05000334/2006008 AND 05000412/2006008 AND EXERCISE OF ENFORCEMENT DISCRETION

Dear Mr. Lash:

On July 20, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Beaver Valley Power Station. The enclosed inspection report documents the inspection results, which were discussed on July 20, 2006, 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 also reviewed FENOC's response to selected operating experience issues. The inspection involved field walkdowns; examination of selected procedures, calculations and records; and interviews with station personnel.

Based on the results of this inspection, no findings of significance were identified. However, a noncompliance was identified during the National Fire Protection Association Standard 805 implementation transition period. The NRC is not taking any enforcement action for this item because the conditions for this noncompliance meet the enforcement discretion criteria specified in the NRC Enforcement Policy, Interim Enforcement Policies, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)."

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 public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) 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
Engineering Branch 2

Division of Reactor Safety

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

Enclosure: Inspection Report 05000334 and 05000412/2006008
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos. 50-334, 50-412

License Nos. DPR-66, NPF-73

Report Nos. 05000334/2006008, 05000412/2006008

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Post Office Box 4
Shippingport, PA 15077

Dates: June 12-16, 2006 (onsite); June 26-30, 2006 (onsite); July 10-14, 2006 (onsite); July 17-20, 2006 (onsite)

Inspectors: S. Pindale, Senior Reactor Inspector (Team Leader)
J. D'Antonio, Senior Reactor Inspector
P. Kaufman, Senior Reactor Inspector
A. Patel, Reactor Inspector
M. Patel, Reactor Inspector
H. Campbell, NRC Mechanical Contractor
J. Leivo, NRC Electrical Contractor

Approved By: Lawrence T. Doerflein, Chief
Engineering Branch 2

Enclosure

SUMMARY OF FINDINGS

IR 05000334/2006008, 05000412/2006008; 06/12/2006 - 07/20/2006; Beaver Valley Power Station, Units 1 and 2; Engineering Design Inspection.

This inspection was conducted by a team of five NRC inspectors and two NRC contractors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

None.

B. Licensee-identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R21 Component Design Bases Inspection (IP 71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components and operator actions for review using information contained in the Beaver Valley Probabilistic Risk Assessment (PRA) and the Nuclear Regulatory Commission's (NRC) Standardized Plant Analysis Risk (SPAR) model. Additionally, the Beaver Valley Significance Determination Process (SDP) Phase 2 Notebook, Revision 2, was referenced in the selection of potential components and actions for review. In general, the selection process focused on components and operator actions that had a risk achievement worth (RAW) factor greater than 2.0 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, valves, tanks, diesel generators, transformers, and electrical buses.

The team initially compiled a list of approximately 40 components based on the risk factors previously mentioned. The team performed a margin assessment to narrow the focus of the inspection to 20 components. The team's evaluation of possible low design margin considered original design issues, margin reductions due to modifications, and margin reductions identified as a result of material condition/equipment reliability issues. The margin review also evaluated the impact of licensing basis changes that could reduce safety analysis margins, such as the extended power uprate (EPU) which was being reviewed by the NRC at the time of this inspection. Several of the EPU-related modifications had already been implemented, and were considered in the team's margin assessment.

As part of the evaluation, the team reviewed items such as failed performance test results, significant corrective action history, repeat maintenance, maintenance rule (a)(1) status, operability reviews for degraded conditions, system health reports and industry operating experience. The team also considered NRC resident inspector input regarding equipment problems. A margin review of operator actions was performed by the team which assessed the complexity of the action, the time to complete the action and the extent of training of the action; as well as the uniqueness and complexity of the design and available defense-in-depth margins. The team performed a detailed review of seven operator actions.

The team performed the detailed design review of the components and operator actions as outlined in Inspection Procedure 71111.21. This inspection effort included walk-downs 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 bases requirements. A summary of the

reviews performed and the specific inspection results are discussed in the following sections of the report. The documents reviewed and key points of contact are identified in the attachment to this report.

.2 Results of Detailed Reviews

.2.1 Detailed Component Design Reviews (20 Samples)

.2.1.1 Refueling Water Storage Tank 2QSS-TK-210 (Unit 2)

a. Inspection Scope

The team reviewed the design and current condition of the Unit 2 refueling water storage tank (RWST). Tank volume and level setpoint calculations were evaluated to ensure that design basis specifications could be satisfied. The team also considered net positive suction head (NPSH) and vortex concerns, and tank drawings and dimensions in the calculation review. The team verified that instrument setpoints were properly translated into system procedures and tests, and reviewed completed tests intended to demonstrate component operability. Further, uncertainty calculations were reviewed, including those regarding the switchover to the recirculation mode of safety injection. Finally, the team discussed the design, operation and maintenance of the RWST and associated equipment with design and system engineers, and completed a walkdown of the RWST with the system engineer.

b. Findings

No findings of significance were identified.

.2.1.2 Reactor Coolant Pump Seals (Units 1 and 2)

a. Inspection Scope

The team reviewed the design and operation of the Unit 1 and Unit 2 reactor coolant pump (RCP) seals. To assess the condition of the seals, the team reviewed system health and condition reports, technical bulletin correspondence, and industry operating experience relating to RCP seal failure concerns. The team also reviewed the potential impact that the upcoming EPU could have on RCP seal operation (higher reactor power and possible decrease in time to core damage for various seal leak scenarios). Finally, the team reviewed calculations relating to seal design and injection flow, as well as completed test results that were associated with the RCP seals.

b. Findings

No findings of significance were identified.

.2.1.3 Emergency Diesel Generator EE-EG-1 [electrical] (Unit 1)

a. Inspection Scope

The team reviewed the electrical capabilities of Unit 1 emergency diesel generator (EDG) EE-EG-1. The evaluation of EE-EG-1 focused on its ability to power safety-related loads during design basis events. Specifically, the team reviewed: 1) the load flow analysis and voltage drop calculations to verify that adequate voltage was provided to the safety-related loads during worst-case loading conditions; 2) the 4160 Vac coordination analysis to ensure that the protective devices were adequately rated; and 3) the sequential starting of loads to determine if EE-EG-1 had sufficient capability to accelerate the loads within the time periods specified in the UFSAR. The team also verified that EDG loading calculations have been revised to incorporate the electrical load increases of the 4160 Vac charging pump motors and the 460 Vac control rod drive mechanism shroud fan motors needed to support unit operation at the proposed EPU conditions. The team reviewed the EDG test results to verify that the test conditions verified compliance with technical specification requirements as well as the actual loading conditions that would be present under design basis events.

b. Findings

No findings of significance were identified.

.2.1.4 Emergency Diesel Generator 2EGS*EG2-1 [mechanical] (Unit 2)

a. Inspection Scope

The team reviewed the mechanical capabilities of Unit 2 EDG 2EGS*EG2-1. Included in this review were selected portions of several design and licensing documents. Calculations reviewed focused on fuel consumption requirements, fuel storage and day tank level/volume and associated instrumentation and setpoints, and heat removal requirements of the EDG building. Further, the team reviewed system health and condition reports, including those concerning tornado wind loading on the building and heat exchanger degradation due to bio-fouling. Also, the results of recently completed monthly surveillance tests were reviewed. Finally, the team discussed the design, operation and maintenance of the EDG and related equipment with design and system engineers, and completed a walkdown of the EDG building.

b. Findings

No findings of significance were identified.

.2.1.5 Recirculation Spray Pump 2RSS-P21C (Unit 2)

a. Inspection Scope

The team reviewed design documents, including drawings, calculations, procedures, tests and modifications to evaluate the functional requirements of the Unit 2 recirculation spray system (RSS) pump 2RSS-P21C. The team reviewed these documents to ensure the pump was capable of meeting design basis requirements, with consideration of allowable pump degradation, heat exchanger tube plugging impact and NPSH. To assess the current condition of the pump, the team interviewed the RSS system engineer and reviewed system health and related condition reports. Recent surveillance test results were reviewed to determine whether pump performance margin was sufficient to assure design basis assumptions could be achieved. Finally, EPU documentation and related calculations were reviewed to assess the associated requirements for higher power operations.

b. Findings

No findings of significance were identified.

.2.1.6 4160 Vac Emergency Bus 2DF (Unit 2)

a. Inspection Scope

The Unit 2 4160 Vac emergency bus 2DF serves one train of safety related loads required for mitigating design basis accidents and for achieving safe shutdown. The team reviewed the applicable voltage and load analysis calculations and degraded voltage protection calculations to confirm that selected equipment ratings would not be exceeded; and that selected loads would have adequate terminal voltage for transient and steady state design basis conditions. This included a review of selected loads impacted by the proposed EPU to confirm that the electrical calculations considered the load characteristics required for operation at the EPU rating. The team also reviewed a sample of preventive maintenance performed for selected 4160 Vac circuit breakers, as well as a sample of calibration and test records for the degraded voltage protection circuits. The team performed a visual external inspection of the switchgear bus to assess external material condition and potential vulnerability to hazards. The team also reviewed system health reports and a sample of condition reports to confirm that the licensee was adequately addressing the conditions. This review assessed the licensee's consideration of apparent or root cause; extent of condition; and the appropriateness and timeliness of corrective actions. The team also reviewed the licensee's disposition of selected industry operating experience pertinent to 4160 Vac switchgear. To supplement the document reviews and walkdowns, the team interviewed design engineers, the system engineer, and other cognizant licensee staff.

b. Findings

No findings of significance were identified.

.2.1.7 Station Service Transformer TR-1A (Unit 1)

a. Inspection Scope

The team reviewed calculations, drawings, maintenance procedures, and vendor data to determine whether the Unit 1 Station Service Transformer TR-1A, which supplies power from offsite to safety-related 4160 Vac buses, was adequately designed and maintained. The team also reviewed the protective relaying for the transformer and the fast transfer relaying schemes to determine adequacy of the offsite power to safety-related 4160 Vac buses upon a trip of Unit 1. The team reviewed preventive maintenance work orders, which included selected periodic tests, oil sampling analysis, and tap changer inspection. Condition reports associated with the station service transformer were also reviewed to ensure the issues had been appropriately addressed.

b. Findings

No findings of significance were identified.

2.1.8 High Head Safety Injection Charging Pump 1CH-P-1B (Unit 1)

a. Inspection Scope

The high head safety injection (HHSI) charging pumps provide for injecting coolant into the reactor coolant system and the reactor coolant pump shaft seals. The design requirements for the pumps discharge pressure considered the full range of reactor coolant system pressures up to the pressurizer safety valve settings, and included calculated charging system pressure drops at maximum flow.

The team reviewed design basis documentation (including calculations, modifications, UFSAR, Technical Specifications, and vendor design specifications) to identify design requirements related to flow, developed head, NPSH, minimum flow and runout protection, and HHSI pump motor sizing. The team reviewed the design change package and calculations that increased the maximum safety injection flow rates of the HHSI pumps runout limit to 580 gpm. The team conducted walkdowns of installed pump configuration, and flow and pressure instrumentation, and reviewed calibration documentation to verify the adequacy of flow measurement.

The team reviewed test results to verify 1CH-P-1B pump performance. Maintenance work orders, in-service testing, and corrective actions were also reviewed to assess potential component degradation and impact on design margins or pump performance. In addition, the team verified the charging pump lube oil cooler required flow was sufficient by reviewing operator logs, thermal performance testing results, and heat exchanger cleaning and inspection records.

b. Findings

No findings of significance were identified.

.2.1.9 River Water Pump WR-P-1B (Unit 1)

a. Inspection Scope

The team examined the functional requirements of the Unit 1 'B' river water (RW) pump (WR-P-1B) by reviewing calculations, modifications, the UFSAR and Technical Specifications. During design basis accident conditions, the RW pump is required to supply cooling water to several safety-related heat exchangers. Specific design documentation reviewed by the team included drawings, calculations addressing pump performance, and vortex and NPSH requirements. After review of these and related documents, including system health and condition reports, the RW system was walked down and visually inspected. Completed surveillance tests, with focus on pump operability and performance margin, were also reviewed. Finally, the team discussed system silting and bio-fouling concerns, as well as the licensee's program to monitor and control these concerns, with system engineers.

b. Findings

No findings of significance were identified.

.2.1.10 Safety Injection Accumulators 1SI-TK-IA, B, C (Unit 1)

a. Inspection Scope

The accumulators are pressure vessels filled with borated water and pressurized with nitrogen gas. Each of the three accumulator tanks is connected to a reactor coolant system cold leg through a normally open motor-operated valve and two check valves. The team interviewed the Unit 1 SI system engineer to gain an understanding of maintenance issues and overall reliability of the SI accumulators and associated motor-operated and check valves. To assess the capability of the SI accumulators to operate as required, the team reviewed equipment specifications, calculations, SI system health reports, design basis documents, modifications, condition reports, level and pressure transmitter calibration records, in-service test records, maintenance work orders, and vendor drawings.

The team verified that each SI accumulator tank contained the required volume, boron concentration, and nitrogen cover pressure to ensure the Technical Specification limits were met and operability was maintained by reviewing control room level and pressure indications, logs and completed surveillance tests. The team also verified the accumulator tank discharge isolation valves were de-energized open.

b. Findings

No findings of significance were identified.

.2.1.11 Safety Injection Accumulator Level and Pressure Instrumentation (Unit 1)

a. Inspection Scope

The team reviewed portions of the scaling, instrument uncertainty, and setpoint calculations for the Unit 1 SI accumulator level and pressure instrumentation to confirm that assumptions and design inputs regarding tank geometry, process effects, reference leg configuration, instrument uncertainty, and analytical or process limits had been appropriately considered, and that appropriate statistical methodology had been used. This included confirming that the calculations were consistent with operation at the proposed EPU rating. The team also reviewed portions of a design modification for the Unit 1 level instruments to confirm that the current configuration satisfied the design bases. In addition, the team reviewed a sample of calibration results and trending data, as reported by the licensee's maintenance measured data program. The team also reviewed a sample of condition reports to ensure issues had been appropriately addressed.

b. Findings

No findings of significance were identified.

.2.2.12 Service Water Pump 2SWS-P21B (Unit 2)

a. Inspection Scope

There are three service water pumps, which supply cooling water to various turbine plant and reactor plant heat exchangers during routine plant operations, and also to essential safeguards equipment in the event of a design basis accident. The team reviewed the design basis documents (calculations, safety evaluations, UFSAR, Technical Specifications and vendor design specifications) to identify design requirements related to flow, developed head, NPSH, minimum flow and runout protection for service water pump 2SWS-P21B. To ensure that adequate NPSH is maintained and test acceptance criteria satisfied, the team reviewed surveillance test results, modifications, technical evaluation reports, and condition reports.

The team reviewed service water system health reports and corrective maintenance work order history records; and performed a walkdown of the service water pump, pressure and flow instrumentation, strainers, bellows, and vacuum check valves to verify material condition and reliability of the pump.

The team reviewed flood door protection seal test results for the service and river water pump cubical doors inside the Intake Structure to verify the assumed UFSAR leakage rate. The team also reviewed structural drawings and performed walkdowns to verify the fresh air intakes on top of the service water/river water pump cubicles inside the

Intake Structure were installed at the proper elevation to prevent water from entering the fresh air intakes during the assumed maximum flood.

b. Findings

No findings of significance were identified.

.2.1.13 Recirculating Spray Heat Exchanger Isolation Valves MOV-1RW-103A & B (Unit 1)

a. Inspection Scope

Motor operated valves MOV-1RW-103A & B are normally closed and are required to open after receiving a containment isolation phase B signal to provide river water to the recirculation spray heat exchangers. The team interviewed, and conducted walkdowns with, the MOV program engineer and MOV design engineer to observe the condition of the selected valves, and gain an understanding of maintenance issues and overall reliability of the MOVs. The team also reviewed MOV calculations, with focus on weak link analysis, maximum thrust/torque, maximum differential pressure, seismic analysis, and degraded voltage. In addition, the team reviewed river water system health reports, design basis documents, drawings, condition reports, work orders, and in-service testing results to assess the capability of the valves to operate as required during design basis events.

b. Findings

No findings of significance were identified.

.2.1.14 480 Vac Substation 1-9P (Unit 1)

a. Inspection Scope

The team reviewed calculations and drawings to determine whether the loading of 480 Vac Substation 1-9P was within equipment and design ratings. The team reviewed the adequacy of design assumptions and calculations related to motor starting and loading voltages to determine if the voltages across motor terminals, under worst-case motor starting and loading conditions, would remain above the minimum acceptable values. The team also verified that calculations have been revised to incorporate the load increases of the 460 Vac control rod drive mechanism shroud fan motors and 460 Vac containment air recirculation fan motors to support unit operation at the proposed EPU condition. On a sample basis, the team reviewed maintenance and test procedures to verify that 480 Vac Substation 1-9P was capable of supplying the minimum voltage necessary to ensure proper operation of connected equipment during normal and accident conditions. On a selected sample of associated equipment, the team reviewed the adequacy of the short circuit ratings of the switchgear and circuit breakers, and the adequacy of protective device coordination. The team reviewed calculations, drawings, and procedures to determine whether undervoltage relay

setpoints were adequate. Finally, the team conducted a walkdown of Substation 1-9P to determine if the material condition and operating environment were consistent with the design basis, and to verify that system alignments were consistent with the design basis.

b. Findings

No findings of significance were identified.

.2.1.15 Switchyard 138 kV Oil Circuit Breaker 92 (Unit 2)

a. Inspection Scope

The team selected 138 kV oil circuit breaker (OCB) 92, which supplies one of the two credited independent offsite power sources to Unit 1. The team reviewed the calculations and capacity test results for the switchyard battery to confirm that adequate DC voltage would be available for breaker control so that offsite power could be restored following a station blackout. The team also reviewed a sample of preventive maintenance and testing performed on OCB 92 and similar switchyard circuit breakers. The team performed a visual inspection of the switchyard, the switchyard 125 Vdc battery and distribution panels, and OCB 92. Inspection of OCB 92 included a visual inspection of material condition and conformance of as-found hydraulic pressure settings to vendor specifications for the breaker control mechanisms. The team reviewed selected condition reports and supporting documentation. The team also interviewed the licensee's switchyard coordinator, the system engineer, and switchyard support staff regarding the design aspects and operating history for the circuit breakers, battery, charger, and 125 Vdc distribution equipment.

b. Findings

No findings of significance were identified.

2.1.16 120 Vac Vital Inverter Bus 2-2 (Unit 2)

a. Inspection Scope

The team reviewed the one-line diagrams that described the configuration of the 120 Vac vital distribution system and equipment. The team also reviewed the calculations that determined the equipment loading margins and maximum/minimum load terminal voltages to confirm that equipment ratings and load performance requirements would be satisfied for design basis conditions. In addition, the team reviewed system health reports, a sample of preventive maintenance performed, and a sample of corrective actions involving operating history, to confirm that the licensee was adequately addressing the conditions. The team also interviewed the design and system engineers regarding the design aspects and operating history for the inverters, internal capacitors, static switches, and regulating transformers.

b. Findings

No findings of significance were identified.

2.1.17 Low Head Safety Injection MOV-1SI-890C (Unit 1)

a. Inspection Scope

The 10-inch safety-related MOV is the outside containment isolation valve which provides/isolates flow from low head safety injection (LHSI) pumps to the reactor coolant system (RCS) cold legs. The valve is administratively controlled open during normal plant operation and is required to close during design basis events. As part of the proposed EPU, the team reviewed the design modification for MOV-1SI-890C, which enables the simultaneous hot and cold leg safety injection recirculation (LHSI to RCS hot legs) by changing the valve position to closed during a design basis event. In addition, the team reviewed the motor replacement modification which was implemented to increase the MOV's design margin. The modifications were reviewed to assess potential component degradation and impact on design margins or performance.

The team interviewed the MOV program and design engineers, and conducted walkdowns to observe the installed configuration of the reach rod assembly and handwheel attachment. To assess the capability of the valves to operate as required, the team reviewed system health reports, design basis documents, drawings, condition reports, work orders, and in-service testing results. To ensure valve performance during design basis events, the team reviewed weak link analyses, and static and dynamic flow testing results obtained during the most recent refueling outage.

b. Findings

No findings of significance were identified.

2.1.18 125 Vdc Bus 2-5 (Unit 2)

a. Inspection Scope

The Unit 2 125 Vdc bus 2-5 is a non-safety related bus, but is risk significant because it provides the 125 Vdc control power necessary for the 4160 Vac fast bus transfer scheme. In selecting this component, the team considered the potential failure of 125 Vdc bus 2-5, which would result in an initiating event such as unit trip. The team reviewed the one-line diagrams for the bus; the calculations for battery sizing and determining minimum voltage at the trip and close coils for the transfer scheme; the calculations that established coordinated protection between selected loads and the main circuit breaker serving the bus from the battery; the results of the last battery capacity test; and a sample of tests and preventive maintenance performed. The team also reviewed system health reports and a sample of condition reports involving operating history to confirm that the licensee was adequately addressing the conditions.

This included a review of the DC ground history, methods for detecting grounds, and electrical ground management to assess vulnerability to “sneak circuits” resulting from multiple grounds. The team also performed a visual inspection of the battery regarding material condition, potential hazards, and ventilation configuration. The team interviewed the cognizant design and system engineers, and other cognizant licensee staff regarding the design aspects and operating history for the battery, charger, and circuit breakers.

b. Findings

No findings of significance were identified.

2.1.19 Station Battery BAT1-2 (Unit 1)

a. Inspection Scope

The team reviewed the station battery calculations to verify that the battery sizing would satisfy electrical loading requirements and that the minimum possible voltage was taken into account. The team focused on verifying that the battery and battery chargers were adequately sized to supply the design duty cycle of the 125 Vdc system for both the loss-of-offsite power/loss-of-coolant accident and station blackout loading scenarios, and that the adequate voltage would remain available for the individual load devices required to operate during a two hour coping duration. The team reviewed battery test results to verify that applicable test acceptance criteria and test frequency requirements specified in Technical Specifications were met. The team also reviewed a modification of the battery chargers and its calculations associated with the capability of supplying the continuous DC loads and recharging the batteries. In addition, a walkdown was performed to visually inspect the physical and material condition, and component readiness of the battery and battery chargers.

b. Findings

No findings of significance were identified.

2.1.20 4160 Vac Safety Bus 4KVS-1AE (Unit 1)

a. Inspection Scope

The team reviewed calculations and drawings to determine if the loading of 4160 Vac Vital Bus 4KVS-1AE was within equipment and design ratings. The team reviewed the adequacy of design assumptions and calculations related to motor starting and loading voltages to determine whether the voltages across motor terminals (under worst-case motor starting and loading conditions) would remain above minimum acceptable values. The team also verified that calculations have been revised to incorporate the load increases of the 4160 Vac charging pump motors to support unit operation at the proposed EPU condition. On a sample basis, the team reviewed maintenance and test procedures and acceptance criteria to verify that 4160 Vac Vital Bus 4KVS-1AE was

capable of supplying the minimum voltage necessary to ensure proper operation of connected equipment during normal and accident conditions. The team reviewed the adequacy of the short circuit ratings of the switchgear and circuit breakers, and the adequacy of protective device coordination provided for a selected sample of equipment.

The team reviewed calculations, drawings, and procedures to determine whether undervoltage relay setpoints were adequate. Finally, the team conducted a walkdown of the 4160 Vac vital bus to determine if the material condition and operating environment were consistent with the design basis, and to verify that system alignments were consistent with the design basis.

b. Findings

No findings of significance were identified.

.2.2 Detailed Operator Action Reviews (7 Samples)

The team assessed manual operator actions and selected a sample of seven 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
- Training

.2.2.1 Operator Response to a Steam Generator Tube Rupture (Unit 2)

a. Inspection Scope

The team selected the manual operator actions required to respond to a steam generator tube rupture (SGTR) on Unit 2. The team reviewed facility documentation of the validation of operators' ability to meet action times stated in the EPU steam generator overfill analysis, and observed a crew respond to a steam generator tube rupture in the Unit 2 simulator. Ability to accomplish certain field actions was evaluated by walkdown with an operator. The specific control room actions evaluated were to identify and isolate the ruptured steam generator, cooldown down and depressurize the RCS to the emergency procedure target value, and to terminate safety injection. Field actions observed were local makeup to the RWST (potentially required for a ruptured/faulted SGTR event) and local isolation of auxiliary feedater (AFW) to the affected SG (emergency procedure action in response to a single active failure of the ruptured SG AFW throttle valve to close).

b. Findings

No findings of significance were identified.

.2.2.2 Operator Response to a Loss of All Steam Generator Feed (Unit 2)

a. Inspection Scope

The team selected the control room manual operator actions required to actuate AFW following automatic initiation failure, attempt main feedwater restoration, and to initiate RCS feed and bleed in response to a loss of all steam generator feed capability on Unit 2. The team observed one crew in the Unit 2 simulator in a scenario requiring these actions to verify adequacy of the procedure and ability of the operators to recognize feed and bleed initiation criteria and perform the required actions.

b. Findings

No findings of significance were identified.

.2.2.3 Operator Response to Station Blackout (Unit 1)

a. Inspection Scope

The team selected the manual operator actions to protect RCP seals and attempt to restore power after a station blackout on Unit 1. The team observed a loss of all AC power scenario in the control room and walked down the following field actions with an operator:

- Establish station blackout crosstie;
- Restoration of AC power from offsite; and
- Isolation of RCP seal return line.

The control room actions evaluated were to direct maintenance actions to replace failed offsite power breakers, crosstie power from the other unit, and accomplish cooldown and depressurization of the RCS when power restoration was unattainable. The team verified that the total time to accomplish these actions was within the time assumed in the PRA human reliability analysis or within the battery capacity time capability stated in the 125 Vdc design basis document.

b. Findings

No findings of significance were identified.

.2.2.4 Operator Response for Loss of RCP Seal Cooling (Units 1 and 2)

a. Inspection Scope

The team selected the manual operator actions for a loss of RCP seal cooling on Units 1 and 2. The team observed a simulator scenario in which the operators were required to respond to a loss of component cooling, loss of charging (seal injection), and high seal

leakoff flow. The team reviewed the adequacy of abnormal operating procedures concerning a loss of all seal cooling and subsequent restoration and verified these procedures addressed actions to prevent thermal shock to the seals. The team also reviewed the procedure for shutdown from outside the control room to determine if RCP seal thermal shock and thermal barrier water hammer concerns were addressed.

b. Findings

No findings of significance were identified. However, one noncompliance was identified with 10CFR50, Appendix B, Criterion V (Procedures) for the failure to include appropriate criteria for restoring cooling to the RCP seals in Unit 2 procedure 2OM-56C.4.B, "Alternate Safe Shutdown from Outside the Control Room." This procedure is intended to address events requiring control room evacuation, including fires. Specifically, while the procedure properly stated that the EDG must be manually started within 10 minutes of aspurious EDG trip (thereby restoring RCP seal cooling), there were no contingency actions for subsequently restoring RCP seal cooling (in the event the EDG could not be promptly restored) in such a fashion to prevent creating a thermal shock to the seals. In response to this issue, the licensee entered the deficiency in the Corrective Action System by initiating Condition Report 06-04134; and promptly implemented compensatory actions (2OM-56C.4.B was revised).

The team concluded that the licensee's compensatory actions were sufficient to correct the noncompliance while the licensee is in the National Fire Protection Association Standard NFPA 805 implementation transition period. Further, the licensee completed a risk assessment of the deficiency, and concluded that the risk significance was very low. The team reviewed the licensee's assessment, and performed an independent review, and similarly concluded that this was an issue of very low safety significance. No enforcement action is required for this issue because the criteria of NRC Enforcement Policy, Interim Enforcement Policies, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10CFR50.48)," were satisfied. Team follow-up of this issue determined that the noncompliance was not willful and, as stated above, the issue was not of high safety significance.

.2.2.5 Operator Response to Small Break Loss of Coolant Accident with Loss of High Head Injection (Unit 1)

a. Inspection Scope

The team selected the actions necessary to respond to a loss of coolant accident with loss of high head injection on Unit 1 when the break size is small enough that the leak does not depressurize the RCS to the low head safety injection system injection pressure. The team observed a simulator scenario requiring these actions and reviewed the associated procedures.

b. Findings

No findings of significance were identified.

.2.2.6 Establish Local Emergency Switchgear Cooling (Unit 1)

a. Inspection Scope

The team selected the actions necessary to provide emergency cooling to Unit 1 vital switchgear. The team verified the adequacy of the procedure and the availability of all equipment called for in this procedure. The team also walked down the activity using the procedure to ensure the activity could be successfully completed within assumed time requirements.

b. Findings

No findings of significance were identified.

.2.2.7 Transfer to Simultaneous Hot and Cold Leg Recirculation (Units 1 and 2)

a. Inspection Scope

The team selected the actions necessary to align for simultaneous hot leg and cold leg recirculation following a postulated loss-of-coolant accident. The team verified that emergency procedures direct this action at the time called for in the EPU analysis, and walked down the action in the control room to verify adequacy of the procedure and that the final flowpath is as specified in the modification documentation. The team also reviewed modification 05-280-01 (for simultaneous hot leg/cold leg injection) and associated calculations to ensure appropriate failure analyses and evaluation of adequacy of the new flowpaths had been performed.

b. Findings

No findings of significance were identified.

.3 Review of Industry Operating Experience (6 Samples)

a. Inspection Scope

The team reviewed selected operating experience issues that had occurred at nuclear facilities for applicability at Beaver Valley. The team performed an independent applicability review and selected issues that appeared to be applicable to Beaver Valley for a detailed review to verify that the licensee had taken appropriate actions. Documents reviewed for these issues are listed in the attachment.

.3.1 NRC Information Notice 90-45: Turbine Driven Auxiliary Feedwater Pump Overspeed

The team reviewed the potential consequences of the turbine driven AFW pump operating at higher speeds due to the loss of control air or a malfunction of the turbine driver. The areas reviewed included potential AFW system over-pressure, excess flow to the steam generators, and increased NPSH requirements.

.3.2 Westinghouse Technical Bulletin 2004-22, Rev. 1: RCP Seal Performance

The team selected this operating experience because this bulletin recommended a reduction in the operator response time to a loss of RCP seal cooling, and also recommended additional plant specific analysis to evaluate any potential increase in the assumed consequences for a loss of seal cooling.

.3.3 NRC Information Notice 94-76: Recent Failures of Charging/SI Pump Shafts

The team reviewed the applicability and disposition of IN 94-76, Recent Failures of Charging/Safety Injection Pump Shafts. The basis of IN 94-76 was to describe numerous failures of pump shafts and vendor guidance on vibration monitoring, operation and maintenance of the pumps, and allowable vibration amplitude limits.

.3.4 NRC Information Notice 88-23: Potential for Gas Binding of High-Pressure Safety Injection Pumps during Design Basis Events

The basis of IN 88-23 was to describe industry experience regarding the transport and accumulation of gases in high pressure safety injection systems. The team reviewed the licensee's procedure on void monitoring and also walked down portions of the charging system piping.

.3.5 NRC Information Notice 2002-12: Submerged Safety-Related Electrical Cables

The team selected this operating experience due to its potential applicability to safety related underground cables. The team reviewed the underground duct drawings and preventive maintenance procedures. The team also performed a walkdown of the underground systems and inspected the inside of a sample of safety related cable manholes to verify and the licensee was appropriately identifying issues in this area.

.3.6 NRC Information Notice 99-13: Insights from NRC Inspections of Low and Medium Voltage Circuit Breaker Maintenance Programs

The team selected IN 99-13 due to industry wide concerns regarding inadequate preventive and corrective maintenance programs and corrective actions of safety related breakers. The team reviewed the licensee's preventive maintenance program and procedures to deal with lubrication issues with circuit breakers.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution

a. Inspection Scope

The team reviewed a sample of problems that were identified by the licensee and entered into the corrective action program. The team reviewed these issues to verify an appropriate threshold for identifying issues, and to evaluate the effectiveness of corrective actions related to design or qualification issues. The specific corrective action documents that were sampled and reviewed by the team are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

4AO6 Meetings, Including Exit

On July 20, 2006, the team presented the inspection results to Mr. J. Lash, Senior Vice President, BVPS, and other members of licensee staff. The team verified that no proprietary information is documented in the report.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Adams	System Engineer
J. Ankney	Nuclear Engineer
D. Beerworth	Nuclear Construction Supervisor
D. Bloom	Nuclear Engineer
R. Boyle	System Engineer
D. Bucklew	Electrical Maintenance Supervisor
S. Checketts	Superintendent, Nuclear Operations
K. Deberry	System Engineer
R. Ferrie	Electrical Maintenance Specialist
K. Frederick	Design Engineer
G. Cacciani	Design Engineer
D. Hoover	Nuclear Engineer
C. Keller	Superintendent, Nuclear Engineering Analysis
E. Lauck	System Engineer
K. Lynch	Design Engineer
R. Manko	System Engineer
J. Mauck	Compliance Specialist
J. Meyers	System Engineer
D. Mickinac	Performance Improvement Specialist
L. Miller	System Engineer
B. Murtagh	Design Engineer
F. Oberlitner	Design Engineer
M. Patel	Design Engineer
B. Paul	Nuclear Specialist
J. Redmond	System Engineer
M. Ressler	Nuclear Engineer
B. Sepelak	Supervisor, Regulatory Compliance
M. Testa	Design Engineer
W. Tobac	Design Engineer
P. Vakharia	System Engineer
M. Wimmel	Nuclear Engineer (MOV Program)

NRC Personnel

P. Cataldo, Senior Resident Inspector
D. Werkheiser, Resident Inspector
C. Cahill, Senior Reactor Analyst

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened / Opened and Closed / Discussed

None.

LIST OF DOCUMENTS REVIEWED

Calculations

10080-DEC-0211, Unit 2 - 4.16 kV Emergency Bus Undervoltage - Degraded Voltage, Rev. 1
10080-E-0309, Protective Device Setting Calculation, RSS Pump Motor Feeder, Rev. 0
10080-E-0310, Protective Device Setting Calculation, SW Pump Motor Feeder, Rev. 0
10080-E-037, Battery Duty Cycle and Size Calculation [Battery 2-5], Addendum 2, Rev. 8
10080-E-222, 4160 and 480 Volt Load Management/Voltage Profile Calculations, Rev. 0
10080-E068, Station Service Voltage and Load Analysis, Addendum 3, Rev. 4
10080-N-789, High Head Safety Injection Pump NPSHA from the RWST, Rev. 1
10080-N-SP-2QSS-012, RWST Level Transmitters Uncertainty & Scaling Calculations, Rev. 3
10080-SP-2EGF-3, Setpoints for 2EGF-LIS 201A/B on Diesel Fuel Oil Storage Tanks, Rev. 4
10080-US(B)-159, NPSH Margin for RSS Pumps, Rev. 2
10080-US(B)-239, BV-2 Containment Response for DBAs - Containment Conversion, Rev.1
11700-140, Sizing of Air Vessels for Water Tight Doors in the Intake Structure, Rev. 0
12241.00-US(B)-183, Containment Sump vs. RWST Levels EOP Setpoint, Rev.3
12241-B-161, EDG Building Ventilation Flow Rate and Operating Temperature, Rev. 2
211-MT-145, Analysis to Verify the Adequacy of Emergency Diesel Fuel Oil System, Rev. 5
211-N-290, RSS Pump NPSH Requirements, Rev. 1
211-N-519, Development of CVCS Seal Water Injection Design, Rev. 0
8700-DEC-0117, Voltage Drop Analysis of SBO 4160 V Cross Tie Circuit, Rev. 0, Addendum 0
8700-DEC-0149, Unit 1 Emergency Bus Undervoltage-Degraded Voltage (Addendum 1), Rev. 0
8700-DEC-068, Station Service Load Flow and Voltage Profile Analysis (Addendum 1), Rev. 4
8700-DEC-182, Tech. Spec. EDG Voltage and Frequency (Addendum 1), Rev. 0
8700-DMC-127, Maximum Pressure Upstream of MOV-RW-103A, Rev. 1
8700-DMC-128, Inlet Headlosses To RSS Heat Exchangers for RW System, Rev. 0
8700-DMC-1430, Minimum Safeguards Injection System Performance (Addendum 1), Rev. 1
8700-DMC-1434, High Head Safety Injection Pump NPSHA from the RWST, Rev. 0
8700-DMC-1569, Maximum Safety Injection Flow Rates, Rev. 0
8700-DMC-1615, River Water and Service Water Pump Intake Bay Vortex Analysis, Rev.1
8700-DMC-2282, ECCS Performance–Recirculation Mode (Addenda 2, 3, 4), Rev. 0
8700-DMC-2740, Torque Calculations for MOV-1RW-103A, B, C, D, Rev. 5
8700-DMC-2772, Torque Calculations for MOV-1SI-890A, B, C, Rev. 7
8700-DMC-2787, Maximum Pressure Across QA Category 1 MOVs in the RW System, Rev. 3
8700-DMC-2788, Maximum Pressure Across QA Category 1 MOVs in the SI System, Rev. 5
8700-DMC-2808, Maximum Torque Outputs (Degraded Voltage) for RW MOVs, Rev. 9
8700-DMC-2811, Maximum Torque Outputs (Degraded Voltage) for SI MOVs, Rev. 8
8700-DMC-2959, Evaluation of MOV-SI-890A-C Using ASME Allowable Stresses, Rev. 1
8700-DMC-2975, BV1 ESGR Area Heatup Following Recovery of Loss of All HVAC, Rev. 0

8700-DMC-3136, River Water Minimum Operating Point, Rev. 3
8700-DMC-3443, Intake Structure Cubicles Internal Flood Analysis, Rev. 2
8700-E-0343, Protective Device Setting Calculation, Attachment 9, (WR-P-1B), Rev. 0
8700-E-0343, Protective Device Setting Calculation, Attachment 10, (CH-P-1B), Rev. 0
8700-E-048, EDG Loading Analysis at Frequency Above 60 Hz, Rev. 4
8700-E-074, Station Service Fault Analysis (Addendum 3), Rev. 2
8700-E-202, DC System Management BAT-2 and BAT-CHG-2, Rev. 1.
8700-E-310, Protective Device Setting Calculation, Rev. 0A1
8700-SP-1CH-10, Instrument Uncertainties - Charging Pump Disch Pressure Loop, Rev.0
8700-SP-1IA-01, Air Supply Relief Valves for Intake Structure Doors, Rev.1
8700-SP-1SI-05, Accumulator Pressure Uncertainties, Rev. 3
8700-SP-1SI-09, Unit 1 SI Accumulator Level Uncertainties and Instrument Scaling, Rev. 2
BV1-MCC-1-E3-B, Motor Control Center Setting Sheets for MOV-1RW-103A, Rev. 2
BV1-MCC-1-E4-B, Motor Control Center Setting Sheets for MOV-1RW-103B, Rev. 4
BV1-MCC-1-E6-AA, Motor Control Center Setting Sheets for MOV-1SI-890C, Rev. 4
BV2-DC5-1, Electrical Protective Device Setting Sheet, Rev. 6
BV2-DC5-7, Electrical Protective Device Setting Sheet, Rev. 5
BV2-DC5-8, Electrical Protective Device Setting Sheet, Rev. 1
DLC 8700-06.048-0167, Anchor/Darling Weak Link Analysis Report, Rev. G
DLC-8700-06.48-0173, Design Analysis Review - MOVs, Rev. C
DMC-3016, DCP-2078, RSS Heat Exchangers Bypass Piping Flow Analysis, Rev. 0
E-76, Voltage Levels at 120 Vac Loads, Rev. 4
E-77, 125 Vdc Class Non-1E Voltage at Loads, Rev. 2
N-211-423. Determine the Available NPSH for the LHSI Pumps at the Design Flow, Rev. 0
Switchyard - Battery/Charger Calculations, Shts 1-12 (Battery A) & Shts 1-7 (Battery B), 5/26/70
TER No. 10253, Replacement Motors for MOV-RW-103A and MOV-103B, Rev. 0
TER No. 7646, Evaluate Butterfly Valve Drawings for Permanent Plant Records, Rev. 0

Functional, Surveillance and Modification Acceptance Testing

1MSP-11.15-1, I-SI920, SI Accumulator 1A Level Calibration, Issue 4, Rev. 12
1MSP-11.21-1, P-SI921, SI Accumulator Tank 1A Pressure Calibration, Issue 4, Rev. 9
2MSP-11.15-1, 2SIS-L920, SI Accumulator Channel I Level Calibration, Issue 4, Rev. 6
2MSP-11.21-1, 2SIS-P921, SI Accumulator Channel I Pressure Loop Calibration, Issue 4, Rev. 7
Maintenance Measured Data reports for calibrations performed 2003 - 2006 for various accumulator level and pressure instruments

Completed Surveillance Test Procedures

1/2-BVT1.11.03, SI Accumulator Discharge Check Valves Full Stroke Test (2/26/06)
1/2-OST-30-21A, Group 1 Flood Door Seal System Operability Check (6/13/06)
1/2-MI-75-Manhole-1E, Inspection of Manholes for Water Induced Damage (9/30/01)
1/2-PMP-E-36-015, ITE Medium Voltage Circuit Breaker Inspection and Test (10/3/03, 6/5/05)
1/2-PMP-36TR-Transformer-1E, System Transformer Inspection (3/11/06)
1/2-OST-30-21B, Group 1 Flood Door Seal System Operability Check (7/12/05)
1/2-PMP-E-75-001, 4160 VAC Motor Inspection and Lubrication (12/07/04)

1BVT 2.30.7, Charging Pump Lube Oil Cooler Heat Exchanger Testing (5/18/06)
1MSP-11.03-I, L-SI920, SI Accumulator Tank 1A Level Loop Test (11/23/05)
1MSP-11.04-I, L-SI922, SI Accumulator Tank 1A Level Loop Test (11/21/05)
1MSP-11.17-I, L-SI924, SI Accumulator 1B Level Calibration (5/16/06)
1MSP-11.18-I, L-SI926, SI Accumulator 1B Level Calibration (4/26/06)
1MSP-11.21-I, P-SI921, SI Accumulator Tank 1A Pressure Calibration (5/05/05)
1MSP-11.22-I, P-SI923, SI Accumulator Tank 1A Pressure Calibration (3/15/05)
1MSP-11.25-I, P-SI929, SI Accumulator Tank 1C Pressure Calibration (8/10/05)
1MSP-36.01A-E, Calibration of Voltmeter VM-VE109 (12/12/05)
1MSP-36.49A-E, 1AE 4KV Bus Degraded Voltage Relays Calibration (2/20/06)
1MSP-36.49B-E, 1AE 4KV Bus Degraded Voltage Relays Calibration (4/07/06)
1MSP-36.52A-E, 1P 480 Volt Bus Degraded Voltage Relays Calibration (3/26/06)
1OST-11.14B, HHSI Full Flow Test (3/30/06)
1OST-11.4A, Accumulator Check Valve (1SI-51, 52, 53) Test (2/15/06)
1OST-11.4B, Accumulator Check Valve (1SI-48, 49, 50) Test (2/14/06)
1OST-24.13, Overspeed Trip Test of Turbine Driven AFW Pump [1FW-P-2] (4/16/06)
1OST-30.12B, Train B Reactor Plant RW System Full Flow Test (1/26/06)
1OST-30.3, Reactor Plant River Water Pump 1B Test (1/27/06, 5/18/06)
1OST-36.1, Diesel Generator No. 1 Automatic Test (2/15/06, 5/03/06, 5/31/06, 6/26/06, 6/28/06)
1OST-7.11, CHS and SIS Operability Test, Train B (2/14/06)
1OST-7.11A, CHS and SIS Operability Test, Train A (4/04/06)
1OST-7.5, Centrifugal Charging Pump 1 CH-P-1B Test (5/16/06)
1PMP-38VB-UPS-1-31, Uninterruptible Power Supply (Solid State Controls) No. 1 (2/24/06)
1PMP-38VB-UPS-2-31, Uninterruptible Power Supply (Solid State Controls) No. 2 (3/29/06)
1PMP-38VB-UPS-3-31, Uninterruptible Power Supply (Solid State Controls) No. 3 (2/26/06)
1PMP-38VB-UPS-4-31, Uninterruptible Power Supply (Solid State Controls) No. 4 (4/3/06)
1PMP-E-37-011, Low Voltage Circuit Breaker Inspection/Test Model AK-3A & 7A-25 (11/13/01)
1T-39-20076-2, Battery Chargers 1-2A and 1-2B Load Test (11/04/04)
2BVT 01.39.10, Station Battery 2-5 Capacity Test (3/11/99)
2ICP-36-LIS203A, EDG 2-1 Fuel Tank Level Indicating Switch Calibration (2/10/06)
2ICP-36-LIS204A, EDG 2-1 Fuel Tank Level Indicating Switch Calibration (2/16/06)
2ICP-36-LIS205A, EDG 2-1 Fuel Tank Level Indicating Switch Calibration (6/09/06)
2MSP-36.05-E, 2DF 4 KV Bus Loss of Voltage Relay Calibration (4/20/05)
2MSP-36.16-E, 2DF 4 KV Bus EDG Start Undervoltage Relay Calibration (4/20/05)
2MSP-36.22-E, 2DF 4 KV Bus Degraded Voltage Time Delay Relay Calibration (4/19/05)
2MSP-36.37-E, 2DF 4 KV Bus Degraded Voltage Relay Test (10/12/05, 1/4/06, 3/29/06)
2OST-24.9, Overspeed Trip Test of Turbine Driven AFW Pump [2FWE*P22] (4/22/05)
2OST-30.13A, Train A Service Water System Full Flow Test (3/22/05, 4/28/05)
2OST-30.13B, Train B Service Water System Full Flow Test (3/23/05, 4/28/05)
2OST-30.17B, SW Pump Train B Seal Water System Operability Test (4/17/06)
2OST-30.3, Service Water Pump 2SWS-P21B Test (4/27/06)
2OST-30.6B, SW Pump 2SWS-P21B Test on Train B Header (5/27/06)
2OST-36.1, [2EGS*EG2-1] Monthly Test (6/07/06, 7/05/06)
2OST-6.2, Reactor Coolant System Water Inventory Balance (8/15/01)
2OST-6.4, Measurement of Seal Injection Flow (6/18/06, 6/28/06)
2PMP-38-VBS-UPS-3-21, UPS-VITBUS2-3 Uninterruptible Power Supply No. 3 (4/10/05)

2PMP-38-VBS-UPS-4-21, UPS-VITBUS2-4 Uninterruptible Power Supply No. 4 (4/18/05)
2PMP-E-39-006, Battery Inspection - BAT 2-5 and BAT 2-6 (6/29/06)
3BVT 01.11.04, Void Monitoring (4/16/06)
Beaver Valley Substation Control Battery Load Testing (1/6/2003)
Quarterly Switchyard Battery A & B test results (5/9/06)
2OM-30.4.M, BV-2 Asiatic Clam and Zebra Mussel Chemical Treatment (4/19/06, 5/03/06)

Corrective Action Documents - Condition Reports (CR)

01-02020	02-11438	04-05685	05-05012	06-04019*
01-05040	03-00374	04-05831	05-05301	06-04093*
01-05084	03-00606	04-05925	05-05914	06-04095*
01-05833	03-00900	04-06592	05-06287	06-04097*
01-06520	03-01606	04-06594	05-06293	06-04110*
01-06550	03-01915	04-07696	05-06403	06-04110*
01-06552	03-02559	04-08246	05-06406	06-04116*
02-00291	03-05498	04-08247	05-07032	06-04144
02-00844	03-06217	04-08298	05-07271	06-04151
02-00989	03-07621	04-08957	05-07330	06-04181*
02-01378	03-08209	04-09276	05-07542	06-04188*
02-01409	03-09338	04-09424	05-07747	06-04191*
02-01796	03-09431	05-01889	06-00900	06-04218*
02-02348	03-10149	05-02206	06-01032	06-04270*
02-03705	03-10686	05-02402	06-01299	06-04272*
02-04489	03-10888	05-02403	06-01705	06-04281*
02-05649	03-11526	05-02409	06-01784	06-04286*
02-06088	03-12115	05-02947	06-02216	06-04287*
02-06183	03-12302	05-02954	06-02343	06-04290*
02-06292	04-00448	05-02963	06-02987	06-04303*
02-06449	04-00980	05-02964	06-03127	06-04311*
02-06897	04-01884	05-03118	06-03216	06-04361*
02-06988	04-02715	05-03260	06-03411	06-04368*
02-07426	04-03668	05-03624	06-03480	06-04373*
02-08574	04-04030	05-03630	06-03743	06-04375*
02-08767	04-04865	05-03840	06-03952	06-04382
02-09368	04-04872	05-04024	06-03998	06-07271*
02-09991	04-05191	05-04275	06-03999*	970428
02-10843	04-05346	05-04770	06-04019	980329
02-11265	04-05347			

* CR written as a result of inspection effort

Design Baseline Documents

1DBD-30, Unit 1 Design Basis Document for River Water System, Rev. 13
1DBD-36A, Unit 1 Design Basis Document for Emergency Diesel Generators, Rev. 11
1DBD-36B, Unit 1 Design Basis Document for 4.16 kV Power Distribution System, Rev. 7

1DBD-37, Unit 1 Design Bases Document for 480 V Distribution System, Rev. 7
1DBD-39, Unit 1 Design Basis Document for 125 VDC Power System, Rev. 3
2DBD-06, Unit 2 Design Basis Document Reactor Coolant System, Rev. 12
2DBD-13, Unit 2 Design Basis Document Containment Depressurization System, Rev. 10

Drawings

10080-E-5DR, Elementary Diagram, Recirculation Spray Pump 2RSS*P21C, Rev. 17
10080-RE-1AR, 125 Vdc One Line Diagram Sht. 1, Rev. 20
10080-RE-1AW, One Line Diagram, Vital Bus System Sheet 1, Rev. 19
10080-RE-1C, Equipment One-Line Diagram, Rev. 12
10080-RE-1DJ, 4160 V One-Line Diagram Sht. 3A, Rev. 6
10080-RE-1F, 4160 V One-Line Diagram Sht. 3, Rev. 19
12241-ESK-130A, Coordination curves for 125 Vdc battery 2-5, breaker N-10, 2/2/99
12241-ESK-130C, Coordination curves for 125 Vdc battery 2-5, breaker N-8, 3/15/84
12241-ESK-130E, Coordination curves for 125 Vdc battery 2-5, breaker N-9, 2/2/99
8700-RE-100A, 4KV Station Service System, Rev. 8
8700-RE-1A, Main One Line Diagram, Rev. 24
8700-RE-1B, Main One Line Diagram, Rev. 24
8700-RE-1C, Main One Line Diagram, Rev. 22
8700-RE-1F, 4160 V One Line Diagram, Rev. 19
8700-RE-1K, 480 V One Line Diagram, Rev. 24
8700-RE-1V, 125 V DC One Line Diagram Sheet 1, Rev. 27
8700-RE-1Z, Vital Bus & DC One Line Diagram, Rev. 27
8700-RE-21DL, Elementary Diagram-Emergency System 90% Undervoltage Protection, Rev. 8
8700-RE-21KL, Elementary Diagram, Safety Injection, Sht 3, Rev. 11
8700-RE-21LA, Elementary Diagram, River Water, Sht 5, Rev. 7
D-77-106-6A, Nozzle Orientation, Shell & Bottom Layout Details, Tank 2QSS*TK21
D-77-101-9A, 50'-0" I.D. x 62'-0" RWST 2QSS*TK21

Engineering Change Documents (Modifications)

DCP-2014, Replace Relief Valves RV-IA-107 A thru F, Rev. 0
DCP-2300, Charging Pump Mini-Flow Restricting Orifice Modification, Rev. 0
ECP 02-0260-09, Safety Injection Accumulator Level Transmitter Replacement [Unit 1], 1/30/04
ECP 02-0260-10, Safety Injection Accumulator Level Transmitter Replacement [Unit 1], 4/1/03
ECP 02-0260-05, Safety Injection Accumulator Level Transmitter Replacement [Unit 1], 8/23/05
ECP 02-0076, Replace Unit #1 Station Battery Chargers, Rev. 0
ECP No. 02-0212-01, Replacement Steam Generator (RSG) Master BVPS-1, Rev. 1
ECP 02-0260-08, Safety Injection Accumulator Level Transmitter Replacement [Unit 1], 2/3/03
ECP-00056, MOV-1SI-890C Motor Replacement, Rev. 1
ECP-00127, Charging Pump 1CH-P-1B Lube Oil Piping Modifications, Rev. 0
ECP-00150, Replacement of Charging High Head Safety Injection Pump 1CH-P-1B, Rev. 0
ECP-02-0193, Raise Allowable Charging Pump Recirculation Flow, Rev. 0
ECP-02-0246, BV-1 Changing System Rethrottling for Power Uprate, Rev. 0
ECP-02-0260-04, Unit 1 SI Accumulator Level Transmitter Replacement, Rev. 3
ECP-05-0280, Simultaneous Hot and Cold Leg SI Recirculation (LHSI to Hot Legs), Rev. 0

ES-E-004, Protective Relaying Philosophy for BVPS Unit No. 1, Rev. 7

Procedures

1/2-OST-30.21B, Group 2 Flood Door Seal System Operability Check, Rev. 2
1/2-PMP-E-39-300, Station Battery Charger Inspection, Issue 4, Rev. 5
1/2-ADM-2046, Rubber Expansion Joint In-Service Inspection Program, Rev. 0
1/2-OST-30.21A, Group 1 Flood Door Seal System Operability Check, Rev. 3
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Unit 1 Emergency Procedures

ECA-0.0, Loss of All Emergency 4KV AC Power, Rev. 6
E-1, Loss of Reactor or Secondary Coolant, Rev. 10
E-3, Steam Generator Tube Rupture, Rev. 8
ES-1.2, Post LOCA Cooldown and Depressurization, Rev. 9
ES-1.4, Transfer to Simultaneous Hot Leg and Cold Leg Recirculation, Rev. 6

Unit 2 Emergency Procedures

ECA-0.0, Loss of All Emergency 4KV AC Power, Rev. 6
E-1, Loss of Reactor or Secondary Coolant, Rev. 8
E-3, Steam Generator Tube Rupture, Rev. 10
ES-1.2, Post LOCA Cooldown and Depressurization, Rev. 7
ES-1.4, Transfer to Simultaneous Hot Leg and Cold Leg Recirculation, Rev. 3

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Work Orders

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LIST OF ACRONYMS USED

AC	Alternating Current
AFW	Auxiliary Feedwater
BVPS	Beaver Valley Power Station
CR	Condition Report
DBD	Design Basis Document
DC	Direct Current
EDG	Emergency Diesel Generator
EPU	Extended Power Uprate
FENOC	First Energy Nuclear Operating Company
gpm	Gallons per Minute
HHSI	High Head Safety Injection
IN	[NRC] Information Notice
LHSI	Low Head Safety Injection
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
MOV	Motor Operated Valve
NFPA	National Fire Protection Association
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
OCB	Oil Circuit Breaker
PRA	Probabilistic Risk Analysis
RAW	Risk Achievement Worth
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RRW	Risk Reduction Worth
RSS	Recirculation Spray System
RW	River Water
RWST	Reactor Water Storage Tank
SDP	Significance Determination Process
SG	Steam Generator
SGTR	Steam Generator Tube Rupture
SI	Safety Injection
SPAR	Standardized Plant Analysis Risk
SW	Service Water
UFSAR	Updated Final Safety Analysis Report
Vac	Volts Alternating Current
Vdc	Volts Direct Current