UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GA 30303-8931

August 17, 2007

EA-07-155

Southern Nuclear Operating Company, Inc.
ATTN: Mr. R. Johnson
Vice President - Farley
7388 N State Hwy 95
Columbia, AL 36319

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT - NRC SUPPLEMENTAL INSPECTION REPORT 05000348/2007008 AND 05000364/2007008

Dear Mr. Johnson:

On May 3, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed the onsite portion of a supplemental inspection at your Joseph M. Farley Nuclear Plant, Units 1 and 2. The enclosed report documents the inspection findings, which were discussed on May 3, 2007, with you and other members of your staff. Subsequently, additional discussions to clarify the inspection results were held with Mr. Ben George, SNC Corporate Licensing Manager, on June 11, 2007, and on July 16, 2007.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001. The purpose of the inspection was to examine the causes for and actions taken related to the Cooling Water Systems Performance Indicator (PI) crossing the threshold from Green (within expected range) to White (low-to-moderate safety significance) for both Units 1 and 2 in the second quarter of 2006. This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White PI are understood, to independently assess the extent of condition, and to provide assurance that the corrective actions for risk significant performance issues are sufficient to address the root causes and contributing causes and to prevent recurrence. The inspection consisted of selected examination of representative records and equipment, and interviews with personnel.

The inspectors determined that problem identification, root cause evaluations, and corrective actions for the component failures were generally adequate, including your decision to accelerate breaker replacement in late 2006. However, the inspectors identified significant weaknesses relating to the thoroughness and quality of several root cause evaluations that challenged your ability to implement effective overall corrective actions. Evaluations of the individual failures that contributed to the White PI did not effectively review for systemic aspects of circuit breaker failures. Specifically, three failures did not receive a thorough evaluation of the

breaker mechanisms considering known breaker backplate bending occurring since 2002. Additionally, while the ongoing efforts to install new circuit breakers was considered a major element of the corrective action plan, recent failures of the new circuit breakers also exhibited problems in the area of thorough evaluations. Based on these NRC-identified significant weaknesses, a parallel White inspection finding will be opened. This parallel White inspection finding will be applied to the NRC Action Matrix until the NRC closes the finding. During future NRC follow-up and closure of this parallel finding, we will re-evaluate the scope of your evaluations related to the original circuit breaker failures associated with the White PI and the thoroughness of evaluations involving the installation of the replacement circuit breakers. We will plan these inspections to determine if you have adequately addressed these issues and reversed the adverse trend in the performance and reliability of safety-related breakers at Farley after you have informed us of your readiness.

In addition, one finding of very low safety significance (Green) with two examples was identified which involved a violation of NRC requirements. These issues also provided a basis, in part, for the NRC's identification of the parallel White inspection finding previously discussed. However, because this violation is of very low safety significance and has been entered into your corrective action program, the NRC is treating this violation as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. If you contest this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001 with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0002; and the NRC Resident Inspector at the Farley Nuclear Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, 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 Web Site at *http://www.nrc.gov/reading-rm/adams.html* (the Public Electronic Reading Room).

Sincerely,

/RA/

Charles A. Casto, Director
Division of Reactor Projects

Docket Nos.: 50-348 and 50-364
License Nos.: NPF-2 and NPF-8

Enclosure: Inspection Report 05000348/2007008 and
05000364/2007008
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

breaker mechanisms considering known breaker backplate bending occurring since 2002. Additionally, while the ongoing efforts to install new circuit breakers was considered a major element of the corrective action plan, recent failures of the new circuit breakers also exhibited problems in the area of thorough evaluations. Based on these NRC-identified significant weaknesses, a parallel White inspection finding will be opened. This parallel White inspection finding will be applied to the NRC Action Matrix until the NRC closes the finding. During future NRC follow-up and closure of this parallel finding, we will re-evaluate the scope of your evaluations related to the original circuit breaker failures associated with the White PI and the thoroughness of evaluations involving the installation of the replacement circuit breakers. We will plan these inspections to determine if you have adequately addressed these issues and reversed the adverse trend in the performance and reliability of safety-related breakers at Farley after you have informed us of your readiness.

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/RA/
Charles A. Casto, Director
Division of Reactor Projects

Docket Nos.: 50-348 and 50-364
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cc w/encl:
B. D. McKinney, Licensing
Services Manager, B-031
Southern Nuclear Operating
Company, Inc.
Electronic Mail Distribution

L. M. Stinson, Vice President
Fleet Operations Support
Southern Nuclear Operating
Company, Inc.
Electronic Mail Distribution

J. T. Gasser
Executive Vice President
Southern Nuclear Operating
Company, Inc.
Electronic Mail Distribution

David H. Jones, Vice President
Engineering
Southern Nuclear Operating
Company, Inc.
P.O. Box 1295
Birmingham, AL 35201-1295

Moanica Caston
Southern Nuclear Operating Company, Inc.
Bin B-022
P. O. Box 1295
Birmingham, AL 35201-1295

State Health Officer
Alabama Department of Public Health
RSA Tower - Administration
201 Monroe St., Suite 700
P. O. Box 303017
Montgomery, AL 36130-3017

M. Stanford Blanton
Balch and Bingham Law Firm
P. O. Box 306
1710 Sixth Avenue North
Birmingham, AL 35201

William D. Oldfield
Quality Assurance Supervisor
Southern Nuclear Operating Company
Electronic Mail Distribution

Distribution w/encls: (See page 4)

Letter to R. Johnson from Charles Casto dated August 17, 2007

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT - NRC SUPPLEMENTAL INSPECTION REPORT 05000348/2007008 AND 05000364/2007008

Distribution w/encl:
K. Cotton, NRR
C. Evans, RII EICS
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-348, 50-364
License Nos.:	NPF-2, NPF-8
Report Nos.:	05000348/2007008 and 05000364/2007008
Licensee:	Southern Nuclear Operating Company, Inc.
Facility:	Joseph M. Farley Nuclear Plant
Location:	Columbia, AL 36319
Dates:	February 12, 2007 – July 16, 2007
Inspectors:	W. Lewis, Reactor Inspector (Lead) E. Crowe, Senior Resident Inspector C. Even, Reactor Inspector
Approved by:	Charles A. Casto, Director Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000348/2007-008 and 05000364/2007-008; 02/12/2007-05/03/2007; Joseph M. Farley Nuclear Plant, Units 1 & 2; Supplemental Inspection IP 95001 for a White Cooling Water Performance Indicator.

Cornerstone: Mitigating Systems

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with unreliability and unavailability reporting in the Cooling Water Systems element of the Mitigating Systems Performance Index (MSPI). This performance issue was previously characterized as having low to moderate risk significance (White) in the licensee's second quarter 2006 performance indicator (PI) data reported to the NRC. During this supplemental inspection, several significant weaknesses were identified regarding historical evaluations for repeat safety-related breaker failures and the thoroughness of design modification reviews for the installation of new breakers.

In general, the licensee's corrective actions for the failures contributing to the White PI were determined to correspond with the root and contributing causes identified by the individual root cause evaluations. The corrective actions were either completed or were being tracked for completion. However, several weaknesses were identified relating to the thoroughness of the evaluations for the failures. In addition, design evaluations related to the installation of replacement breakers failed to identify mechanism-operated contact (MOC) alignment differences. Based on these NRC-identified weaknesses, a parallel PI White finding will be opened to allow the NRC to continue to monitor activities in this area.

In addition, one Green non-cited violation with two examples was identified. The significance of most findings is identified by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

A. NRC-Identified and Self-Revealing Findings

- White. The NRC identified significant weakness regarding historical evaluations for safety-related breaker failures and the thoroughness of design modification reviews for the installation of new breakers.

  In accordance with NRC Inspection Manual Chapter (MC) 0305, a PI finding will be opened. This provides for NRC's continued review of the licensee's actions to address the weaknesses identified in this report. In accordance with MC 0305, this finding takes the color of the original PI. (Section 02.04.1)

- Green. The NRC identified a Green non-cited violation with two examples of 10 CFR 50, Appendix B, Criterion XVI, for failing to promptly identify and correct a condition adverse to quality. For the first example, weaknesses with the thoroughness of

evaluations for safety-related service water breaker failures resulted in a failure to identify backplate bending as a primary root cause for three failures which contributed to the White PI. For the second example, the licensee failed to identify and correct MOC switch alignment problems which resulted in an inoperable breaker for the 1C EDG.

The first example is more than minor because the finding affected the equipment performance attribute of the Mitigating Systems cornerstone objective involving equipment reliability in that affected service water breakers could open when demanded to close. This finding is of very low safety significance (Green) because the failure to identify and correct backplate bending in the three failures did not result in the actual loss of safety function of a single Train for greater than its Technical Specification allowed outage time. The example was found to be associated with the thoroughness of evaluation aspect of the Problem Identification and Resolution cross-cutting area in that backplate bending was not effectively evaluated as a cause for breaker failures.

The second example is more than minor because it adversely affected the equipment performance attribute of the Mitigating Systems Cornerstone objective involving equipment reliability in that the 1C EDG sequencer was not functional for 176 days. Because there was an actual loss of safety function of a single train for greater than the TS allowed outage time, a Phase 3 evaluation was performed. This finding was determined to be of very low safety significance (Green) due to mitigation/recovery credit for the failure based on emergency procedures that clearly direct operators to manually load the 1C EDG with the required safety equipment. The example was also found to be associated with the thoroughness of evaluation aspect of the Problem Identification and Resolution cross-cutting area in that earlier MOC switch failures were not thoroughly evaluated resulting in a thorough design evaluation not being accomplished.

This violation was entered into the licensee's corrective action program (CAP) as CR 2007104129. (Section 02.04.2)

REPORT DETAILS

01 Inspection Scope

The NRC performed this supplemental inspection to assess the licensee's evaluation associated with unreliability and unavailability reporting in the Cooling Water Systems element of the Mitigating Systems Performance Indicator (MSPI). This performance issue was previously characterized as White in the licensee's second quarter 2006 PI data submitted to the NRC.

The licensee reported eight failures listed below as contributing to the White PI. The failures occurred between October 2003 and April 2006 and covered a broad spectrum of failure mechanisms.

1. 10/14/2003 – 2B Service Water (SW) pump cooling coil failed. (CR 2003002747)

2. 03/31/2004 – 2E SW pump breaker failed to close due to a control cable splice failure. (CR 2004001493)

3. 07/26/2004 – 1C SW pump breaker failed to close due to breaker mechanism misalignment. (CR 2004101522)

4. 03/19/2005 – 1D Service Water pump breaker failed to close due to breaker mechanism misalignment as described in (CR 2005103081)

5. 08/25/2005 – 2D SW pump breaker failed to close due to breaker mechanism misalignment. (CR 2005108511)

6. 11/07/2005 – 2C SW pump breaker failed to close due to a system alignment error by station operators. This condition was further exacerbated by misalignment in the breaker racking safety interlock interface between the breaker-mounted plunger and the cubicle guide rail notch sequence slots. (CR 2005111288)

7. 02/08/2006 – 2D SW pump breaker failed to close due to misalignment in the breaker racking safety interlock interface between the plunger and the guide rail notch sequence slots. (CR 2006101160)

8. 04/26/2006 – 1C CCW pump handswitch failed. (CR 2006104043)

The inspectors reviewed the root cause evaluations that were performed for these failures. The licensee did not perform a root cause evaluation for the White PI that would describe any systemic aspects that contributed to the White PI. The inspectors used available corrective action program documents and developed a timeline that described the contributory events and overlaid their respective actions in order to develop a comprehensive understanding of the circumstances over the reporting period.

02 Evaluation of Inspection Results

02.01 Problem Identification

a. Determination of who (i.e., licensee, self-revealing, or NRC) identified the issue and under what conditions

The individual contributing failures were self-revealing events and were discovered either during testing or during routine operations, such as swapping of operating pumps.

b. Determination of how long the issue existed and prior opportunities for identification

The inspectors identified that none of the eight failures existed for an unreasonable period before licensee detection and action. However, inspectors noted that the 3rd, 4th, and 5th failures exhibited conditions such as increasing or excessive clearance between the trip latch and trip latch roller, bent or broken stop bolts, and misalignment of the breaker mechanism which resulted in the breakers going trip-free (open) when in receipt of a close signal. These conditions were consistent with backplate bending and occurred on 07/26/2004, 03/19/2005, and 08/25/2005, respectively.

The backplate was a structural member integral to the breaker's frame that established the alignment of the breaker operating mechanism to support successful operation of the breaker. The backplate received two substantial blows from the breaker operating mechanism during each opening cycle of the breaker. The licensee first documented backplate bending in a 2002 work order. While being noted in an informal maintenance tracking system, this condition was not entered into the licensee's CAP. In 2003, the licensee performed a root cause investigation for a broken stop bolt on the 2B RHR pump breaker (CR 2003001178). While backplate bending was noted as being present and a likely precursor to the bolt failure, there was no further evaluation of backplate bending as a root cause for breaker failures. The CR also noted that routine straightening of the backplate should not be accomplished; however, this guideline was not universally implemented by craft personnel.

In September 2006, following reporting of the White PI, failure of the 1C SW pump breaker (CR 2006108584) received a thorough root cause evaluation. This evaluation conveyed the importance of the backplate for successful breaker closing. The evaluation also noted that backplate bending was occurring in approximately 60% of the licensee's 4kV Allis-Chalmers circuit breakers. Based on this information, the licensee accelerated the breaker replacement program. The inspectors determined that the licensee was aware that backplate bending existed, but was not evaluated as a root cause for these previous three failures. The inspectors concluded that not thoroughly evaluating backplate bending as a root cause for previous breaker failures contributed to the PI crossing the White threshold.

In addition, the inspectors reviewed Table 7 of ANSI C37.06-200, and determined that 4kV circuit breakers exposed to fault duties of 40kA should be rated for a service life of 5000 no-load operations. Further, the licensee sometimes used a maintenance and testing technique known as "bumping the pump," to introduce current to loads (inrush).

The breaker was cycled closed and then opened after only a short time interrupting the inrush. Inrush interrupt reduced the service life of the breaker to 400 operations by the same reference. Based on the known usage of certain breakers, the inspectors concluded the Allis-Chalmers breakers were near or had exceeded their service life. The licensee purchased the 4kV breakers with no operations counter and had no formal means of tracking the number of operations. This weakness in evaluating service life as a contributing cause to breaker failures contributed to the PI crossing the White threshold.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issue

The eight individual failures that contributed to the overall PI reporting results were of very low safety significance. None resulted in a 10 CFR 50.72 or 50.73 reporting. The change from White to Green reporting for the third quarter 2006 was due to the licensee's reanalysis of the number of SW pumps needed for success in certain accident conditions. A regional SRA reviewed the reanalysis and confirmed that the changes were consistent with the most recent thermal hydraulic analysis. In addition, a cut set review confirmed that the risk model logic was generating a valid output. Also, the SRA determined that the applicable importance measures from the risk model's output were inserted into the revised Mitigating System Performance Indicator Basis Document.

Additionally, the inspectors reviewed guidance contained in NEI 99-02 (April 2006), Appendix F, Section 2.1.3, Definition of Component Boundaries, Table 2, to no longer count subsequent handswitch failures during manual actuations as functional failures. Given the automatic start function associated with the SW and CCW pumps, the inspectors concluded that the licensee had appropriately interpreted the guidance as long as the auto start of the pump was not adversely impacted.

02.02 Root Cause and Extent-of-Condition Evaluation

a. Evaluation of method(s) used to identify root cause(s) and contributing cause(s)

To evaluate the various failures, the licensee used a combination of structured root cause analysis techniques including fault tree analysis and "Why" staircase. The licensee also used informal elements such as interviews, independent investigation, and document searches. The methods used to identify root and contributing causes were appropriate.

b. Level of detail of root cause evaluation

In general, the inspectors found the level of detail in root and contributing cause evaluations to be adequate. However, while the evaluation for the 4th failure was of adequate detail to eliminate handswitch failure, there was no pursuit of the "root cause" as related to the breaker's operating mechanism. This is another example of weaknesses in evaluation that contributed in the PI crossing the White threshold.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

The inspectors found that the licensee's review of past performance and incorporation of relevant operating experience was generally adequate. However, the inspectors noted two elements of the licensee's 4kV circuit breaker investigations. First, the lack of vendor support for the Allis-Chalmers breakers caused the licensee to serve as their own vendor without many of the relevant design details and engineering experience. This was a significant factor in not eliminating breaker failures due to the complexity of the breaker and its associated cubical interfaces and alignments.

Secondly, the lack of focus on the potential for backplate bending in 2002 and to capture relevant details from the investigation in 2003 in the CAP contributed to the licensee's failure to thoroughly evaluate it as a potential failure mechanism until late 2006.

d. Consideration of potential common cause(s) and extent of condition of the problem

The inspectors identified two potential common causes of the eight Allis-Chalmers breaker failures; backplate bending and breaker racking safety interlock interface alignment. Backplate bending was discussed in Section 02.01.

Evaluation of the second common cause contributor, breaker racking safety interlock interface alignment, was adequate. Inspectors noted that the guide rail would be a legacy issue as the existing cubicle would be used with the Cutler-Hammer breakers. The licensee was in process of developing an As-Built Notice (ABN) drawing detailing the guide rail "design" dimensions based on a detailed review of the replacement breakers and the cubicles.

02.03 Corrective Actions

a. Appropriateness of corrective action(s)

In general, the licensee's corrective actions for the failures that contributed to the White PI were adequate to address the identified root and contributing causes. However, as discussed in section 02.01, inspectors concluded that there were weaknesses in the evaluations for previous breaker failures for backplate bending. In addition, the inspectors identified a weakness in the technical evaluation of the 4kV Cutler-Hammer breakers as a replacement for the 4kV Allis-Chalmers breakers. In 2000 and 2001, the licensee recognized the breakers, particularly those with high operational cycles, were near the end of useful life and performed an evaluation to purchase replacement breakers for the River Water Intake Structure (RWIS). The inspectors interviewed licensee personnel about the evaluation of the difference in breaker operating mechanism between the Allis-Chalmers breakers and the Cutler-Hammer breakers. The licensee concluded that the differences were not significant.

On November 1, 2006, the 1C EDG output breaker failed to close when demanded. The licensee replaced the existing Allis Chambers 4160 volt circuit breaker with a Cutler-Hammer 4160 volt circuit breaker. However, these corrective actions were inadequate

as the replacement resulted in the inability of the MOC switch to provide a "breaker closed" signal to the 1C EDG sequencer. This condition existed for 176 days. The MOC switch was mounted on the breaker cubicle and operated by a fork on the breaker operating mechanism. When the breaker closed, the fork engaged the MOC switch which caused it to rotate, changing the contacts within the switch. These contacts provided both breaker position indication and, in certain applications (diesel generator, component cooling water, etc), inputs to other safety-related equipment. Successful operation of the MOC switch was dependent on the proper alignment between the MOC switch and the fork on the breaker operating mechanism. The licensee had previously experienced similar MOC switch alignment failures on RWIS breakers (non-safety related) and station service water breakers (safety related) such that the breakers would indicate both open and closed on a control room status panel. However, because these breakers utilized the MOC switch to provide only breaker position indication, the licensee elected not to perform a complete root cause evaluation which could have identified MOC switch alignment problems prior to the 1C EDG output breaker failure. Because the licensee determined that the failure involving misalignment between the breaker operating mechanism and the MOC switch was generic to the replacement breakers, the inspectors determined that the overall evaluation of the differences between Allis-Chalmers breakers and the Cutler-Hammer breakers had not been thorough.

b. Prioritization of corrective actions

The inspectors did not identify any significant problems with prioritization of corrective actions. The licensee was committed to replacing all of the Allis-Chalmers breakers with Cutler-Hammer breakers. Installation of the Cutler-Hammer replacement breakers was prioritized with relevant criteria such as high duty cycle versus low duty cycle. The inspectors concluded this was appropriate considering the failure mechanisms of the Allis-Chalmers breakers.

c. Establishment of schedule for implementing and completing the corrective actions

The corrective actions were either completed or were being tracked for completion. The licensee had advanced the 4kV circuit breaker replacement schedule to be complete by the Fall of 2007. The decision to establish vendor and industry engineering support for the MOC switch modifications to keep breaker replacement on schedule was noteworthy.

d. Establishment of quantitative or qualitative measure of success for determining the effectiveness of the corrective actions to prevent recurrence

Where issues were identified by the licensee as warranting a root cause evaluation, corrective action effectiveness reviews were performed which the inspectors generally found adequate. However, while CRs would identify the need for an effectiveness review, generally no acceptance criteria was specified.

02.04 Findings

.1 Weaknesses in Evaluation of 4kV Breaker Failures

Introduction: The NRC identified a Parallel PI White Finding for weaknesses regarding historical evaluations for repeat safety-related breaker failures and the thoroughness of design modifications for the installation of new breakers.

Description: The inspectors found that the licensee did not adequately support a systemic and thorough evaluation of failures affecting 4kV Allis-Chalmer breaker inventory. Process weaknesses, such as the lack of adequate tracking of breaker cycles, the lack of vendor interface or support, the lack of complete specifications for relevant design conditions, and not proactively addressing backplate bending in the CAP contributed to the PI crossing the White threshold.

The more recent failures of the replacement Cutler-Hammer breakers were also determined to have a direct causal link to thoroughness of evaluation, in that, the licensee did not identify the critical operational aspect of MOC switch alignment for necessary indication and control signals. The weakness in thoroughness of design evaluation for the MOC switch reflected a strong casual link with the lack of thorough evaluation of the original failures which led to the White MSPI.

Analysis: In accordance with NRC IMC 0305, a parallel PI finding is assigned the same safety significance as the initiating PI. This parallel PI finding provides for NRC's continued review of the licensee's actions to address the weaknesses identified in this report and demonstrate progress in reversing the adverse trend in safety-related breaker performance as evidenced by the White PI. This finding takes the color (White) of the original MSPI PI per NRC IMC 305.

Enforcement: No violation of regulatory requirements was identified for this specific finding. This finding will be tracked as FIN 05000348,364/2007008-01, Parallel Performance Indicator White Finding. This parallel White inspection finding will be applied to the NRC Action Matrix until the NRC closes the finding.

.2 Failure to Identify and Correct Deficiencies Associated with Safety Related 4kV Circuit Breakers

Introduction: The NRC identified a Green non-cited violation with two examples of 10 CFR 50, Appendix B, Criterion XVI, for failing to promptly identify and correct a condition adverse to quality. For the first example, weaknesses with the thoroughness of evaluations for safety-related breaker failures resulted in a failure to identify backplate bending as a primary root cause for three failures which contributed to the White PI. For the second example, the licensee failed to identify MOC switch alignment problems which resulted in a breaker failure for the 1C EDG.

Description: As discussed in section 02.01 b., the licensee failed to adequately evaluate and identify backplate bending as a root cause for several breaker failures. As

discussed in section 02.03 a., the licensee failed to evaluate design differences for the operation of the MOC switch.

Analysis: The first example is more than minor because the finding affected the Equipment Performance attribute and the Mitigating Systems cornerstone objective involving equipment reliability in that affected breakers could open when demanded to close. This finding is of very low safety significance (Green) because the failure to identify and correct backplate bending in three service water pump breaker failures occurring on 07/26/2004, 03/19/2005, and 08/25/2005 did not result in the actual loss of safety function of a single Train for greater than its Technical Specification allowed outage time. The example was found to be associated with the thoroughness of evaluation aspect of the Problem Identification and Resolution cross-cutting area in that backplate bending was not effectively evaluated as a cause for breaker failures.

The second example is more than minor because it adversely affected the Design Control attribute and the Mitigating Systems Cornerstone objective involving equipment reliability in that the 1C EDG sequencer was not functional for 176 days. Because there was an actual loss of safety function of a single train for greater than the TS allowed outage time, a Phase 3 evaluation was performed. The dominant accident sequence involved the unrecoverable loss of offsite power with the failure of all the EDGs, except EDG 1C and failure to align the Bus 1F loads to EDG 1C. Mitigation/recovery credit was given based on emergency procedures that clearly directed operators to close the applicable load breakers on Bus 1F allowing EDG 1C to power the loads. Therefore, the finding was determined to be of very low safety significance (Green). The example was found to be associated with the thoroughness of evaluation aspect of the Problem Identification and Resolution cross-cutting area in that earlier MOC switch failures were not thoroughly evaluated and a thorough design evaluation was not accomplished.

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action” states, in part, that measures shall be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to the above, conditions adverse to quality were not properly identified and corrected. For the first example, there were two opportunities in 2002 and 2003 to identify and correct a condition adverse to quality. The effect of backplate bending on breaker operability was not identified and corrected, contributing to three breaker failures in 2004 and 2005. For the second example, earlier MOC switch failures were not thoroughly evaluated and a thorough design evaluation was not accomplished, which resulted in the 1C EDG sequencer being inoperable for 176 days. The licensee did not identify key alignment parameters based on previous MOC switch failures.

Because this finding is of very low safety significance and was entered into the licensee’s CAP as CR 2007104129, it is considered an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000348,364/2007008-02, Inadequate Evaluation of Breaker Failures and Subsequent Corrective Actions.

03. Management Meetings

Exit Meeting Summary

The inspectors presented the inspection results to Randy Johnson, Vice President – Farley, and other members of licensee management on May 3, 2007. Additional exit discussions were held on June 11, 2007, and July 16, 2007, with Mr. Ben George, SNC Corporate Licensing Manager. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel
W. L. Bargeron, General Manager
W. R. Bayne, Performance Analysis Supervisor
S. H. Chestnut, Engineering Support Manager
B. L. Moore, Maintenance Manager
T. L. Youngblood, Site Plant Support Manager

NRC personnel
S. Shaeffer, Chief, Branch II, Division of Reactor Projects
W. Rogers, Regional Senior Risk Analyst,

LIST OF ITEMS OPENED AND CLOSED

Opened

05000348, 364/2007008-01	FIN	Parallel Performance Indicator White Inspection Finding (Section 02.04.1)

Opened and Closed

05000348, 364/2007008-02	NCV	Inadequate Evaluation of Breaker Failures and Subsequent Corrective Actions (Section 02.04.2)

LIST OF DOCUMENTS REVIEWED

UFSAR
Drawing D-177183, Ver. 15, Elementary Diagram Component Cooling Water Pump 1C

Procedures
FNP-0-AP-8, Ver 37, Design Modification Control
FNP-0-ACP-88.1, Ver 4, Applicability Determination
FNP-0-AP-88, Ver 8, 10CFR50.59 Screening and Evaluations
FNP-0-SOP-36.6, Ver 37, Circuit Breaker Racking Procedure
FNP-0-SOP-36.6, Ver. 34.0, Circuit Breaker Racking Procedure
FNP-0-EMP-1313.03, Ver. 29.0, Maintenance of Siemens-Allis 4.16kV Circuit Breakers

Work Orders
M04002153, 2C Charging Pump Supply Breaker
M04002154, 2E SW Pump Supply Breaker
2060687301, 2D SW Pump
2060647402, 2D SW Pump Troubleshoot
M300792701, #1 River Water Pump Motor
S03007930, 2B Service Water Pump Motor

Condition Reports
2003002747, 2B SW Pump Upper Oil Reservoir Overflowing
2003001178, RHR/LHSI Pump 2B Breaker Supply Bolt Found Broken at Bottom of Cubicle
2004001493, 2E SW Pump Failed to Start on SI
2004101522, 1C SW Pump Supply BKR DK-05 Tripped Immediately When Closed
2004001241, 2C Charging and 2E SW Pumps Failed to Close on SI
2005103081, 1D SW Pump Tripped Instantly While Starting
2005101317, Attempted to Start 2D SW Pump, Amber BKR Tripped Flag Lit
2005108511, Attempted to Start SW Pump 2D and Received a Yellow BKR Fault Light
2005111288, 2C SW Pump Will Not Start
2006110645, Corrective Actions addressed from CR2005108511 Were not Effective
2006104043, 1C CCW Pump did not Start as Required
2006101160, 2D SW Pump Failed to Start When Attempted
2006108584, Failure of 1C Service Water Pump Due to Breaker Failure to Remain Closed
2006106207, Informal Assessment of SW Pump Breaker Failures
2006108613, Prepare Work Order to Support Breaker Troubleshooting
2006109440, Generate Work Orders to Schedule Stop Bolt Inspections
2006101907, Request Engineering Review on Necessary Width of Breaker Guiderail Notch
2007101220, BKR Charging Motor Continued to Run After BKR was Closed
2007101305, Interlock Plunger not Secured in the Slot for Connect Position
2007101298, 2B CCW B Train BKR Closing Spring did not Close When BKR was Racked in

Action Items
AI2006204593, Adverse Trend of 4kV Breakers Update
AI2006202792, Training Needs for MCB Handswitch Operation
AI2006200922, Revise FNP-0-EMP-1313.3 to Tighten the Trip Solenoid Adjustment Tolerances
AI2005204698, Revise SOP-24.0D to Correct Verification Steps
AI2005205452, Provide Brief Summary to all Operations Personnel
AI2005205453, Revise SOP Checklists for Swing Components for Both Units
AI2005205454, Establish a Standard for Verifying Train Alignment
AI2005203937, Perform an Effectiveness Review on CR 2005108511
AI2005203938, Revise FNP-0-EMP-1313.3 to Clarify the Step to Adjust the Trip Latch
AI2005203939, Identify a Sample of Breakers to Inspect the Stop Bolt
AI2005201716, Review Maintenance Rule Justification for CR 2005103081
AI2005201271, Review and Approve Developed Criteria with Maintenance Rule Manager
AI2005201690, Determine Cause of Failure for DL03
AI2004202000, Revise FNP-0-GMP-60.1 to Include a Step to Inspect the Outer Raychem Sleeve
AI2004202002, Perform Effectiveness Review on the Adequacy of the Corrective Actions for CR 2004001493
AI 2004202088, Write WOs to Perform Inspections of 3 Unit 1 Splices
AI2003204173, FNP 4kV SW and River Water Pump Motor Repair Guideline Needs to be Revised
AI2003204175, Investigate SW/RW Motor Cooling Coil to Determine if E/C is Occurring
AI2003204176, Assure Proper Funds are Budgeted for U2 SW/RW Motor Repairs
AI2003204177, Cost Justification for Purchasing NDE Tooling
AI2004205519, Transferred from AI2003204177

AI2003204181, Perform an Effectiveness Review on the Corrective Actions for the U2 SW/RW Motors
AI2003202262, Revise FNP-0-EMP-1313.03 to Replace OEM Stop Bolts with Mild Steel
AI2003202263, SNC Develop Owners Who Provide Oversight for 4160V BKRs
AI2003202264, Consider Revising the Equivalency Determination Process
AI2003202265, Determine if Effectiveness Review was Satisfactory

Miscellaneous
ANSI C37.06-2000, Table 7, Schedule of Operating Endurance Capabilities for Circuit Breakers
FP 01-0278, Replace Allis-Chalmers MA-350 Breakers with Vacuum Breakers at RWIS SWGR 1J & 1H and 2J & 2H
U-184393, Ver 1.0, Instr 4160 V Metal-Clad Switchgear - Bus 1D
SS-1102-38, Rev 10, Inquiry for 4160 Volt Metal Clad Switchgear for Joseph M. Farley Nuclear Plant
Self Assessment of Farley's Current Practices with Regard to 4160V Breakers
NMP-GM-002-F09, Ver. 1.0, Root Cause Determination Report
U-184909, Rev. 0, Types MA-75, MA-250C and MA-350C, 5kV Air Magnetic Circuit Breakers with Stored Energy Operators
FNP-0-EMP-1313.03, Ver. 28.0, Figure 4, Stored Energy Operator Assembly
FNP-0-CGDP-40, Rev.0, Stop Bolt Dedication Plan
RER F-03-216, Allis-Chalmers Circuit Breaker Stop Bolt Failure
FNP-0-ACP-9.1, Ver. 9.0, 4160V Breaker DG09-2 Stop Bolt Failure
RER C060731601, Criteria for 4kV Allis-Chalmers Switchgear Guide-Rail Notches
NMP-GM-002-F06, Ver. 1, Effectiveness Review Form for AI2005203937
NMP-GM-002-GL07, Ver 1.0, Effectiveness Review for AI2004203649
FNP-0-ACP-9.1, Ver. 9.0, Root Cause Summary 4160V Breaker DG09-2 Stop Bolt Failure