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June 9, 2000

Docket No.: 50-364

NEL-00-0157

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Joseph M. Farley Nuclear Plant
Response to an Apparent Violation in
Inspection Report Numbers 50-348/00-02 and 50-364/00-02

Ladies and Gentlemen:

By letter dated May 1, 2000, the NRC notified Southern Nuclear that an apparent violation had occurred at Farley Nuclear Plant, Unit 2. The response to the apparent violation is attached.

Confirmation

I affirm that the response is true and complete to the best of my knowledge, information, and belief.

Respectfully submitted,


Dave Morey

WAS/maf:SW Booster Pump EEI Letter.doc

Attachment:

Response to an Apparent Violation in Inspection Report
Numbers 50-348/00-02 and 50-364/00-02

IE01

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U. S. Nuclear Regulatory Commission

cc: Southern Nuclear Operating Company
Mr. L. M. Stinson, General Manager - Farley

U. S. Nuclear Regulatory Commission, Washington, D. C.
Mr. L. M. Padovan, Licensing Project Manager - Farley

U. S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. T. P. Johnson, Senior Resident Inspector – Farley

Attachment
Response to an Apparent Violation in Inspection Report
Numbers 50-348/00-02 and 50-364/00-02

Response to an Apparent Violation in Inspection Report Numbers 50-348/00-02 and 50-364/00-02

This apparent violation is identified as Escalated Enforcement Item (EEI) 50-364/00-02-01, Technical Specification 3.0.5 Entered Due to Service Water Lubrication and Cooling Pumps Inoperable. The conclusion under Report Details Section O2.2 states, in part, the following:

“Unit 2 was operated in a condition that could have prevented the service water system from performing its intended function. An apparent violation was identified for failure to meet the requirements of TS 3.0.5.”

Admission or Denial

We agree that a violation occurred in that, based on the information that was available to the shift at the time of the event, TS 3.0.5 should have been entered at the time the diesel generator (DG) was removed from service and was not. However, Unit 2 was not operated in a condition that could have prevented the Service Water (SW) system from performing its intended function. Based on vendor evaluation subsequent to the event, the SW system was always capable of performing its intended function.

Background Related to TS 3.0.5 Entry

The Farley Ultimate Heat Sink is the SW Pond. Water is delivered from the SW pond to the plant using 10 SW pumps (2 A-train, 2 B-train, and 1 swing pump per unit). The Unit 1 and Unit 2 SW pumps are provided by different vendors and design differences in the pumps result in only the Unit 2 pumps requiring lubrication and cooling (L & C) booster pumps as a backup to the normal L & C water source (the cyclone separators). During normal operation, the cyclone separators provide L & C to the SW pumps. The Unit 2 SW booster pumps are normally not in service. The design of the Unit 2 SW pumps requires that the L & C supply provide water against pump discharge pressure (~ 90 psi). If the cyclone separator is lost to a train of Unit 2 SW pumps, the associated train Unit 2 SW booster pump starts to provide high pressure L & C to the SW pumps (~ 125 psi). Two annunciators are alarmed in the Main Control Room (MCR) – the Service Water Intake Structure (SWIS) Trouble Alarm and the SW Booster Pump Running Alarm. If both the Cyclone separator and the booster pump are lost on a Unit 2 SW train, the associated SW pumps will receive lubrication and cooling via reverse flow from their own discharge, through the pump bearings and out of the pump packing.

In the late 1980's the function of the SW booster pumps was evaluated to determine whether they should be included in the Inservice Testing (IST) Program. It was determined that they did not meet the criteria for inclusion in the IST Program. However, it was recognized that operation of the SW booster pumps was important to the long-term operation of the Unit 2 SW Pumps in the event that the cyclone separator was removed from service. Therefore, appropriate testing and monitoring were established. In 1990, a Functional System Description (FSD) was developed for the SW system. During the development of the FSD, the SW pump vendor was contacted and asked if the SW pumps could survive for 30 minutes with no lubrication water supplied (a complete loss of lube and cooling water flow). The vendor confirmed in a letter that the pumps would continue to operate for 30 minutes without a failure and that increased bearing wear would result from the intrusion of pond water into the pump bearings. This response was referenced and the information was incorporated into the FSD. In 1993, during the Service Water Operational Performance Inspection (SWOPI) at FNP, the NRC asked why the SW booster pumps were not included in the IST Program. In answering this question, the vendor was again contacted. The vendor confirmed his previous statement that the pumps could operate for thirty minutes without any lube and cooling flow and provided additional clarification. A letter was received from the vendor at that time which stated that they would not expect a pump to fail within 60 days after a cooling or flush water system failure if the pump

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was within acceptable vibration parameters prior to failure. Historically, the SW booster pumps had not been treated as attendant equipment. The 1993 vendor letter reinforced this interpretation. At this time, no discrepancy was seen to exist between the two vendor letters and the FSD was not revised. In 1998, on-shift personnel questioned the information on the SW booster pumps in the FSD (operation for up to 30 minutes) because of the FNP position that the SW booster pumps were not attendant equipment and knowledge of the 1993 letter. Investigation into this apparent discrepancy was not tracked, Operations on-shift personnel were not informed of the apparent discrepancy, and the FSD was not changed (for more information on this history, see the Additional Information section).

In February of 2000, when the DG was removed from service, operation under TS 3.0.5 should have been evaluated. Prior to the DG being removed from service, the B Train SW booster pump had failed and was tagged out. Based on the existing FNP position, the operating crew on-shift at the time the DG was removed from service did not treat the SW booster pump as necessary attendant equipment and no Technical Specification (TS) limiting condition was entered. An on-shift Senior Reactor Operator (SRO) on the following shift questioned this position based on his past experience with the SW booster pumps and knowledge of the FSD. At that time, the on-shift operating crew entered TS 3.0.5 and conservatively made a four-hour non-emergency report and wrote an occurrence report to resolve the apparent discrepancy between the FSD and the plant position related to the SW booster pumps. Based on subsequent evaluation, FNP has decided to treat the booster pumps as attendant equipment for the future. Information from this investigation will be reflected in appropriate design documentation, procedures, and training.

Potential Loss of the SW Safety Function

The conclusion under Report Details Section O2.2 goes on to state the following:

“The Unit 2 ‘A’ train service water (SW) system emergency power source (1C diesel generator) was removed from service for maintenance concurrent with the redundant ‘B’ train SW lube and cooling booster pump being out of service. The ‘B’ train SW lube and cooling booster pump is required attendant equipment for SW so this constituted a potential loss of the SW safety function.”

The SW safety function was never lost, and would not have been lost in the event of a dual unit LOSP.

At the time of the event, it was not clear how long the Service Water pumps would run without the support of the booster pumps. Design documents and various vendor letters with different times related to operation of the SW pumps without booster pump support contributed to confusion among the plant staff. Due to these discrepancies, a four-hour non-emergency report was made to the NRC on February 7, 2000, followed by an LER on March 3, 2000.

The cyclone separator, a non-safety related source of filtered lube and cooling supply to the SW pumps, remained operable throughout this event. The SW pumps would have been impacted only in the event of a dual unit Loss of Site Power (LOSP). A dual unit LOSP did not occur during the time that both the B Train SW booster pump and the 1C DG were out of service. The A Train 1-2A DG remained in service during this event and could have been manually aligned to supply Unit 2 if necessary. If a dual unit LOSP had occurred, the lubrication and cooling flow to the pumps would have come from service water flowing from the impeller region up through the pump shaft tube and out the packing. The pump vendor was contacted to determine the impact of having the B Train SW booster pump out of service. Although the use of this unfiltered service water for lubrication results in increased wear rates on the pump bearings, the pump vendor has indicated that bearing cooling can be supported provided packing leakoff exists. It was

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confirmed that bearing cooling on the B Train SW pumps would have been supported by the packing leakoff provided from the process flow at the time of the event. Based on the conditions that existed during this time period, the vendor concluded that the pumps should have been capable of operating for a minimum of 24 hours following a loss of external lube and cooling water. Based on these additional discussions with the vendor, the LER was revised. Since the total time period when the booster pump and the DG were both inoperable was approximately 12.5 hours, there would have been at least one train of SW available at all times.

Reason for Apparent Violation

The cause of this event was a personnel error involving an incorrect interpretation in that the booster pumps were not considered as attendant equipment of the Unit 2 SW pumps. This is attributable to a long-term practice by plant personnel based on initial vendor communications that the Unit 2 SW booster pumps were not required support equipment. A contributing cause was personnel error in that an apparent discrepancy in information pertaining to the booster pumps was not entered into the corrective action program for resolution.

Corrective Steps Taken and Results Achieved

- Procedures have been revised to require that the SW booster pumps be considered attendant equipment for the Unit 2 SW system.
- Licensed and on-shift Operations personnel have been notified of this change in attendant equipment status.
- The LER has been revised to incorporate the vendor evaluation that concluded the SW pumps would have operated satisfactorily during the period the diesel generator was removed from service.
- Operations procedures have been revised to provide expectations on determining what is attendant equipment, the proper evaluations that should be performed, and resolution of issues involving attendant equipment.
- The condition reporting process has been improved.

Corrective Steps That Will Be Taken to Avoid Further Violations

- The FSD for the SW system will be revised to incorporate vendor information.
- Training will be enhanced to address this event and add System Operator actions related to the SW system on a LOSEP on Unit 2.

Date of Full Compliance

October 31, 2000

Additional Information

Included in the conclusion under Report Details Section O2.2 is the following statement:

“Previous opportunities to identify and correct the discrepancy between operating practices and the applicability of the service water lubrication and cooling booster pumps as attendant equipment were not effective.”

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Historically, the SW lube and cooling booster pumps had not been considered attendant equipment. An opportunity in 1998 to correct the discrepancy between operating practices and the applicability of the service water lubrication and cooling booster pumps as attendant equipment was not effectively tracked to completion. The following discussion tracks the history associated with this issue.

A Safety System Self Assessment (SSSA) was performed on the Service Water (SW) System in the 1989 time frame. A program was established to address items found to be deficient during this assessment and a Functional System Description (FSD) was drafted. As part of that effort, Southern Company Services (SCS) personnel contacted Johnston Pump Company (the pump vendor for the Unit 2 SW pumps). SCS personnel asked if the SW pumps could survive for 30 minutes with no lubrication water supplied from either the cyclone separator or the booster pumps (a complete loss of lube and cooling water flow). A response dated April 10, 1990 confirmed that the pumps would continue to operate for 30 minutes without a failure and that increased bearing wear would result from the intrusion of pond water into the pump bearings. However, no upper time limits were provided by the vendor on the expected consequences of booster pump failure on the SW pumps after 30 minutes of operation without lube and cooling. This response was referenced and the information was incorporated into the draft of the FSD. Various site personnel reviewed the FSD draft. Documentation of such reviews was found from the Maintenance, Systems Performance, and Training groups. Revision 0 of the FSD was issued on December 31, 1990.

In 1993, the NRC performed a Service Water Operational Performance Inspection (SWOPI) at FNP. During that inspection, the NRC asked why the SW booster pumps were not included in the Inservice Testing (IST) Program and what actions would be taken if the pumps did not fulfill the requirements of FNP-2-STP-24.11. The pumps were not included in the IST as discussed in letter NMS-89-0185. However, it was recognized that operation of the SW booster pumps was important to the long-term operation of the Unit 2 SW Pumps in the event that the cyclone separator is removed from service. Therefore, proper operation of the SW booster pumps was verified per FNP-2-STP-24.11. Johnston Pump Company was contacted during this inspection. The vendor confirmed his previous statement that the pumps could operate for thirty minutes without any lube and cooling flow and provided additional clarification. The vendor also stated that even with flow as low as 1 gpm, the SW pumps could be operated indefinitely with no damage to the pump bearing. The vendor also stated that even without the cyclone separator and booster pump, a small amount of flow will exist due to leakage through the pump packing. A letter, dated September 1, 1993, stated that based on continuance of the Farley monitoring system, addition of a five year repair cycle, and increased surveillance frequency should the flush water system fail, they would not expect a pump to fail within 60 days after a cooling or flush water system failure if the pump was within acceptable vibration parameters prior to failure. This Johnston Pump Company response was incorporated into the SWOPI response. Historically, the SW booster pumps had not been treated as attendant equipment. The 1993 vendor letter reinforced this interpretation. With this additional information from the vendor, no conflict between the "up to 30 minutes" statement in the FSD (based on no flow past the bearings) and the plant position concerning the SW booster pumps (based on process flow past the bearings should both the cyclone separator and the booster pump fail) was seen to exist and the FSD was not changed.

In July of 1998, a Senior Reactor Operator (SRO), questioned the statement in the FSD stating that the pumps would operate for up to 30 minutes after a loss of lubricating water. Based on his experience in 1993 with the SWOPI, the SRO was convinced that this reference in the FSD was a typographical error (recalling that FNP had received a letter allowing for days of operation vice minutes). The SRO sent an e-mail to the Manager of the Configuration Management Group stating personal certainty that the commitment from Johnston Pumps was for 30 days of operation vice 30 minutes. The Manager of the

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Configuration Management Group forwarded this e-mail to Southern Company Services to incorporate the comment via the As Built Notice (ABN) design document change process. SCS personnel confirmed that the reference in the FSD was correct (based on the 1990 Johnson letter) and stated that the letter answered a specific question asked by SCS regarding a specific time frame (30 minutes). They went on to state that Johnston Pumps did not elaborate on exactly how long the pumps would last. Johnston Pump Company personnel only answered the question asked. The SCS personnel asked whether they should pursue an answer or not. The SRO sent an e-mail back, referencing the 1993 letter and requesting that SCS pursue a change to the FSD. Prior to this point, SCS was not aware that the 1993 letter existed. SCS contacted Johnston Pump Company personnel who stated that they could not support the 1993 letter. A formal request was never initiated from the site or corporate office and SCS never pursued the issue further. At this point, the SRO who originally questioned the FSD began to think of the SW booster pumps as attendant equipment but this information was not disseminated among the Operations staff.

On February 6, 2000 at 0257, the B Train SW lube and cooling booster pump failed. This pump provides B Train SW pumps bearing lubrication in the event of a loss of normal AC power. Based on the existing FNP position, the on-shift operating crew did not identify the booster pump as necessary attendant equipment and no Technical Specification limiting condition was entered. On February 7, 2000 at 0329, an A Train diesel generator (DG) (DG 1C), which is the emergency power supply for A Train SW, was removed from service for planned maintenance. At this time, because the B Train booster pump was out of service and the A Train SW pumps would not have had emergency power, both trains of SW could have failed to perform their intended function should a dual unit LOSP event have occurred (This event could be mitigated by manually aligning the A Train 1-2A DG to Unit 2). Subsequent vendor evaluation concluded that the pumps should have been capable of operating for a minimum of 24 hours following a loss of external lube and cooling water. Since the total time period when the booster pump and the DG were both inoperable was approximately 12.5 hours, there would have been at least one train of SW available at all times. The same SRO who was involved with the SWOPI in 1993 and questioned the FSD in 1998, also identified the concurrent inoperabilities of the 1C DG and the B Train SW booster pump on February 7, 2000 and raised the question of TS 3.0.5 applicability. The A Train DG 1C was returned to service on February 7, 2000 at 1605, thereby restoring the functionality of the A Train SW system. The B Train lubrication and cooling booster pump was returned to service on February 8, 2000 at 1303. This event is not applicable to Unit 1 since its SW pumps are of a different design and do not require booster pumps.