UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

October 27, 2011

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

SUBJECT: BEAVER VALLEY POWER STATION – NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT 05000334/2011009 AND 05000412/2011009

Dear Mr. Harden:

On September 16, 2011, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Beaver Valley Power Station Units 1 and 2. The enclosed report documents the inspection results discussed with you, and other members of your staff.

This inspection examined activities conducted under your license as they relate to identification and resolution of problems and compliance with the Commission's rules and regulations and conditions of your license. Within these areas, the inspection involved examination of selected procedures and representative records, observations of activities, and interviews with personnel.

Based on the samples selected for review, the inspectors concluded that FirstEnergy Nuclear Operating Company (FENOC) was generally effective in identifying, evaluating, and resolving problems. FENOC personnel identified problems and entered them into the corrective action program at a low threshold. FENOC prioritized and evaluated issues commensurate with the safety significance of the problems and corrective actions were generally implemented in a timely manner.

This report documents two self-revealing findings of very low safety significance (Green). The inspectors determined that each of these findings also involved a violation of NRC requirements. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as non-cited violations, consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Beaver Valley Power Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response, within 30 days of the date of this inspection report, with

the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Beaver Valley Power Station.

In accordance with 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 the NRC's document system (ADAMS). ADAMS is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

Eugene M. DiPaolo

Eugene M. DiPaolo, Acting Chief
Reactor Projects Branch 6
Division of Reactor Projects

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

Enclosure: Inspection Report 05000334/2011009 and 05000412/2011009
w/Attachment: Supplementary Information

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the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Beaver Valley Power Station.

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Sincerely,

/RA/

Eugene M. DiPaolo, Acting Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket Nos.: 50-334, 50-412
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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.:	05000334/2011009 and 05000412/2011009
Licensee:	FirstEnergy Nuclear Operating Company (FENOC)
Facility:	Beaver Valley Power Station, Units 1 and 2
Location:	Shippingport, PA 15077
Dates:	August 29, 2011 – September 16, 2011
Team Leader:	Carey Bickett, Senior Project Engineer
Inspectors:	Scott Barber, Senior Project Engineer Paul Kaufman, Senior Reactor Inspector Erin Bonney, Beaver Valley Resident Inspector
Approved by:	Eugene M. DiPaolo, Acting Chief Reactor Projects Branch 6 Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000334/2011009 and 05000412/2011009; 08/29/2011 – 09/16/2011; Beaver Valley Power Station; Biennial Baseline Inspection of Problem Identification and Resolution. The inspectors identified one finding in the area of problem evaluation and one finding in the area of implementation of corrective actions.

This NRC team inspection was performed by three regional inspectors and one resident inspector. The inspectors identified two self-revealing findings of very low safety significance (Green) during this inspection and classified these findings as non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process." Findings for which the SDP does not apply may be Green or assigned a severity level after NRC management review. Cross-cutting aspects associated with findings are determined using IMC 0310, "Components Within the Cross-Cutting Areas." 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.

Problem Identification and Resolution

The inspectors concluded that FENOC was generally effective in identifying, evaluating, and resolving problems. FENOC personnel identified problems, entered them into the corrective action program at a low threshold, and prioritized issues commensurate with their safety significance. In most cases, FENOC appropriately screened issues for operability and reportability, and performed causal analyses that appropriately considered extent of condition, generic issues, and previous occurrences. The inspectors also determined that FENOC typically implemented corrective actions to address the problems identified in the corrective action program in a timely manner. However, the inspectors identified two violations of NRC requirements, one in the area of problem evaluation, and one in the area of implementation of corrective actions.

The inspectors concluded that, in general, FENOC adequately identified, reviewed, and applied relevant industry operating experience to Beaver Valley Power Station (Beaver Valley) operations. In addition, based on those items selected for review, the inspectors determined that FENOC's self-assessments and audits were thorough.

Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employee concerns program issues, the inspectors did not identify any indications that site personnel were unwilling to raise safety issues nor did they identify any conditions that could have had a negative impact on the site's safety conscious work environment.

Cornerstone: Initiating Events

- Green. The inspectors identified a Green, self-revealing, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that FENOC did not take corrective actions to prevent recurrence of a significant condition adverse to quality. Specifically, FENOC failed to implement corrective actions following the 2A service water pump motor failure in 2005, which resulted in another failure of the same pump motor in 2011. FENOC implemented the corrective actions to prevent recurrence identified following the 2005 failure

for the rewind of 2SWS-P21A motor in July 2011. FENOC documented this issue in their corrective action program as condition report 11-96293.

The inspectors determined that FENOC's failure to prevent recurrence of a significant condition adverse to quality was a performance deficiency. Specifically, FENOC failed to implement corrective actions to prevent recurrence of a turn-to-turn winding failure of the 2A service water pump due to excessive voiding in the epoxy of the stator end windings. This self-revealing finding is more than minor because it was associated with the equipment performance attribute of the Initiating Events cornerstone and adversely impacted the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors evaluated the significance of this finding using IMC 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," for the initiating events cornerstone. The inspectors determined that the finding was of very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or function would be unavailable. The inspectors determined that this finding had no cross cutting aspect because it is not reflective of current plant performance. Specifically, the actual performance deficiency occurred in 2005 and FENOC implemented corrective actions from the 2005 root cause evaluation for the 2011 rewind of the 2A service water pump motor. [Section 4OA2.1.c.(2)]

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green, self-revealing, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that FENOC failed to take adequate corrective actions to prevent recurrence of a significant condition adverse to quality. Specifically, FENOC's extent of condition review and long-term corrective actions following a residual heat removal socket weld failure, caused by vibration-induced high-cycle fatigue, were inadequate to preclude the recurrence of a similar failure on the auxiliary feedwater system. FENOC entered this issue into their corrective action program as condition report 11-01453 for further review.

  The inspectors determined that FENOC's failure to plan or implement adequate corrective actions to prevent recurrence of socket weld failures on safety-related piping was a performance deficiency. This issue was reasonably within FENOC's ability to foresee and correct due to previous opportunities to identify and correct socket weld failures on safety-related systems at Beaver Valley. The inspectors determined that this self-revealing finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors evaluated the significance of this finding using IMC 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," and determined that this finding was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of safety system function, and did not screen as potentially risk-significant due to external initiating events. This finding had a cross-cutting aspect in the area of problem identification and resolution because FENOC did not thoroughly evaluate a significant condition adverse to quality such that the resolutions address the extent-of-condition. Specifically, FENOC failed to perform an adequate extent of condition review following the failure of the 1RH-200 socket weld which resulted in not developing adequate corrective actions to address socket welds on the auxiliary feedwater system. [P.1(c)] [Section 4OA2.1.c.(1)]

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution (71152B)

This inspection constitutes one biennial sample of problem identification and resolution as defined by Inspection Procedure 71152. All documents reviewed during this inspection are listed in the Attachment to this report.

.1 Assessment of Corrective Action Program Effectiveness

a. Inspection Scope

The inspectors reviewed the procedures that described FENOC's corrective action program at Beaver Valley. To assess the effectiveness of the corrective action program, the inspectors reviewed performance in three primary areas: problem identification, prioritization and evaluation of issues, and corrective action implementation. The inspectors compared performance in these areas to the requirements and standards contained in 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," and FENOC procedure NOP-LP-2001, "Corrective Action Program." For each of these areas, the inspectors considered risk insights from the station's risk analysis and reviewed condition reports selected across the seven cornerstones of safety in the NRCs Reactor Oversight Process. Additionally, the inspectors attended multiple Plan-of-the-Day and Management Review Board meetings. The inspectors selected items from the following functional areas for review: engineering, operations, maintenance, emergency preparedness, radiation protection, chemistry, and physical security.

(1) Effectiveness of Problem Identification

In addition to the items described above, the inspectors reviewed a sample of completed corrective and preventative maintenance work orders, completed surveillance test procedures, operator logs, and maintenance backlog lists. The inspectors also completed field walkdowns of various systems on site, such as the auxiliary feedwater system, safety related battery and switchgear rooms, component cooling water pumps, and the service water intake structure. Additionally, the inspectors reviewed a sample of condition reports written to document issues identified through internal self-assessments, audits, emergency preparedness drills, and the operating experience program. The inspectors completed this review to verify that FENOC entered conditions adverse to quality into their corrective action program as appropriate.

(2) Effectiveness of Prioritization and Evaluation of Issues

The inspectors reviewed the evaluation and prioritization of a sample of condition reports issued since the last NRC biennial Problem Identification and Resolution inspection completed in September 2009. The inspectors also reviewed condition reports that were assigned lower levels of significance that did not include formal cause evaluations to ensure that they were properly classified. The inspectors' review included the appropriateness of the assigned significance, the scope and depth of the causal analysis, and the timeliness of resolution. The inspectors assessed whether the evaluations identified likely causes for the issues and developed appropriate corrective

actions to address the identified causes. Further, the inspectors reviewed equipment operability determinations, reportability assessments, and extent-of-condition reviews for selected problems to verify these processes adequately addressed equipment operability, reporting of issues to the NRC, and the extent of the issues.

(3) Effectiveness of Corrective Actions

The inspectors reviewed FENOC's completed corrective actions through documentation review and, in some cases, field walkdowns to determine whether the actions addressed the identified causes of the problems. The inspectors also reviewed condition reports for adverse trends and repetitive problems to determine whether corrective actions were effective in addressing the broader issues. The inspectors reviewed FENOC's timeliness in implementing corrective actions and effectiveness in precluding recurrence for significant conditions adverse to quality. The inspectors also reviewed a sample of condition reports associated with selected non-cited violations and findings to verify that FENOC personnel properly evaluated and resolved these issues. In addition, the inspectors expanded the corrective action review to five years to evaluate FENOC's actions related to Unit 2 service air system deficiencies and failures of the 2A service water pump.

b. Assessment

(1) Effectiveness of Problem Identification

Based on the selected samples, plant walkdowns, and interviews of site personnel in multiple functional areas, the inspectors determined that FENOC identified problems and entered them into the corrective action program at a low threshold. FENOC staff at Beaver Valley initiated approximately 15,500 condition reports between January 2009 and July 2011. The inspectors observed supervisors at the Plan-of-the-Day and Management Review Board meetings appropriately questioning and challenging condition reports to ensure clarification of the issues. Based on the samples reviewed, the inspectors determined that Beaver Valley trended equipment and programmatic issues, and appropriately identified problems in condition reports. The inspectors verified that FENOC entered conditions adverse to quality identified through this review into the corrective action program as appropriate. In general, inspectors did not identify any issues or concerns that had not been appropriately entered into the corrective action program for evaluation and resolution. However, the inspectors did identify one observation related to effectiveness of problem identification.

During a review of equipment deficiencies and condition reports in the security functional area, the inspectors identified that the preventive maintenance work orders for some site security systems lacked detailed work instructions required to complete the maintenance. Further, the inspectors noted that although the work-in-progress log (used to describe specific work performed) did document some of the work activities that had been completed, it failed to provide a reference to any specific work instructions, and did not document implementation of any of the specific maintenance activities listed in the vendor manual. The inspectors also identified that there was a wide variance in the degree of documentation in the work-in-progress log. Some had technical detail, while others just stated that the quarterly preventive maintenance was completed. The inspectors determined that none of these work-in-progress log entries referenced a specific procedure or work instruction. Despite the lack of detailed documentation or

work instructions, the inspectors did not identify any equipment failures that were directly attributable to this observation. As such, this issue is considered to be minor and therefore not subject to enforcement action in accordance with the Enforcement Policy. FENOC entered this issue into their corrective action program as condition report 11-94255.

(2) Effectiveness of Prioritization and Evaluation of Issues

The inspectors determined that, in general, FENOC appropriately prioritized and evaluated issues commensurate with the safety significance of the identified problem. FENOC screened condition reports for operability and reportability, categorized the condition reports by significance, and assigned actions to the appropriate department for evaluation and resolution. The condition report screening process considered human performance issues, radiological safety concerns, repetitiveness, adverse trends, and potential impact on the safety conscious work environment.

Based on the sample of condition reports reviewed, the inspectors noted that the guidance provided by FENOC's corrective action program implementing procedures appeared sufficient to ensure consistency in categorization of issues. In general, the station performed operability and reportability determinations when conditions warranted, and, the evaluations supported the conclusion. In most cases, causal analyses appropriately considered the extent of condition or problem, generic issues, and previous occurrences of the issue.

The inspectors did identify one example of more-than-minor significance where FENOC personnel did not adequately evaluate a significant condition adverse to quality which resulted in corrective actions that did not prevent recurrence of the condition. This finding is documented in Section 4OA2.1.c.

(3) Effectiveness of Corrective Actions

The inspectors concluded that corrective actions for identified deficiencies were generally timely and adequately implemented. In most cases, for significant conditions adverse to quality, FENOC identified actions to prevent recurrence. The inspectors concluded that in general, corrective actions to address the sample of NRC non-cited violations and findings since the last problem identification and resolution inspection were timely and effective.

However, the inspectors determined that FENOC did not take corrective actions for a condition adverse to quality related to implementation of a six-month frequency for inspection of safety-related cables with the potential for submergence. Fleet oversight audit report MS-C-10-07 identified a need for a preventive maintenance change request to change the frequency of inspection of manholes 1EMH-8A and 1EMH-8B from one year to six months. FENOC developed this change in response to a previously identified NRC non-cited violation related to submerged safety-related cables in these manholes (see NRC inspection report 05000334/2009003 and 05000412/2009003). Following review of this audit report, the inspectors requested the last three completed work orders for this inspection. FENOC subsequently identified that the revised work order had not been implemented due to an issue with the work management software program. The last time FENOC had performed this inspection on these manholes was in July 2010.

Upon identification of this condition, FENOC promptly performed the required inspections on manholes 1EMH-8A and 1EMH-8B and found no significant deficiencies. Inspectors performed a walkdown of manhole 1EMH-8B upon initial opening and did not observe an excess water level in the manhole. In addition, FENOC has completed other maintenance activities in the manholes since July 2010, including inspection of the sump pumps that were installed in response to the 2009 NRC non-cited violation. The inspectors evaluated this issue for significance in accordance with IMC 0612, Appendix B, "Issue Screening," and IMC 0612, Appendix E, "Examples of Minor Issues," and determined that this issue was minor based on the satisfactory results of the manhole inspections and no evidence of flooding of the manholes. As such, this issue was not subject to enforcement action in accordance with the Enforcement Policy. FENOC documented this issue in condition report 11-01913.

The inspectors also identified one example of more than minor significance where FENOC personnel were not effective in implementing corrective actions. This finding is documented in Section 4OA2.1.c.

c. Findings

(1) Failure to Implement Effective Corrective Actions to Prevent Recurrence of Socket-Weld Failures

Introduction. Inspectors identified a Green, self-revealing, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that FENOC failed to take adequate corrective actions to prevent recurrence of a significant condition adverse to quality. Specifically, FENOC's extent of condition review and long-term corrective actions following a residual heat removal socket weld failure, caused by vibration-induced high-cycle fatigue, were inadequate to preclude the recurrence of a similar failure on the auxiliary feedwater system.

Description. On October 2, 2010, Unit 1 experienced a socket weld failure on residual heat removal drain line valve 1RH-200. This failure resulted in FENOC declaring both trains of the residual heat removal system inoperable. FENOC subsequently repaired 1RH-200 and returned the residual heat removal system to service. Additionally, FENOC classified this event as a significant condition adverse to quality and initiated a root cause evaluation to determine the cause and any corrective actions. On April 9, 2011, a similar socket weld failure occurred on Unit 2 auxiliary feedwater vent valve 2FWE-940, resulting in FENOC declaring the 'A' steam generator feedwater injection header inoperable, and conducting a technical specification required shutdown to repair the weld. FENOC repaired 2FWE-940 and returned the injection header to service. FENOC also classified this event as a significant condition adverse to quality and initiated a root cause evaluation to determine the cause and any corrective actions.

The inspectors reviewed both root cause evaluations associated with these socket weld failures. The evaluations determined that both failures were the result of vibration-induced high-cycle fatigue. During review of these evaluations, the inspectors concluded that FENOC had prior opportunity to identify and implement/plan corrective actions prior to the 2FWE-940 failure. The inspectors noted that the root cause evaluation for the residual heat removal issue did not include an adequate extent-of-condition review and planned corrective actions to prevent recurrence of socket weld failures on safety-related piping. Specifically, FENOC's extent of condition review for the

residual heat removal failure eliminated the need to consider auxiliary feedwater socket welds based on infrequent operation of the auxiliary feedwater system. FENOC also did not establish corrective actions to review socket welds on safety-related systems that were eliminated from the initial scope of review. During review of the root cause evaluation for the auxiliary feedwater failure, the inspectors noted that FENOC's actions for long-term review of socket welds was not sufficiently comprehensive in identifying the socket welds most susceptible to vibration-induced high-cycle fatigue. Specifically, FENOC credited their Risk-Informed In-Service Inspection Program, which relies on VT-2 inspections, as a method to prioritize their scope of review. After review of this information, the inspectors noted that this program would have again eliminated the need to review auxiliary feedwater system socket welds. FENOC entered this issue into their corrective action program as condition report 11-01453 for further review.

Analysis. The inspectors determined that FENOC's failure to plan or implement adequate corrective actions to prevent recurrence of socket weld failures on safety-related piping was a performance deficiency. This issue was reasonably within FENOC's ability to foresee and correct due to previous opportunities to identify and correct socket weld failures on safety-related systems at Beaver Valley. The inspectors determined that this self-revealing finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors evaluated the significance of this finding using IMC 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," and determined that this finding was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of safety system function for the auxiliary feedwater system, and did not screen as potentially risk-significant due to external initiating events. Inspectors dispositioned the socket weld failure associated with the Unit 1 residual heat removal system in Section 4OA3 of NRC inspection report 05000334/2010005 and 05000412/2010005.

This finding had a cross-cutting aspect in the area of problem identification and resolution because FENOC did not thoroughly evaluate a significant condition adverse to quality such that the resolutions address the extent-of-condition. Specifically, FENOC failed to perform an adequate extent of condition review following the failure of the 1RH-200 socket weld which resulted in not developing adequate corrective actions to address socket welds on the auxiliary feedwater system. [P.1(c)]

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that in the case of significant conditions adverse to quality, measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, FENOC failed to assure that adequate corrective actions were sufficiently comprehensive to preclude recurrence of socket weld failures on safety-related systems caused by vibration-induced high-cycle fatigue. As a result, Beaver Valley experienced a failure of a socket weld on the auxiliary feedwater system in April 2011 which resulted in a technical specification required shutdown for repair. Because this violation was of very low safety significance (Green), and FENOC entered this issue into the corrective action program (condition report 11-01453), this violation is being treated as a non-cited violation, consistent with the Enforcement Policy. **(NCV 05000334, 412/2011009-01: Failure to Implement Effective Corrective Actions to Prevent Recurrence of Socket Weld Failures)**

(2) Failure to Implement Corrective Actions for 2A Service Water Pump Motor Epoxy Voiding

Introduction. Inspectors identified a Green, self-revealing, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that FENOC did not take corrective actions to prevent recurrence of a significant condition adverse to quality. Specifically, FENOC failed to implement corrective actions following the 2A service water pump motor failure in 2005, which resulted in another failure of the same pump motor in 2011.

Description. In May 2001, FENOC sent the 2A service water pump motor (2SWS-P21A) to a vendor for motor rewind due to a bearing failure that damaged the motor. Following the rewind, the station returned the motor to service in November 2001. On August 2, 2005, 2SWS-P21A tripped on overcurrent due to inadequate insulation of the stator coils. FENOC determined that this issue was a significant condition adverse to quality and performed a root cause evaluation for this failure. The station determined that the inadequate insulation of the stator coils was the result of voids in the epoxy of the motor coils, and developed corrective actions to prevent recurrence of this issue. However, FENOC sent 2SWS-P21A to the vendor to be rewound before the corrective actions to prevent recurrence were implemented. Updated procedures requiring FENOC inspection at process hold points were not in place at the time of the 2005 motor rewind, and FENOC had no plans to return the motor to the vendor to ensure the motor was rewound in accordance with the new specifications.

Two sample stator coils were created during the 2005 motor rewind for void determination testing. The inspection of the vendor sample revealed no voids and the station placed the motor back in service in August 2005. In September 2005, FENOC sent the second sample coil to an independent laboratory for testing and significant voiding was discovered. Based on these results, FENOC scheduled a third party to perform a partial discharge test to detect voids on 2SWS-P21A in October 2005. The test can detect voids in the linear portion of the coil; however the test does not detect voids in the end turns of the stator coils. The 2005 and 2011 motor failures occurred due to voids in the end turns of the stator coils. The 2SWS-P21A motor was left in service after the satisfactory partial discharge test until the June 2011 motor failure.

On June 10, 2011, 2SWS-P21A again tripped due to an overcurrent condition caused by a turn-to-turn failure in the end windings of the motor stator which resulted from voids in the epoxy of the stator end windings. The voids in the stator end windings allowed movement of the motor coils causing insulation degradation. Insulation degradation resulted in a short across several coil windings, which caused an overcurrent condition, tripping 2SWS-P21A. This was the third failure of the motor in ten years, with both the August 2005 and June 2011 failures being due to the same cause. FENOC implemented the corrective actions to prevent recurrence identified following the 2005 failure for the rewind of 2SWS-P21A motor in July 2011. FENOC documented this issue in their corrective action program as condition report 11-96293.

Analysis. The inspectors determined that FENOC's failure to prevent recurrence of a significant condition adverse to quality was a performance deficiency. Specifically, FENOC failed to implement corrective actions to prevent recurrence of a turn-to-turn winding failure of the 2A service water pump due to excessive voiding in the epoxy of the stator end windings. This self-revealing finding is more than minor because it was associated with the equipment performance attribute of the Initiating Events cornerstone

and adversely impacted the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors evaluated the significance of this finding using IMC 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," for the initiating events cornerstone. The inspectors determined that the finding was of very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or function would be unavailable.

The inspectors determined that this finding had no cross cutting aspect because it is not reflective of current plant performance. Specifically, the actual performance deficiency occurred in 2005 and FENOC implemented corrective actions from the 2005 root cause evaluation for the 2011 rewind of the 2A service water pump motor.

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that in the case of significant conditions adverse to quality, measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, in 2005, FENOC failed to take adequate corrective action to prevent recurrence of a turn-to-turn failure in the stator end coils of the 2A service water pump motor. As a result, in June 2011, FENOC experienced an additional failure of the 2A service water pump motor. Because this violation was of very low safety significance (Green), and FENOC entered this issue into their corrective action program (condition report 11-96293), this violation is being treated as a non-cited violation, consistent with Enforcement Policy. **(NCV 05000412/2011009-02, Failure to Implement Corrective Actions for 2A Service Water Pump Motor Epoxy Voiding)**

.2 Assessment of the Use of Operating Experience

a. Inspection Scope

The inspectors reviewed a sample of condition reports associated with review of industry operating experience to determine whether FENOC appropriately evaluated the operating experience information for applicability to Beaver Valley and had taken appropriate actions, when warranted. The inspectors also reviewed evaluations of operating experience documents associated with a sample of NRC generic communications to ensure that FENOC adequately considered the underlying problems associated with the issues for resolution via their corrective action program. In addition, the inspectors observed various plant activities to determine if the station considered industry operating experience during the performance of routine and infrequently performed activities.

b. Assessment

The inspectors determined that FENOC appropriately considered industry operating experience information for applicability, and used the information for corrective and preventive actions to identify and prevent similar issues when appropriate. The inspectors determined that operating experience was appropriately applied and lessons learned were communicated and incorporated into plant operations and procedures when applicable.

c. Findings

No findings were identified.

.3 Assessment of Self-Assessments and Audits

a. Inspection Scope

The inspectors reviewed a sample of audits, including the most recent audit of the corrective action program, departmental self-assessments, and assessments performed by independent organizations. Inspectors performed these reviews to determine if FENOC entered problems identified through these assessments into the corrective action program, when appropriate, and whether FENOC initiated corrective actions to address identified deficiencies. The inspectors evaluated the effectiveness of the audits and assessments by comparing audit and assessment results against self-revealing and NRC-identified observations made during the inspection.

b. Assessment

The inspectors concluded that self-assessments, audits, and other internal assessments were generally critical, thorough, and effective in identifying issues. The inspectors observed that FENOC personnel knowledgeable in the subject completed these audits and self-assessments in a methodical manner. FENOC completed these audits and self-assessments to a sufficient depth to identify issues which were then entered into the corrective action program for evaluation. In general, the station implemented corrective actions associated with the identified issues commensurate with their safety significance.

c. Findings

No findings were identified.

.4 Assessment of Safety Conscious Work Environment

a. Inspection Scope

During interviews with station personnel, the inspectors assessed the safety conscious work environment at Beaver Valley. Specifically, the inspectors interviewed personnel to determine whether they were hesitant to raise safety concerns to their management and/or the NRC. The inspectors also interviewed the station Employee Concerns Program coordinator to determine what actions are implemented to ensure employees were aware of the program and its availability with regards to raising safety concerns. The inspectors reviewed the Employee Concerns Program files to ensure that FENOC entered issues into the corrective action program when appropriate.

b. Assessment

In general, Beaver Valley staff expressed a willingness to use the corrective action program to identify plant issues and deficiencies, and stated that they were willing to raise safety issues. All of those interviewed stated that they would initially raise concerns to their supervisors and would also use the corrective action program to resolve their issues. These same individuals indicated that they would raise their

concerns up the management chain if they did not get satisfactory resolutions at the supervisory levels. All individuals were also aware that they could raise their concerns through the Employee Concerns Program and/or bring them to the NRC. The inspectors noted that no one interviewed stated that they personally experienced or were aware of a situation in which an individual had been retaliated against for raising a safety issue. Based on these limited interviews, the inspectors concluded that there was no evidence of an unacceptable safety conscious work environment and no significant challenges to the free flow of information.

c. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On September 16, 2011, the inspectors presented the inspection results to Mr. Paul Harden, Site Vice President, and other members of Beaver Valley staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

P. Harden	Site Vice President
D. Batina	Employee Concerns Program Representative
D. Benyak	Manager, Regulatory Compliance
A. Berger	Nuclear Engineering Manager
S. Buffington	Design Engineering
R. Dibler	Security Supervisor
K. Deberry	Chemical Volume Control System Engineer
A. Dometrovich	Regulatory Compliance
M. Johnson	Operating Experience Program
G. Kammerdeiner	Principal Consultant, Fleet Engineering
S. Kubis	Electrical System Engineer
J. Kunz	Instrument & Control Supervisor
R. Lieb	Director, Site Operations
R. Lubert	Supervisor, Design Engineering
J. Marsh	Electrical Engineer
J. Matsko	Electrical Engineering Supervisor
D. Miller	Work Management Supervisor
K. Mitchell	Chemical Volume Control System Engineer
M. Mitchell	Technical Services Supervisor
D. Murray	Director, Performance Improvement
C. O'Neil	Nuclear Engineer
D. Reeves	Manager, Technical Services Engineering
D. Salera	Chemistry Manager
J. Saunders	Radiation Protection Supervisor
D. Schwer	Operations Supervisor
B. Sepelak	Regulatory Compliance
J. West	System Engineer
T. White	Maintenance Specialist
R. Winters	Chemistry Supervisor
K. Wolfson	Performance Improvement Supervisor

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened and Closed

05000334, 412/2011009-01	NCV	Failure to Implement Effective Corrective Actions to Prevent Recurrence of Socket Weld Failures
05000412/2011009-02	NCV	Failure to Implement Corrective Actions for 2A Service Water Pump Motor Epoxy Voiding

LIST OF DOCUMENTS REVIEWED

Section 4OA2: Problem Identification and Resolution

Audits and Self-Assessments

BV-C-09-10-19, Beaver Valley Nuclear Security Program Audit Report, October 2009
BV-IPAT-09-051, Corrective Action Program, Second Six Months of 2009
BV-IPAT-09-060, Integrated Performance Assessment and Trending Program: Radiation Protection 2009
BV-SA-09-049, Safety Culture Assessment Summary Report, December 2009
BV-SA-10-378, Safety Culture Assessment Summary Report, December 2010
CA-SA-11-157, Beaver Valley Nuclear Safety Culture Assessment, May 16-20, 2011
IP-SA-10-118, Integrated Performance Assessment of the Corrective Action Program, First Quarter of 2010
IP-SA-10-220, Corrective Action Program Self Assessment, First Six Months of 2010
IP-SA-10-341, Integrated Performance Assessment of the Corrective Action Program, Third Quarter of 2010
IP-SA-11-043, Corrective Action Program Self Assessment, Second Six Months of 2010
IP-SA-11-178, Integrated Performance Assessment of the Corrective Action Program, First Quarter of 2011
MS-C-10-01-13, Design Control/Engineering Programs Audit Report, March 8, 2010
MS-C-10-03-01, Operations Multi-Site Audit Report, March 2010
MS-C-10-05-12, Reactor Engineering and Nuclear Fuels/Test Control Programs, July 6, 2010
MS-C-10-06-13, Engineering ASME Multi-Site Audit Report, August 13, 2010
MS-C-10-07-07, Fleet Oversight Maintenance/Work Management Audit Report
MS-C-10-07-07, Maintenance/Work Management Multi-Site Audit Report, July 2010
MS-C-10-10-19, Security Multi-Site Audit Report, October 2010
MS-C-10-11-24, Emergency Preparedness Multi-Site Audit Report, December 16, 2010
MS-C-11-02-22, Corrective Action Program, February 18 – April 11, 2011
SN-SA-10-094, Corrective Action Program Assessment on Condition Report Program Administrator (CRPA) Function Across the Fleet
SN-SA-10-288, Snapshot Self Assessment, Equipment Failures versus PM Template Strategy
SN-SA-11-245, Snapshot Self Assessment, FENOC Chemistry Quality Control Program

Condition Reports *(* indicates that condition report was generated as a result of this inspection)*

05-01889	07-31957	09-62244	09-68348
05-02370	08-32843	09-62471	09-68540
05-04875	08-34827	09-62681	09-69255
05-05414	08-34874	09-62782	09-69258
05-08106	08-40514	09-63461	10-70648
06-06363	08-42554	09-63801	10-70901
06-06588	08-47368	09-63998	10-71230
06-11286	08-50667	09-63999	10-71811
07-17074	09-58065	09-64018	10-71812
07-18729	09-61453	09-64040	10-72237
07-21122	09-61679	09-64688	10-72482
07-24317	09-61881	09-66219	10-72654
07-24584	09-61993	09-68214	10-72701
07-31458	09-62156	09-68236	10-76002

10-76437	10-83646	11-01399*	11-91720
10-76610	10-84420	11-01434*	11-91932
10-77657	10-85863	11-01453*	11-92065
10-78918	10-87037	11-01476*	11-92311
10-79999	10-87057	11-01683*	11-92330
10-80132	10-87058	11-01836	11-92597
10-81338	10-87068	11-01913*	11-92850
10-81393	10-87226	11-02002*	11-92859
10-81610	10-87230	11-87696	11-93405
10-81664	10-87438	11-88021	11-93685
10-81666	10-98063	11-88287	11-94255*
10-81667	11-00063	11-89255	11-95010
10-81747	11-00145	11-89567	11-96170
10-81835	11-00209	11-89576	11-96228
10-82257	11-01038	11-89724	11-96242
10-83224	11-01078	11-90091	11-96281
10-83492	11-01376	11-90601	11-96293
10-83533	11-01377	11-91287	11-96490
10-83544	11-01378	11-91350	11-97399
10-83604	11-01379	11-91698	11-98323

Operating Experience

IN 2010-06, Inadvertent Control Rod Withdrawal
IN 2010-11, Steam Void – RHR System Inoperable
IN 2010-27, Ventilation System Preventative Maintenance and Design Issues
OE32217, Hydrogen Fire
OE32329, Low Pressure Coolant Injection Time Delay
SAP Notification 200222230, NRC Information Notice 2010-17, Service Water Systems
SAP Notification 2010-01, Pipe Support Anchors Installed Improperly
SAP Notification 600336858, NRC Information Notice 2005-19, Effect of Plant Configuration Changes on Emergency Plan
SAP Notification 600618195, NRC Information Notice 2011-04, Stress Corrosion Cracking at PWRs

Non-Cited Violations and Findings

NCV 2009005-02, Inadequate RHS Shutdown Procedure Results in UE Declaration
NCV 2009008-01, Unit 2 Containment Isolation Valve Limit Switch 50.65 (a)(2) Performance not Demonstrated
NCV 2010004-01, Unit 1 EDG Intake Damper Linkage Disconnected
NCV 2010201-01, Failure to Adequately Protect Safeguards Information
NCV 2010403-01, Failure to Identify, Log, and Badge Visitor
NCV 2011002-01, Inadvertent Auxiliary Feedwater Start during Steam Generator Water Level Adjustments
NCV 2011002-01, Unit 1 Inadequate Spray Additive System Sampling Procedures
NCV 2011003-01, Unit 2 Recirculation Spray System Heat Exchangers not Maintained in Chemical Wet Layup
NCV 2011007-01, EDG Fuel Oil Transfer System Design
NCV 2011007-02, Design Basis of Electrical Distribution System
NCV 2011007-04, Vital Bus Voltage Calculations

Procedures

1/2-ADM-1301.F16, Sodium Hydroxide Analysis Review, Revision 0
1/2-CHM-ANA-4.27F, Sodium Hydroxide Concentration Determination, Revision 7
1/2-CMP-75-Mason-38-13-1I, Masoneilan Model 38, Sizes 9, 11, and 13 Actuator Maintenance, Revision 7
1/2MI-75-Manhole-1E, Inspection of Manholes for Water Induced Damage, Revision 7
1-CHM-SAM-3.19, Chemical Addition Tank, Revision 9
1OM-7.4.BF, Returning the 1A Charging Pump to Service, Revision 1
1OM-7.4.BG, Returning the 1B Charging Pump to Service, Revision 0
1OM-7.4.BH, Returning the 1C Charging Pump to Service, Revision 0
2-CHM-SAM-3.79D, Recirculation Spray Heat Exchangers, Revision 2
2PMP-38-EMERLGT-4E, Appendix R and Non Appendix R Emergency Lighting Operability Test
3BVT-01.1.04, Void Monitoring, Revision 6
Inspection and Repair, Revision 20
NOBP-LP-2001, FENOC Self-Assessment/Benchmarking, Revision 17
NOBP-LP-2003, Employee Concerns Program, Revision 3
NOBP-LP-2005, Employee Concerns Program Staff Manual, Revision 3
NOBP-LP-2007, Condition Report Process Effectiveness Review, Revision 6
NOBP-LP-2008, FENOC Corrective Action Review Board, Revision 9
NOBP-LP-2010, CREST Trending Codes, Revision 9
NOBP-LP-2011, FENOC Cause Analysis, Revision 12
NOBP-LP-2012, Fleet Oversight Standards and Expectations, Revision 6
NOBP-LP-2013, Safety Conscious Work Environment Review Team, Revision 2
NOBP-LP-2018, Integrated Performance Assessment and Training, Revision 7
NOBP-LP-2023, Performance Assessment, Revision 8
NOBP-LP-2024, Fleet Oversight Reporting and Analysis, Revision 5
NOBP-LP-2031, Fleet Oversight External Independent Audit Process, Revision 2
NOBP-LP-2034, FENOC Assessment Strategy, Revision 2
NOBP-LP-2040, Conducting Stream Analysis, Revision 0
NOBP-LP-2100, FENOC Operating Experience Process, Revision 6
NOBP-LP-2501, Safety Culture Assessment, Revision 13
NOBP-LP-2502, Safety Culture Monitoring, Revision 5
NOBP-OP-0012, Operator Work-Arounds, Burdens and Control Room Deficiencies, Revision 1
NOBP-WM-5014, Maintenance Rework Program, Revision 3
NOBP-WM-5014, Maintenance Rework Program, Revision 3
NOP-ER-3001, Problem Solving and Decision Making, Revision 5
NOP-LP-2001, Corrective Action Program, Revision 27
NOP-LP-2006, Company Nuclear Review Board (CNRB), Revision 8
NOP-LP-2022, Administration of the FENOC Quality Assurance Program (QAPM), Revision 1
NOP-LP-2023, Conduct of Fleet Oversight, Revision 7
NOP-LP-2100, Operating Experience Program, Revision 5
NOP-OP-1009, Operability Determinations and Functionality Assessments, Revision 3
NOP-OP-1010, Operational Decision Making, Revision 3
NOP-OP-1011, Plant Operations Review Committee (PORC), Revision 2
NOP-SS-8001, FENOC Activity Tracking, Revision 1
NOP-WM-0001, Work Management Process, Revision 6
NOP-WM-1001, Order Planning Process, Revision 13
NOP-WM-1003, Nuclear Maintenance Notification Initiation, Screening and Minor Deficiency Monitoring Process, Revision 5

NOP-WM-1005, Work Management Order Testing Process, Revision 2
NOP-WM-2001, Work Management Scheduling/Assessment/Seasonal Readiness Processes, Revision 11
NOP-WM-2003, Work Management Surveillance Process, Revision 5
NOP-WM-3001, Work Management PM Process, Revision 9
NOP-WM-3620, Air Operated Valve Diagnostic Testing, Revision 0
NOP-WM-4006, Conduct of Maintenance, Revision 5
NOP-WM-4300, Order Execute Process, Revision 10
NOP-WM-4305, Order Closure, Revision 2
NOP-WM-9001, FIN/Minor/Toolpouch/Immediate/Urgent Maintenance, Revision 5

Work Orders and Notifications

200264579	200390613	200400387	200464681
200264580	200396970	200410319	200465048
200266598	200397085	200413763	200465061
200286133	200400349	200432538	200468740
200327130	200400350	200435497	600573445
200328616	200400351	200441436	600641058
200329385	200400352	200448745	600665799
200339898	200400353	200455927	600677547
200350174	200400358	200457567	600680275
200360089	200400359	200460549	600684855
200385864	200400386	200463036	600691406

Miscellaneous

1DBD-10, Design Basis Document for Residual Heat Removal System, Revision 9
2DBD-24B, Design Basis Document for Auxiliary Feedwater System, Revision 12
2DBD-34, Design Basis Document for Compressed Air System, Revision 5
ASTM D 975, Requirements for Diesel Fuel Oils, dated 1981
Beaver Valley SCWE Survey Results for August 2009
Beaver Valley SCWE Survey Results for August 2010
Beaver Valley Unit 2 System Health Reports BV-2-34 System – Unit 2 Compressed Air System 2007-1, 2009-2, 2010-3, and 2011-2
Beaver Valley Units 1 and 2 Corrective Maintenance Backlog, dated 08/2011
Beaver Valley Units 1 and 2 Critical and Non-Critical Orders Deep into Grace, dated 08/2011
Beaver Valley Units 1 and 2 Critical and Non-Critical PM Deferrals, dated 08/2011
Beaver Valley Units 1 and 2 Critical Component Failure, dated 08/2011
Beaver Valley Units 1 and 2 Schedule Adherence, dated 08/2011
BVPS ISI Ten-Year Plans, Revision 11
BVPS/Analytics 1st Quarter RETS Cross Check Program results, dated 06/30/2011
FENOC Equipment Reliability Index, dated 08/2011
NOP-ER-3004-02, Maintenance Rule (a)(2) Evaluation Form, BV – Emergency Lights 2, Revision 0
On-Line Work Week Report Card, dated 09/05/2011, 08/29/2011
Unit 1 and 2 Maintenance Rule (a)(1) Status List

LIST OF ACRONYMS

ADAMS	Agency-wide Documents Access and Management System
CFR	Code of Federal Regulations
FENOC	FirstEnergy Nuclear Operating Company
IMC	Inspection Manual Chapter
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records System