UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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NOVEMBER 22, 2000

Southern Nuclear Operating Company, Inc.
ATTN: Mr. D. N. Morey
Vice President
P. O. Box 1295
Birmingham, AL 35201

SUBJECT: NRC INSPECTION REPORT NOS. 50-348/00-11 AND 50-364/00-11

Dear Mr. Morey:

By letter dated June 26, 2000, you were informed that the NRC would conduct a supplemental inspection at the Farley Nuclear Plant to review your evaluation associated with the white Performance Indicators (PIs) for the Unit Two Heat Removal System (auxiliary feedwater) and Emergency Alternating Current (AC) Power System Unavailability. During that inspection (NRC Inspection Report Nos. 50-348/00-08 and 50-364/00-08), the NRC reviewed your root cause evaluations of the performance issues and determined that the root causes were associated with problems in the preventive maintenance program, in implementation of the Maintenance Rule, and in other related maintenance activities. By letter dated August 17, 2000, you were informed that we would continue our supplemental inspection to follow-up on these problems in order to determine the overall extent of condition. The enclosed inspection report presents the results of that supplemental inspection. The results of this inspection were discussed on October 27, 2000, with Mr. C. D. Nesbitt and other members of your staff.

This supplemental inspection was an examination of 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. Within these areas, the inspection consisted of a selected examination of procedures and representative records, observations of activities, and interviews with personnel. Specifically, the inspector reviewed breaker and turbine driven auxiliary feedwater pump maintenance and Maintenance Rule implementation. Breaker failures and turbine driven auxiliary feedwater pump failures contributed to the White PIs on Unit 2, which resulted in the Degraded Mitigating Systems Cornerstone. Based on the results of this inspection, an inspection finding without color identified problems with the Maintenance Rule program implementation at Farley. This finding is supported by several observations, including the status of breakers and the auxiliary feedwater system in Maintenance Rule (a)(1) for an extended period of time. This was an apparent precursor to the Degraded Mitigating Systems Cornerstone.

The NRC supplemental inspection of your response to the Unit 2 Degraded Mitigating Systems Cornerstone is complete. Due to your acceptable performance in addressing and developing corrective action for these issues, the White PIs associated with both units' Emergency AC Power and the Unit 2 Heat Removal System availability will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in NRC Manual Chapter 0305. NEI-99-02, Regulatory Assessment Performance Indicator Guideline, revision 0, contains guidance for the removal of fault exposure hours contributing to unavailability totals. Section 2.2, Mitigating Systems Cornerstone - Safety System Unavailability, allows the removal

of fault exposure hours after 4 quarters have elapsed provided, among other criteria, that supplemental inspection activities by the NRC have been completed. Since the supplemental effort is complete, Farley may reset the fault exposure hours for the above White PIs when the other criteria are fulfilled. Implementation of your corrective actions will be reviewed during a future inspection.

In accordance with 10 CFR 2.790 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/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Charles Casto, Director
Division of Reactor Safety

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

Enclosure: NRC Inspection Report Nos. 50-348/00-11
and 50-364/00-11

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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|---|---|
| Docket Nos.: | 50-348 and 50-364 |
| License Nos.: | NPF-2 and NPF-8 |
| Report Nos.: | 50-348/00-11 and 50-364/00-11 |
| Licensee: | Southern Nuclear Operating Company, Inc. |
| Facility: | Farley Nuclear Plant, Units 1 and 2 |
| Location: | 7388 N. State Highway 95<br>Columbia, AL 36319 |
| Dates: | October 2-6 and October 23-27, 2000 |
| Inspector: | R. D. Gibbs, Senior Reactor Inspector, RII |
| Approved by: | Mark S. Lesser, Chief<br>Maintenance Branch<br>Division of Reactor Safety |

Enclosure

# SUMMARY OF FINDINGS

IR 05000348-00-11, IR 05000364-00-11, on October 2-6 and 23-27, 2000; Southern Nuclear Operating Company Joseph M. Farley Nuclear Plant, Unit 2. Supplemental Inspection - Degraded Cornerstone.

Cornerstone: Mitigating Systems

This supplemental inspection was performed to assess the licensee's evaluation and corrective actions associated with a Unit 2 Degraded Mitigating Systems Cornerstone due to two White Performance Indicators (PIs) for Heat Removal System (auxiliary feedwater(AFW)) and Emergency Alternating Current (AC) Power System unavailability. This supplemental inspection, performed in accordance with inspection procedure (IP) 95002, was the final focused phase of NRC follow up to assess extent of condition and programatic implications of the licensee evaluation findings. This inspection also focused on corrective actions to prevent recurrence of any similar conditions in accordance with IP 95002. The initial inspection of the Unit 2 Degraded Mitigating Systems Cornerstone in accordance with IP 95001 and IP 95002 was documented in inspection reports 50-348,364/00-07 and 348,364/00-08, respectively. The purpose of this inspection was to accomplish further supplemental inspection of breaker and turbine driven (TD) AFW pump maintenance, and Maintenance Rule implementation, due to concerns raised during the initial IP 95002 inspection.

The results of this inspection concluded that the corrective actions to prevent recurrence of breaker failures were adequate to address the extent of condition for those failures. Similarly, the corrective actions for the TDAFW pump failures were adequate to address the extent of condition for those failures. However, the corrective actions were not yet fully implemented.

No Color. An inspection finding without color identified problems with the licensee's Maintenance Rule program implementation. This finding is supported by several observations which indicated an adverse performance trend, including the status of breakers and the auxiliary feedwater system in Maintenance Rule (a)(1) for an extended period of time. While the risk associated with each observation was very low, this was an apparent precursor to the Unit 2 Degraded Mitigating System Cornerstone.

Due to the licensee's acceptable performance in addressing and developing corrective action for these issues, the NRC supplemental inspection effort for the Unit 2 Degraded Mitigating Systems Cornerstone is complete. The White PIs associated with both units' Emergency AC Power and the Unit 2 Heat Removal System availability will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in NRC Manual Chapter 0305. NEI-99-02, Regulatory Assessment Performance Indicator Guideline, revision 0, contains guidance for the removal of fault exposure hours contributing to unavailability totals. Section 2.2, Mitigating Systems Cornerstone - Safety System Unavailability, allows the removal of fault exposure hours after 4 quarters have elapsed provided, among other criteria, that supplemental inspection activities by the NRC have been completed. Since the supplemental effort is complete, the licensee may reset the fault exposure hours for the above White PIs when the other criteria are fulfilled. Implementation of the licensee's corrective actions will be reviewed during a future inspection.

## Report Details

### 01 Inspection Scope

This supplemental inspection was an additional focused review done in accordance with procedure IP 95002 and is the final phase of NRC follow up. The previous IP 95002 review of the problems leading to the degraded mitigating system cornerstone, documented in inspection report 50-348,364/00-08, identified the need for additional inspection in three areas: 4160V and 600V breaker maintenance; TDAFW pump maintenance; and implementation of the Maintenance Rule related to functional failures of these components. The inspector reviewed the following: the failure history for breakers and AFW, corrective actions for individual failures, the status and frequency of breaker and TDAFW pump preventive maintenance (PMs), root cause and corrective actions for the white PIs, the (a)(1) Maintenance Rule history for breakers and AFW, the current (a)(1) goals and monitoring, the Maintenance Rule classification of failures, and the corrective actions for weaknesses identified in the last Maintenance Rule periodic assessment. In addition, the inspector interviewed the systems engineers for breakers and AFW, the single point contact for Maintenance Rule failure determinations, the Maintenance Rule coordinator, and responsible engineering supervisors.

### 02 Independent Assessment of Extent of Condition and Generic Implications

#### a. 4160V and 600V Breaker Maintenance

Review of the failure history data for these breakers determined that Farley has a history of breaker failures which goes back at least five years. Additional review determined that, until recently, corrective actions appeared to be more focused on returning the equipment to an operable status, rather than identifying the root cause and taking actions which would prevent future failures. This focus has changed significantly in the last two years and now appears to be appropriately directed at preventing failures. The stimulus for this change was a licensee self assessment of the breaker area, using NRC Temporary Instruction 2515/137 as guidance, which was completed in September 1998. Corrective actions for the problems identified by this assessment were intended to improve breaker performance and resulted in the following:

- Breaker PM procedures were updated to incorporate industry operating experience and Farley's own operating experience.

- A policy was established to quarantine failed breakers to assist in root cause failure analysis.

- The PM periodicity for safety related and loss of offsite power breakers was reduced from 5 to 3 years, non-safety breaker PM periodicity was reduced from 9 to 5 years.

- The program to track breaker PMs was changed to track PMs by breaker number rather than cubicle number.

- An experienced systems engineer was assigned to monitor the breaker program.

The enhanced program was implemented in the fall of 1999 for 4160V breakers, and was implemented for 600V breakers in the spring of 2000. A review of the latest PMs

determined that approximately 50% of the 4160V breakers and 20% of the 600V breakers had PM done to the new program standards. The licensee was aggressively pursuing PM of the remaining breakers to the updated program. These corrective actions were adequate to prevent recurrence of failures and adequately address the extent of conditions for the problems which resulted in the degraded cornerstone. However, the site was still vulnerable until all breakers have had PM done to the new program.

b. Turbine Driven AFW Pump Maintenance

Review of the failure history data for the AFW system also determined that Farley has a history of failures, which goes back at least five years. Similar to breakers, corrective actions, until recently, appeared to be more focused on returning the equipment to an operable status, rather than identifying the root cause, and taking actions which would prevent future failures. The four most recent failures all involved failure of the turbine driven control system (governor and speed controller) to adequately control pump speed. A recent visit by site engineering services to one of the licensee's sister plants has resulted in several corrective actions, which, when implemented, will enable the licensee to identify control system degradation before this degradation results in a pump failure. These actions include the following:

- Implement a design change which will monitor degradation of the control circuit while operating and when in standby.

- Develop the capability to bench test the governor and speed controller.

- Develop procurement requirements for refurbishment of the governor and speed controller, which will require replacement of piece parts known to cause failures.

- Enhance Farley procedures based on the sister plant's experience with the equipment.

These corrective actions properly addressed extent of condition and include actions to prevent recurrence. However, the corrective actions were still being implemented.

c. Maintenance Rule Implementation

Inspection of this area resulted in an inspection finding without color that identified problems with the licensee's Maintenance Rule program implementation. This finding is based on the following observations:

- The AFW system (except for a short period in 1999), and 4160V and 600V breakers have been in Maintenance Rule (a)(1) for five years, and corrective actions have not resulted in any significant improvement in equipment performance. This is not reasonable if identified problems are adequately pursued.

- The licensee is re-scoping all systems, structures and components (SSCs) under the Maintenance Rule in order to scope by function rather than by system.

- The licensee's Maintenance Rule program is not in accordance with the latest revision of the licensee's probabilistic risk assessment (PRA), and is not in accordance with previous revisions of the PRA (i.e. PRA risk significant systems are not treated as risk significant in the licensee's Maintenance Rule program). This treatment does not have approval of the licensee's Maintenance Rule Expert Panel.

- Weaknesses identified in the licensee's Maintenance Rule program, which were identified during the licensee's 1999 periodic assessment, were not included in the licensee's corrective action program and many of those issues remain uncorrected 15 months later.

- The most recent failures of the Unit 2 TDAFW pump were not consistently identified as maintenance preventable functional failures (MPFFs). Only one out four of these failures was properly identified. However, the licensee had properly classified the TDAFW pump as (a)(1).

While the risk associated with each of the above was very low, these observations indicated an adverse performance trend in the availability and reliability of safety systems. Most of these issues had been previously identified by the licensee and corrective actions were in progress.

## MANAGEMENT MEETING

### Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on October 27, 2000. The licensee acknowledged the findings presented.

## Partial List of Persons Contacted

R. Badham, Safety Audit Engineering Review Supervisor
M. Ballard, Engineering Support Supervisor
C. Barefield, Maintenance Manager (acting)
M. Coleman, O & M Manager
M. Connor, Engineering Support
K. Dyar, Administration Manager (acting)
G. Dykes, Maintenance Rule Coordinator
R. Lovvorn, Plant Support
R. Martin, Engineering Support Manager
B. Monk, Engineering Support Supervisor
C. Nesbitt, Assistant General Manager - Plant Support
B. Oldfield, Operations Training Supervisor
B. Sampson, Engineering Support
T. Youngblood, Unit Superintendent

## List of Acronyms

| | |
|---|---|
| AFW | Auxiliary Feedwater |
| MPFF | Maintenance Preventable Functional Failures |
| PI | Performance Indicators |
| PM | Preventive Maintenance |
| PRA | Probabilistic Risk Assessment |
| SSC | Systems Structures and Components |
| TDAFW | Turbine Driven Auxiliary Feedwater |