

June 25, 2004

Mr. Christopher M. Crane  
President and Chief Nuclear Officer  
Exelon Nuclear  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNIT 1  
NRC SUPPLEMENTAL INSPECTION REPORT NO. 05000456/2004005(DRS)

Dear Mr. Crane:

On May 27, 2004, the NRC completed an inspection at your Braidwood Station, Unit 1 regarding a White Performance Indicator (PI) which involved the Unit 1 Safety System Unavailability, Heat Removal System (AFW) [auxiliary feedwater system] in the Mitigating Systems Cornerstone. The enclosed report presents the results of that inspection which were discussed on May 27, 2004, with Mr. C. Dunn.

This inspection was conducted in accordance with inspection Procedure 95001, "Inspection for One or Two White Inputs In a Strategic Performance Area," and examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with conditions of your license. Within these areas, the inspection consisted of a selective review of documents, procedures, root cause evaluations, self assessments, interviews with engineering staff, and field walkdowns.

The inspection focused on assessing the adequacy of your root cause evaluations and corrective actions taken and planned to address the May 2003 failure of the 1B AFW diesel driven pump to start, and the July 2003 failure of the 1B AFW diesel driven pump blower during a pump start and your actions to prevent recurrence.

Based on the results of this supplemental inspection, and the acceptable performance of the 1B AFW diesel driven pump since August 2003, we determined that comprehensive root cause evaluations and appropriate corrective actions had been implemented to identify and address the root and contributing causes associated with the 1B AFW diesel driven pump failures. No findings of risk significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure 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).

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

*/RA/*

Cynthia D. Pederson, Director  
Division of Reactor Safety

Docket No. 50-456  
License No. NPF-72

Enclosure: Braidwood Supplemental Inspection  
Report 05000456/2004005(DRS)

cc w/encl: Site Vice President - Braidwood Station  
Plant Manager - Braidwood Station  
Regulatory Assurance Manager - Braidwood Station  
Chief Operating Officer  
Senior Vice President - Nuclear Services  
Vice President - Operations Support  
Vice President - Licensing and Regulatory Affairs  
Director Licensing  
Manager Licensing - Braidwood and Byron  
Senior Counsel, Nuclear, Mid-West Regional  
Operating Group  
Document Control Desk - Licensing  
Assistant Attorney General  
Illinois Department of Nuclear Safety  
State Liaison Officer  
Chairman, Illinois Commerce Commission

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Report 05000456/2004005(DRS)

cc w/encl: Site Vice President - Braidwood Station  
Plant Manager - Braidwood Station  
Regulatory Assurance Manager - Braidwood Station  
Chief Operating Officer  
Senior Vice President - Nuclear Services  
Vice President - Operations Support  
Vice President - Licensing and Regulatory Affairs  
Director Licensing  
Manager Licensing - Braidwood and Byron  
Senior Counsel, Nuclear, Mid-West Regional  
Operating Group  
Document Control Desk - Licensing  
Assistant Attorney General  
Illinois Department of Nuclear Safety  
State Liaison Officer  
Chairman, Illinois Commerce Commission

\*See Previous Concurrence

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-456  
License No: NPF-72

Report No: 05000456/2004005(DRS)

Licensee: Exelon Generation Company, LLC

Facility: Braidwood Station, Unit 1

Location: 35100 S. Route 53  
Suite 84  
Braceville, IL 60407-9617

Dates: May 25 through 27, 2004

Inspectors: Z. Falevits, Sr. Reactor Engineer

Approved By: J. Lara, Chief  
Electrical Engineering Branch  
Division of Reactor Safety

Enclosure

## SUMMARY OF FINDINGS

IR 05000456/2004005(DRS); 05/25/2004 - 05/27/2004; Braidwood Station; Unit 1; Supplemental Inspection - Mitigating Systems Cornerstone.

The supplemental inspection was conducted by a regional inspector in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area." No findings of significance were identified. 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.

### **Cornerstone: Mitigating Systems**

The U. S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's root cause evaluation, extent of condition determination, and corrective actions for the unavailability of the Unit 1 auxiliary feedwater system since the last quarter of 2001, which resulted in the licensee exceeding the NRC's performance indicator threshold. The licensee's evaluations and corrective actions associated with this White performance indicator were previously examined by the NRC and inspection results were documented in supplemental inspection reports 50-456/02-04(DRP) and 50-456/02-10(DRP) and in the problem identification and resolution inspection report 50-456/457/2003009(DRP).

During this inspection, the inspector focused on licensee's evaluations and corrective actions associated with the 1B AFW Diesel Driven Pump failure on May 24, 2003, and the July 11, 2003, airbox blower bearing failure. Based on the results of this supplemental inspection, the inspector concluded that the licensee had developed comprehensive root cause evaluations and corrective actions to address the concerns associated with the Braidwood Unit 1 AFW system White performance indicator. Additionally, an engine monitoring system was added to continuously monitor, and periodically assess, important engine parameters which should help in early identification of conditions which could adversely impact the ability of the diesel driven AFW pump to perform its intended safety function.

#### **A. Inspector-Identified and Self-Revealed Findings**

None.

#### **B. Licensee-Identified Violations**

None.

## REPORT DETAILS

### **01 INSPECTION SCOPE**

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the adequacy of the licensee's root cause evaluations and completed corrective actions associated with the Unavailability of the Unit 1 Auxiliary Feedwater (AF) system which was identified during the last quarter of 2001. This unavailability resulted in exceeding the NRC's performance indicator threshold (system unavailability greater than two percent) and resulted in a White performance indicator in the Mitigation Systems Cornerstone. The licensee's evaluations and corrective actions associated with this White performance indicator were previously examined by the NRC and inspection results were documented in supplemental inspection reports 50-456/02-04(DRP) and 50-456/02-10(DRP) and in the problem identification and resolution inspection report 50-456/457/2003009(DRP).

This supplemental inspection focused in particular on Unit 1 AF system unavailability related problems and adequacy of licensee's evaluations and corrective actions conducted between January 1, 2003, to March 31, 2004. The inspector focused on licensee's evaluations and corrective actions associated with the last 1B AF Diesel Driven Pump failure on May 24, 2003, and the July 11, 2003, airbox blower bearing failure.

#### **01.01 Background Information**

On March 2, 2002, the NRC conducted a supplemental inspection to assess AF unavailability (IR 50-456/02-04(DRP)). The inspection focused on the licensee's corrective action process in regard to the evaluation of why the Unit 1 auxiliary feedwater system exceeded the NRC's performance indicator threshold during the last quarter of 2001. The inspectors concluded that the level of detail of the root cause evaluation for exceeding the performance indicator threshold was adequate. However, the level of detail of previous apparent cause evaluations for events that led to exceeding the performance indicator threshold were poor. The NRC also identified that licensee staff did not perform a root cause or an apparent cause evaluation to identify the cause and prevent recurrence for the September 1999 failure of the 1B auxiliary feedwater system, a significant condition adverse to quality.

On December 2, 2002, the NRC completed another supplemental inspection per the requirements of 95002, "Inspection For One Degraded Cornerstone or Any Three White Inputs In A Strategic Performance Area." The inspection results were documented in IR 50-456/02-10(DRP). During this inspection, plant performance at Braidwood Station, Unit 1 was within the Degraded Cornerstone Column of the NRC Action Matrix based on two White issues in the Mitigation Systems Cornerstone. The first issue was identified in the fourth quarter of 2001 when performance of the Unit 1 auxiliary feedwater system declined resulting in a White performance indicator (Safety System Unavailability, Heat Removal System, Auxiliary Feedwater System (AFW)) in the Mitigation Systems Cornerstone. With respect to the Degraded Mitigation Systems Cornerstone, the inspection team determined that the licensee attributed the primary root cause to be the



inability of station personnel to identify and correct long term equipment problems and an overall tolerance for longstanding degraded material conditions. The inspection team did not identify significant weaknesses in the evaluation. The team noted that the licensee proposed corrective actions and evaluation activities associated with the degraded cornerstone were in a developmental and investigatory phase. While the team found the licensee's approach for completing these activities to be sound, the team was not able to assess the effectiveness or completeness of these proposed actions because these actions were incomplete. The team also noted that the second corrective action, specifically, the performance of aggregate system reviews, was not yet endorsed by corporate management. Because the team's assessment of licensee's corrective actions was based on preliminary plans, the team concluded that this item would be reviewed and, if necessary, the effectiveness of the corrective actions would be re-assessed during an additional Problem Identification and Resolution Inspection (PI&R) which was to be performed in accordance with Inspection Procedure 71152.

On October 15, 2003, the NRC completed a PI&R Inspection at Braidwood station Units 1 and 2 (05000456/2003009(DRP); 05000457/2003009(DRP)). The team reviewed progress on all corrective actions from the licensee's degraded cornerstone root cause investigation (CR 113947) and conducted a more detailed review of 15 of those actions. The team concluded that the licensee had completed essentially all of the corrective actions identified in the degraded cornerstone root cause investigation. As a result of this inspection, the NRC determined that substantial efforts had been made at the Braidwood Station to address the previously-identified issues and that these efforts appeared to be successful.

In preparation for this supplemental inspection, the licensee conducted Focused Area Self-Assessments (FASA) in March - April 2004, to review the adequacy of evaluations and corrective actions to resolve the concerns associated with the unavailability of the Unit 1 AF system. The inspector determined that the FASA (ATI No. 206318) was well done and identified nine deficiencies related to inadequate implementation of preventive maintenance program's required periodic inspections of AF diesel components, use and control of Vendor Equipment Technical Information Program (VETIP), reporting of systems unavailability data, and action tracking item (ATI) closure documentation. The FASA findings were documented in Condition Reports (CRs) and entered into the corrective action process. The majority of the specified corrective actions have been accomplished.

## **02 EVALUATION OF INSPECTION REQUIREMENTS**

### **02.01 Problem Identification**

- a. Determine that the evaluation identifies who (i.e., licensee, self-revealing, or NRC), and under what conditions the issue was identified.**

This was a self-revealing issue noted during the Braidwood's Operating Department monthly surveillances of the 1B AF diesel driven pump. The licensee appropriately identified under what condition the issue was identified.

The 1B AF diesel driven pump failed to start on May 24, 2003, February 25, 2002, November 30, 2001, and September 10, 1999, during the performance of the Operating Department monthly surveillance (1BwOSR 3.7.5.3-2, "Unit One Diesel Driven Auxiliary Feedwater Pump Monthly Surveillance"). In addition, on July 11, 2003, the 1B AF pump started but had to be shut down due to an airbox blower bearing failure. As a result of the declining performance of the Unit 1 AF safety system, the performance indicator (PI) for the Heat Removal System (AFW) Unavailability in the Mitigating System cornerstone turned White in the fourth quarter of 2001, and in the second quarter of 2003.

**b. Determine that the evaluation documents how long the issue existed, and prior opportunities for identification.**

Root Cause Evaluation Report (RCR) 160402, dated July 13, 2003, documented that the Braidwood 1B AF diesel driven pump has failed to start four times from 1999 to 2003. The root cause evaluation attributed the root cause of the latest July 13, 2003 pump failure to the governor oil reservoir being located (installed) too high with respect to the governor. The licensee determined that this field configuration resulted in the governor oil reservoir level being siphoned down to the point where the pick-up tube became uncovered resulting in insufficient oil being in the governor to allow the governor to develop the force required to move the fuel rack to a full fuel position. The licensee's investigation of the latest failure identified that the governor reservoir installation configuration for the Braidwood AF diesels, as originally supplied by Detroit Diesel, did not agree with Woodward's (the governor manufacturer) recommended field installation/configuration.

The licensee was not successful in identifying the root cause of the first three pump failures to start. However, after the third 1B AF pump failure in February 2002, the licensee installed an engine monitoring system for the 1B AF diesel engine pump in an attempt to continuously monitor engine parameters and identify the root cause of pump failures to start. Through this system, 15 parameters are being continually monitored as well as governor oil reservoir level and fuel prime status. Following the latest pump failure to start, the licensee used the collected data to evaluate the potential failure modes. This was a very valuable licensee tool in diagnosing the cause of the failures to start. Based on the data collected, the licensee determined the root cause to be the governor oil reservoir being located (installed) too high with respect to the governor.

The licensee stated in the RCR 160402 evaluation that prior to the May 24, 2003 failure, a monitoring system was added to monitor engine parameters and specifically to monitor the governor oil reservoir level because it was known to be critical to the engine's starting capabilities. However, insufficient trending of this level, coupled with an inadequate guidance to the operators to prevent a failed start, contributed to the engines failed start.

Root cause evaluation RCR 167330, dated August 29, 2003, documented that the causal factor for the diesel engine blower failure was inadequate lubrication to an airbox blower rear bearing. The licensee determined the root cause of the inadequate lubricating oil supply to be the introduction of foreign material that eventually lead to the blockage of an oil spray nozzle internal to the airbox blower. The engine blower supplies fresh air for combustion and scavenging.

Review of licensee's root cause evaluations conducted for the 1B AF pump failures to start indicated that with more engineering rigor and better management oversight, the licensee conceivably had prior opportunities following the previous failures to identify the failures mechanism. The critical nature of the governor oil reservoir was noted and acknowledged in all previous failure assessments but adequacy of the installation was not thoroughly evaluated and verified until after the fourth failure.

**c. Determine that the evaluation documents the plant specific risk consequences (as applicable) and compliance concerns associated with the issue.**

This issue was classified as a "White" performance indicator (PI). The Root Cause evaluations (RCR 160402 and RCR 167330) also documents that the indicator associated with this issue became a "White" PI in November 2001.

The licensee's Risk Assessment stated that following the May 24, 2003 1B AF pump failure to start during the performance of the scheduled monthly surveillance, the control room declared the 1B AF pump inoperable then entered and performed the actions of LCOAR 1BwOL 3.7.5. This caused the licensee's on-line safety system status for Unit 1 to go from Green to Yellow. The licensee documented that the 1A AF Pump was operable and available to mitigate the consequences of an accident or transient. The governor and starting solenoid valve (SSV) were subsequently replaced and the 1B AF Pump successfully started on the next attempt.

The licensee's update of the PRA in June 2003 included the impact of the multiple 1B AF failures, the failures probability for the 1B AF pump changed as follows:

Failure to Start: 1.5E-2 changed to 2.3E-2  
Failure to Run: 2.4E-2 changed to 1.7E-2  
Unavailability: 5.6E-3 changed to 9E-3

The licensee determined that this had the impact of increasing the Unit 1 CDF by 6E-7 per year.

With regards to the airbox blower failure, the licensee determined that if the AF system had been required during the period from June 27, 2003, when the 1B AF pump was last successfully tested until the blower failure on July 11, 2003, the 1B AF pump would have started and run in response to a manual or automatic actuation signal. The licensee could not determine precisely how long the diesel engine would have operated with a failed blower bearing. However, based on data obtained from the EMS, the licensee concluded that with a completely failed airbox blower bearing (all balls missing), the 1B AF diesel engine would have performed per design until it was shutdown by the operators.

Based upon the licensee's analysis and actions, the inspector concluded that the licensee appropriately addressed the risk consequences and compliance concerns associated with this issue. No compliance issues were identified.

02.02 Root Cause and Extent of Condition and Extent of Cause Evaluation

**a. Determine that the problem was evaluated using a systematic method(s) to identify root cause(s) and contributing cause(s).**

The licensee used the following methods for performing this investigation: Event and Causal Factor charting; Failure Modes and Effects Analysis; Cause and Effect Analysis; Change Analysis; Barrier Analysis and TapRoot methodology. The licensee's root cause evaluation results and conclusions were based upon the outcome of these root cause evaluation tools.

The inspector determined that the methods used to evaluate the root and contributing causes were adequate and commensurate with the significance of the AF system related issues.

**b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.**

The inspector concluded that the root cause evaluation was sufficiently self-critical and was conducted to a level of detail commensurate with the significance of the AF system failures. The root cause explored the associated design and human performance issues that contributed to the AF system White performance indicator.

The root cause evaluation noted that the failures attributed to the AF 1B pump components increased the period of time during which the 1B AF pump was potentially unavailable to perform its safety function. The safety function of the AF system is to provide adequate cooling water to the steam generator in the event of a loss of offsite power or a loss of normal feedwater.

The licensee determined that there were three failed or inadequate barriers as well as two causal factors associated with the May 24, 2003 pump failure to start. One barrier was Operation's rounds not having a definitive action step to ensure the pump was started when the governor oil reservoir sight glass reached 50 percent. A second barrier was the engineering documents that installed the Engine Monitoring System (EMS) did not include a step to have the actual pickup tube level indicated on the governor oil reservoir sight glass. The third barrier was the lack of trending of the sight glass levels.

The first causal factor was categorized by the licensee as a corrective action from the previous root cause needing improvement. The previous root cause evaluation was concerned with the governor oil reservoir not being filled via the engine oil system. The siphoning effect was not addressed in the previous root cause. Oil level in the sight glass was not trended.

The second causal factor was determined to be the root cause. The engine manufacturer (Stewart & Stevenson) obtained the diesel engine from a supplier (Detroit Diesel) that had incorrectly located the governor oil reservoir with respect to the governor. The governor oil reservoir was not installed in accordance with their

sub-component supplier's (Woodward Governor) recommended practice to preclude drain back and siphoning from the governor oil reservoir.

**c. Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.**

The root cause evaluation has a dedicated section entitled, "Previous Event." This section considered prior occurrences. Braidwood and Byron are the only plants in the country that have this type of diesel driven pump. The licensee documented the description of the previous events at Byron and Braidwood in root cause reports in the CAP database.

The licensee stated that there was nothing in the previous three pump failures that can exclude them from being potentially caused by the phenomena discussed in the May 24, 2003 root cause evaluation (RCR 160402). The licensee's evaluation noted that causes of the previous failures should have uncovered the root cause found in the root cause evaluation performed for the last pump failure in May 2003. The evaluation stated that once the licensee recognized that the governor oil reservoir was critical to the engine's operation and quick start capability, a thorough investigation of the adequacy of the reservoir's installation would have revealed the installation deficiency uncovered during the last root cause investigation.

Failure number one occurred on September 10, 1999, when the Braidwood 1B AF pump failed to start and locked out on overcrank. Neither a root cause evaluation nor an Apparent Cause Evaluation (ACE) was performed. Four corrective actions were developed as part of an operability determination and completed. The licensee stated that although no confirmed root cause for the failed start was identified, all likely contributors were either replaced or inspected.

The root cause evaluation attributed the November 30, 2001 failed start to an inappropriate shutdown solenoid valve (SSV) coupled with particle laden crankcase oil that lead to the SSV failing. The SSV was replaced.

The February 25, 2002 failure to start identified no definitive failure mode. Thirty-seven potential failure modes for this engine that could interfere with engine startup were identified. Of these thirty-seven failure modes, five were identified as having the potential to result in the failure profile noted. One of the five potential failure modes was the governor oil reservoir inventory below the pickup tube level. The licensee's evaluation noted that the empty reservoir would be caused by insufficient supply from the engine oil system upon engine cranking. Licensee corrective action to prevent recurrence for this item required the initiation of Preventive Maintenance (PM) to periodically inspect and replace the hoses and fittings supplying oil to the reservoir. Additional corrective actions to aid in diagnosing engine trouble included adding a sight glass to ensure the reservoir was being filled during engine runs. The licensee concluded that the installation of the sight glass and the EMS, as well as the data and system response knowledge gathered by the EMS during multiple normal start surveillances, eventually allowed the identification of the actual mechanism of the 1B AF pump failure to start on 25 May 2003.

Although the symptom observed during the May 24, 2003 event (uncovered pickup tube) was the same as one discussed in the February 25, 2002 event, the licensee determined that the actual cause of the February 25, 2002 event was unknown and no specific corrective actions were developed to address the siphoning issue and prevent recurrence. The governor oil reservoir sight glass was installed to verify the engine oil system supplied oil to the reservoir. Since siphoning was not a known issue at that time, no method for trending oil level was implemented by the licensee.

**d. Determine that the root cause evaluation addresses the extent of condition and the extent of cause of the problem.**

The licensee performed the extent of condition reviews and considered the extent of cause of the failures. Under the "Extent of Condition" title in the root cause performed for the last pump failure, the licensee documented that failure of the 1B AF pump is specific to Braidwood, but the corrective actions from this root cause may be applicable to both Braidwood pumps and the Byron Station diesel driven AF pumps as well as the Byron Station SX booster pumps. The Braidwood system engineer stated that he has been sharing lessons learned at Braidwood with Byron system engineers who also plan to implement the design changes implemented at Braidwood to address this issue. The licensee documented in the root cause evaluation that a detailed Operating Experience (OPEX) review of diesel related failures in the industry was performed and no industry related problems were identified.

As a result of the FASA assessment findings in April 2004, the licensee recognized that potential weaknesses existed in the implementation of PM tasks for the engine turbocharger and blower and in the documentation of inspections by maintenance and the vendor. The licensee initiated additional actions to further review a sample of the PM program implementation for safety related equipment to assure potential extent of condition issues are identified.

The self-assessment also identified poor use of engineering fundamental of technical rigor. To address this concern and determine extent of condition, the licensee assigned a follow up action item to the functional area manager to determine if additional actions should be taken to address this finding.

02.03 Corrective Actions

**a. Determine that appropriate corrective action(s) are/were specified for each root/contributing cause or that there is/was an evaluation that no actions are/were necessary.**

The corrective actions appear to be appropriate for the items addressed in the root cause evaluations. The licensee addressed the root cause of the pump failures by relocating the governor reservoir and sight glass. On October 10, 2003, the licensee implemented a design change to relocate the governor oil reservoir to be in conformance with Woodward recommendation. In addition, a visual aid was added to the sight glass to help Operations accurately measure the governor oil reservoir level. The 1B AF diesel pump has had 12

successful starts since the design changes were implemented in October 2003.

The licensee attributed the primary root cause of the 1B AF pump blower failure to be lack of lubricating oil as a result of the introduction of foreign material that eventually lead to the blockage of an oil spray nozzle internal to the airbox blower. During the July 11, 2003 event, the oil supply to one of the blower bearings became restricted, resulting in the bearing overheating and failing. The licensee determined that a partially blocked oil passage reduced the amount of lube oil delivered to the spray nozzle. This resulted in limited lubrication to the failed bearing. Engineering personnel confirmed the partially blocked oil passage via inspection during the blower replacement. The root cause evaluation identified a second possible cause stating that the bearing failed due to a defect. This could not be validated since the bearing was completely destroyed in the failure.

The licensee addressed the concerns noted in the root cause evaluation of the blower failure by replacing the airbox blowers with the latest design provided by Detroit Diesel. The 1B AF diesel blowers were replaced via WO 594988 on July14, 2003, and the 2B AF diesel blowers were replaced via WO 602702 during A2R10. The new airbox blowers were supplied with an upgraded design that has a more robust bearing oil supply system which will ensure an adequate supply of oil will be supplied to the bearings even if the initial oil nozzle is plugged.

This root cause evaluation also identified areas for improvement in system management, blower lubrication design, and maintenance. The licensee has initiated corrective action items to evaluate and incorporate the needed improvements.

Overall, the inspector concluded that the licensee was taking adequate and timely corrective actions to address the issues identified in the root cause reports for the mitigating system degraded cornerstone White performance indicator.

**b. Determine that the corrective actions have been prioritized with consideration of the risk significance and regulatory compliance.**

While it was not clear if specific risk information was used in prioritizing the corrective actions, it appears that the licensee scheduled and performed the corrective actions based upon overall plant conditions and vulnerabilities. The licensee identified corrective actions to address the root causes and contributing cause identified in the evaluations. Corrective actions that addressed the root causes and contributing causes were prioritized higher than corrective actions not directly associated with the root and contributing causes.

Since the 1B AF pump issues involve a White PI in the Mitigating Systems Cornerstone, it is implicit that regulatory compliance was considered during both development and prioritization of corrective actions.

**c. Determine that a schedule has been established for implementing and completing the corrective actions.**

The inspector determined that the licensee had completed essentially all of the corrective

actions identified in the degraded cornerstone root cause investigations. The only exceptions to having all actions complete were some long-term effectiveness reviews and revising the Performance Centered Maintenance (PCM) template to address the cleaning and inspection of the lube oil filter bypass valves every 18 months. Based upon review of the root cause evaluations and the completed and proposed corrective action items, the corrective actions were being properly assigned, scheduled and implemented.

- d. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.**

Effectiveness reviews were established by the licensee to evaluate the corrective actions associated with the identified root causes and contributing causes that were complete to assess their effectiveness in preventing recurrence. The effectiveness reviews were not completed when this supplemental inspection was performed. These reviews were scheduled to be performed in the second half of 2005.

### **03 MANAGEMENT MEETINGS**

#### Exit Meeting Summary

On May 27, 2004, the inspector presented the inspection results to Mr. Carl Dunn and other members of licensee staff. The licensee acknowledged the issues presented.

The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION



## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

T. Joyce, Senior Vice President  
E. Stefan, Regulatory Assurance Coordinator  
K. Root, Regulatory Assurance Manager  
S. Mullins, Plant Engineering  
D. Skoza, Design Engineering  
C. Dunn, Site Engineering Director  
P. Smith, Resident Inspector, IEMA

#### Nuclear Regulatory Commission

S. Ray, Senior Resident Inspector

### **LIST OF DOCUMENTS REVIEWED**

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

#### Condition Report Initiated During Inspection

CR 00224103; NRC 95001 Inspection Observation - VETIP Submittals; dated May 27, 2004

#### Documents Reviewed During Inspection

RCR 160402; 1B Auxiliary Feedwater Pump Failed to Start Due to Low Governor Oil Reservoir Level Due to Siphoning Caused by the Inappropriate Location of the Governor Oil Reservoir; dated July 18, 2003

RCR 167330; 1B Auxiliary Feedwater Pump Diesel Driven Failure Due to an Airbox Blower Bearing Failure Due to Insufficient Oil Supply to the Bearing; dated August 25, 2003

03-025; PORC Meeting Notes; dated July 17, 2003

03-032; PORC Meeting Notes; dated September 2, 2003

03-035; PORC Meeting Notes; dated September 9, 2003

ATI 206318; Focus Area Self-Assessment Report for Supplemental Inspection, White Performance Indicator (PI), Auxiliary Feedwater (AF); dated April 13, 2004

PI; Safety System Unavailability, Heat Removal System (AFW); dated May 19, 2004

1B AF Pump Run History Since October 18, 2003; dated May 27, 2004

LS-AA-126; Self-Assessment Program; Revision 4

LS-AA-126-1001; Focused Area Self-Assessments; Revision 2

LS-AA-2060; Monthly Data Elements for NRC Safety System Unavailability - RCIC (BWRs) or AFW (PWRs) Systems; Revision 4

CR 160402; 1B AF Pump Failed to Start During Monthly Surveillance; dated May 24, 2003

CR 00167330; During 1B AF Pump Run Gray Smoke Coming from Valve Cover; dated July 12, 2003

CR 00212375; AF FASA Deficiency - AF NEI/NRC Unavailability Over-reported; dated April 1, 2004

CR 00170908; Monthly PI Data for RCS Activity Reported Incorrectly; dated August 8, 2003

CR 00215961; NOS Identified AF NEI/NRC Unavailability Misreported in March 2004; dated April 20, 2004

CR 00215665; NOS Identified PCM Template Frequency Deviation not Documented; dated April 19, 2004

CR 00211741; AF FASA Potential Deficiency - Processing of Vendor Information; dated March 30, 2004

CR 00211747; AF FASA Deficiency - Documenting NEI Data; dated March 30, 2004

CR 00211721I; AF FASA Potential Deficiency - Documentation of ATI Closure; dated March 30, 2004

CR 00211711; Potential AF FASA Deficiency - Benchmarking NEI/NRC Data; dated March 30, 2004

CR 00211715; Potential AF FASA Deficiency - Documentation of ATI Closure; dated March 30, 2004

CR 00212678; FASA Recommendations AF Part Availability; dated April 2, 2004



CR 00211076; Further Evaluations Needed for Auxiliary Feedwater PMs; dated March 26, 2004

NOL-20-04-0009; Nuclear Oversight Readiness Letter for NRC Supplemental Inspection for a Mitigating System White Performance Indicator, Auxiliary Feedwater (AF); dated April 23, 2004

NOSPA-04-2Q; NRC Supplemental Inspection Readiness Audit/Assessment; dated April 22, 2004

### LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
AF	Auxiliary Feedwater
AFW	Auxiliary Feedwater System
ATI	Action Tracking Item
CAP	Corrective Action Program
CCA	Common Cause Analysis
CFR	Code of Federal Regulations
CR	Condition Report
DRS	Division of Reactor Safety
ECR	Engineering Change Request
EMS	Engine Monitoring System
FASA	Focused Area Self Assessment
IR	Inspection Report
NCV	Non-Cited Violation
NOS	Nuclear Oversight
NRC	Nuclear Regulatory Commission
OPEX	Operating Experience
PCM	Performance Centered Maintenance
PI	Performance Indicators
PI&R	Problem Identification and Resolution
PM	Preventive Maintenance
RCR	Root Cause Report
VETIP	Vendor Equipment Technical Information Program
WO	Work Order
WR	Work Request