



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

June 2, 2010

Mr. J. Randy Johnson
Vice President - Farley
Southern Nuclear Operating Company, Inc.
7388 North State Highway 95
Columbia, AL 36319

**SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT - NRC SPECIAL INSPECTION
REPORT 05000348/2010007 AND 05000364/2010007**

Dear Mr. Johnson:

On April 23, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed a special inspection at your Joseph M. Farley Nuclear Plant Unit 1 and 2 facilities. This special inspection team was chartered to review the circumstances related to the failure of the 2E service water pump. A special inspection was warranted based on the conditional risk and the deterministic criteria specified in Management Directive 8.3, "NRC Incident Investigation Program." The potential for the failure to have involved a major deficiency in design or construction having potential generic safety implications was the deterministic criterion met. Additionally, the result of the NRC's initial conditional risk assessment associated with this degraded condition indicated that a special inspection was warranted.

The enclosed inspection report documents the inspection results, which were discussed at the exit meeting on April 23, 2010, with Mr. Randy Johnson and members of your staff. The determination that the inspection would be conducted was made by the NRC on February 22, 2010, and the inspection started on February 23, 2010.

The inspection was performed in accordance with Inspection Procedure 93812, "Special Inspection," and focused on the areas discussed in the inspection charter described in the report. The inspection examined activities conducted under your license as they relate to safety, compliance with the Commission's rules and regulations, and with the conditions of your license. The team reviewed selected procedures and records, conducted field walk downs, and interviewed personnel. In addition, a NRC Quality and Vendor Inspection was conducted at the service water pump vendor facility. The results of the vendor inspection were documented in NRC Inspection Report 9901361/2010-201.

The report documents one self-revealing finding of very low safety significance (Green). This finding was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because it was entered into your corrective action program, the NRC is treating the finding as a non-cited violation (NCV) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest this non-cited violation (NCV), you should provide a

response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Farley Nuclear Plant. In addition, if you disagree with the characterization of the finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement to the Regional Administrator, Region II, and the NRC Resident Inspector at the Farley Nuclear Plant. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's Rules of Practice, a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of 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/

Leonard D. Wert, Jr., Director
Division of Reactor Projects

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

Enclosure: Inspection Report 05000348, 364/2010007
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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SNC

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Letter to J. Randy Johnson from Leonard D. Wert, Jr. dated June 2, 2010

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT - NRC SPECIAL INSPECTION
REPORT 05000348/2010007 AND 05000364/2010007

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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.: 05000348/2010007, 05000364/2010007

Licensee: Southern Nuclear Operating Company, Inc.

Facility: Joseph M. Farley Nuclear Plant, Units 1 and 2

Location: Columbia, AL

Dates: February 23, 2010 through April 23, 2010

Inspectors: C. Young, P.E., Senior Resident Inspector, Sequoyah (Lead)
M. Coursey, Reactor Inspector

Approved by: Leonard D. Wert, Jr., Director
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000348/2010007, 0500364/2010007; 02/23/2010 – 04/23/2010; Joseph M. Farley Nuclear Plant, Units 1 and 2; Special Inspection.

This report covered a 4-day period (February 23-26, 2010) of onsite inspection, with further review continuing through April 23, 2010, by a special inspection team consisting of a senior resident inspector and a reactor inspector. One Green finding was identified, which was a non-cited violation (NCV). The significance of most findings is indicated 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 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," (ROP) Revision 4, dated December, 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. A self-revealing non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," was identified for the licensee's failure to establish measures to assure that the 2E service water pump (SWP) installed on November 22, 2006, conformed to purchase order requirements. The failure to assure that the 2E SWP minimum rotor critical speed met the purchase order design specification resulted in an increased susceptibility of the SWP to resonant vibration, which was a factor that contributed to the pump failure. The licensee entered this event into their corrective action program as CR 2009110325.

The finding was determined to be greater than minor because it was associated with the design control attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency contributed to the failure of the 2E SWP, and thus impacted the reliability of the service water system. Using Inspection IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance (Green) because it did not represent an actual loss of safety function of a single Train for greater than its Technical Specification (TS) allowed outage time. No cross-cutting aspect was identified since the issue was not reflective of current licensee performance, in that the performance deficiency occurred in 2006. (Section 4OA5.3)

B. Licensee-Identified Violations

None.

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REPORT DETAILS

Event Description

The service water (SW) system for each of the two units includes five service water pumps (SWPs), which are designated A (1A for Unit 1 and 2A for Unit 2), B, C, D, and E. The A and B pumps are capable of being aligned to the system's 'A' train for each unit, while the D and E pumps are capable of being aligned to the system's 'B' train for each unit. The 'C' SWP for each unit is capable of being aligned to either train of the system. Each train requires two pumps to be aligned in order to meet TS requirements for operability. For each pump, there is a seismic support ring, which is a ring-shaped structure that is mounted to the wall of the SW bay and surrounds the exterior of the pump column near the bottom with a nominal 0.2 inch clearance.

On August 15, 2009, the Unit 2 2E service water pump (SWP) was started for post-maintenance testing following repairs that had been made to its seismic support ring. After approximately 10 minutes of operation, an abnormal noise was observed coming from the pump, and motor running amps were noted to be abnormally high. The pump was secured following approximately 1 hour of operation, and was found to be in a seized condition. At the time of the failure the original cause determination was failure of the seismic rings. The extent of condition review indicated that the other SWP seismic rings were not exhibiting significant degradation and the original failure mechanism was isolated to the 2E SWP.

Following removal of the 2E SWP, the failed pump was transported to a vendor facility for a detailed root cause analysis of the failure mechanism. The pump seal rings were found to be broken, pump shaft coatings at the bearing journal locations were found to be corroded and delaminated, and the associated bearings were damaged. Based on the completed root cause, a common mode failure mechanism was applicable to all of the Sulzer SWPs. In addition, the generic implications of the failure mechanism per Management Directive 8.3, "NRC Incident Investigation Program," required a special inspection. On January 27, 2010, the pump vendor issued a notification pursuant to 10 CFR Part 21 to report the defective pump shaft journal coating which resulted in the pump failure.

Inspection Scope

A Special Inspection was initiated following the NRC's review of the licensee's root cause for this failure based on the deterministic and conditional risk criteria specified in Management Directive 8.3. The inspection was conducted in accordance with NRC Inspection Procedure 93812, Special Inspection, and the Special Inspection Charter dated February 24, 2010. The inspection focus areas included the following charter items:

1. Develop a sequence of events, including applicable management decision points concerning the 2E service water pump failure.
2. Review licensee documents for adequacy and to assess if the licensee knew or should have known that 2E SW pump shaft bearing degradation was occurring. Specifically, assess the following areas:
 - Operational decision making

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- Operational experience (internal and external)
 - Vendor information on expected service life, recommended preventative maintenance, and if any bulletins or addendums were issue
3. Quality Assurance Process for service water pump procurement and receipt inspection.
 4. Assess the available common cause analysis for the service water pumps and operability evaluation for the remaining service water pumps. Review overall service water system health reports and related information to identify other potential vulnerabilities which could affect operability of the SW system.
 5. Assess any reviews, preventative maintenance, or evaluations developed to support continued operation of the service water pumps.
 6. Review to determine if there was any correlation between the seismic ring degradation and the 2E SW pump failure.
 7. Evaluate the need for additional inspection activities at the vendor facilities. Specifically, assess the following areas:
 - Review available vendor and sub-vendor procedures for adequacy and commonalities.
 - Review of station receipt and inspection documentation.
 - Make recommendation for additional offsite vendor inspection scope
 8. Collect data necessary to support completion of the significance determination process, if applicable.
 9. Identify any potential generic safety issues and make recommendations for appropriate follow-up action (e.g., Information Notices, Generic Letters, and Bulletins). Review the related Part 21 concerning the Farley SW pump issue.

4. OTHER ACTIVITIES

4OA5 Other Activities – Special Inspection (93812)

.1 Sequence of events concerning the 2E SWP failure. (Charter Item 1)

May 26, 2005

The licensee issued FM-S-05-001, "Specification for Replacement Service Water Pumps for Joseph M. Farley Nuclear Plant – Unit No. 1 and 2," version 1.0, which was developed to support a project to replace all of the service water pumps on both units with a new standard design, and contained the design details and requirements for the new pumps.

April 26, 2006

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The licensee issued purchase order (PO) QP060449 for a total of 11 service water pumps to be manufactured according to the above design specification to support replacement of all of the pumps currently in service.

November 22, 2006

The 2E SWP was replaced with a new design pump and placed in service.

July 7, 2007

The 2D SWP was replaced with a new design pump and placed in service.

February 29, 2008

The 1A SWP was replaced with a new design pump and placed in service.

November 8, 2008

The 1E SWP was replaced with a new design pump and placed in service.

July 15, 2009

The 1D SWP was replaced with a new design pump and placed in service.

August 2, 2009

8:35am: The 2E SWP was started. Shortly thereafter, operations personnel reported observing a clanking noise in the service water building.

9:14am: The 2E SWP was stopped and the abnormal noise stopped.

2:37pm: The 2E SWP was started to support investigation of the abnormal noise.

3:29pm: The 2E SWP was stopped. The source of the abnormal noise was believed to have been associated with the pump's seismic support ring.

August 2-15, 2009

The seismic support ring for the 2E SWP was found to have come loose from its mounting bracket, and was in contact with the pump column. The ring was repaired.

August 15, 2009

6:23pm: The 2E SWP was started. After approximately 10 minutes, operations personnel reported observing an adverse grinding noise coming from the pump. Pump motor amps were noted to be abnormally high.

7:35pm: The 2E SWP was stopped, and was found to be in a seized condition.

.2 Assessment of the availability of indications that 2E SWP pump shaft bearing degradation was occurring. (Charter Item 2)

a. Inspection Scope

The team reviewed interviewed licensee personnel and reviewed operations logs, licensee procedures, corrective action program documents, work orders, system health reports, relevant operating experience, and vendor technical manuals and delivery/receipt documentation to assess whether the licensee should have been aware

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of degraded conditions associated with the 2E SWP. The team also reviewed inservice testing (IST) procedures and results for the SW pumps.

b. Findings and Observations

No findings were identified. The team did not identify any records or sources of information which could have allowed the licensee to be aware of any design or manufacturing flaws, or that degradation was occurring in the pump. The inspectors determined that the licensee was performing appropriate maintenance and testing, with no indications that bearing degradation was occurring.

.3 Review of Quality Assurance (QA) process for service water pump procurement and receipt inspection. (Charter Item 3)

a. Inspection Scope

The team interviewed licensee and vendor personnel, reviewed the licensee's QA procedures for oversight of vendor activities, procurement documentation, and reviewed vendor design and manufacturing documentation to assess whether appropriate processes associated with safety related component procurement were implemented.

b. Findings and Observations

One finding of significance was identified, as discussed below. The inspectors determined that the licensee was adequately implementing applicable requirements for auditing and evaluating the safety related component vendor's QA program. The inspectors noted that the licensee's root cause evaluation identified areas for improvement and issued corresponding corrective actions associated with requirements for vendor oversight and evaluation processes as well as procurement specification content and control.

Introduction. A self-revealing Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," was identified for the licensee's failure to establish measures to assure that the 2E service water pump (SWP) installed on November 22, 2006, conformed to purchase order requirements. The failure to assure that the 2E SWP minimum rotor critical speed met the purchase order design specification resulted in an increased susceptibility of the SWP to resonant vibration, which was a factor that contributed to the pump failure that occurred on August 15, 2009.

Description. On April 27, 2009, the licensee placed an order for a total of 11 replacement SWPs to be manufactured in accordance with FM-S-05-001, "Specification for Replacement Service Water Pumps for Joseph M. Farley Nuclear Plant – Unit No. 1 and 2," version 1.0. Section 3.6.2.1 of this specification contained a requirement that "pump rotors shall be designed with critical speeds at least 25 percent above normal rated speed."

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On November 22, 2006, the replacement 2E SWP was installed and placed in service. Over the next 32 months, it accumulated approximately 14,947 run hours. On August 2, 2009, the 2E SWP was started and subsequently secured due to the presence of an unusual noise that was observed in the service water (SW) building while placing the 2E SWP in service. A seismic support ring, which was located external to the lower portion of the pump column and mounted to the wall of the service water bay, was found to have come loose from its mounting bracket and was in contact with the pump column. This issue was reviewed in detail in NRC Inspection Report 248,364/2009005 issued January 29, 2010. Following repairs to this support ring, the 2E SWP was again started on August 15, 2009, with no noise similar to that observed on August 2 present. After approximately 10 minutes of operation, a different abnormal noise coming from the pump was observed, and motor running amps were noted to be abnormally high. The pump was secured following approximately 1 hour of operation, and was found to be in a seized condition due to the fracture of pump wear rings.

The licensee entered this event into their corrective action program as CR 2009110325. The causes which contributed to the failure included vendor design and manufacturing issues such as material selection and interference fit parameters associated with the pump wear rings, inadequate commercial grade dedication associated with the process of coating the pump shafts at the bearing journal locations (as several shaft bearings and associated journal coatings were found to be degraded and damaged), and failure to meet the design specification for minimum rotor critical speed. The licensee's root cause effort for the pump failure concluded that the SWP natural frequencies (i.e. critical speed) were not above the minimum requirement of 125 percent of normal running speed, as required by FM-S-05-001, "Specification for Replacement Service Water Pumps for Joseph M. Farley Nuclear Plant – Unit No. 1 and 2," version 1.0. This resulted in increased susceptibility to resonant vibration in the presence of forcing functions at normal running speed caused by minor misalignments, imbalances, and/or manufacturing tolerances. Planned corrective actions include the replacement of all SWPs with a new design which addresses the above issues.

The 2E SWP normally serves as one of the two pumps required for the 'B' train of the Unit 2 SW system to be operable. The 2D SWP is the other 'B' train pump, and the 2C SWP can be aligned to either the 'A' or 'B' train. Prior to its failure in August 2009, the 2E SWP was in service from July 14 through July 27, 2009, during which time it was secured and restarted once (on July 24) and successfully underwent quarterly inservice testing on July 25. It was next started on August 2, 2009, as described above, and ultimately failed to run upon its next demand on August 15, 2009. The 2C SWP was aligned (along with the 2D SWP) to the 'B' train from July 27, 2009, throughout the subsequent failure and replacement of the 2E SWP.

Analysis. The failure to establish measures to assure that the 2E SWP, installed on November 22, 2006, conformed to the purchase order requirement for minimum rotor critical speed was a performance deficiency. This resulted in an increased susceptibility of the SWP to resonant vibration, which was a factor that contributed to the failure that occurred on August 15, 2009. The finding was determined to be greater than minor because it was associated with the design control attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability,

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and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency affected the likelihood of failure of the 2E SWP, and thus the reliability of the SW system to perform its safety function. Using Inspection IMC 0609, "Significance Determination Process," Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance (Green) because it did not represent an actual loss of safety function of a single Train for greater than its TS allowed outage time. Specifically, the TS allowed outage time for one train of the SW system is 72 hours. The inspectors considered whether or not there was a time period of greater than 72 hours during which the 'B' train did not have the required two SWPs aligned in an operable condition. The inspectors concluded that since the 2C and 2D SWPs were aligned to the 'B' SW train during the time period from when the 2E SWP was secured on July 27, 2009, throughout the subsequent failure and replacement of the 2E SWP, the above Phase 1 criterion for very low safety significance (Green) was met.

No cross-cutting aspect was identified since the issue was not reflective of current licensee performance, in that the performance deficiency occurred in 2006.

Enforcement. 10 CFR Part 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," requires, in part, that measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. Contrary to this, from April 27, 2006, through August 15, 2009, the licensee failed to establish measures to assure that purchased equipment conformed to the procurement documents. The failure to assure that the 2E SWP installed on November 22, 2006, conformed to the purchase order requirement for minimum rotor critical speed resulted in an increased susceptibility of the SWP to resonant vibration, which was a factor that contributed to the failure that occurred on August 15, 2009. Because the finding was of very low safety significance and has been entered into the licensee's CAP as CR 2009110325, this violation is being treated as an NCV, consistent with Section VI.A of the Enforcement Policy: NCV 05000364/2010007-01, "Inadequate Controls for Service Water Pump Procurement."

.4 Assessment of operability evaluation for the remaining service water pumps. (Charter Item 4)

a. Inspection Scope

The team reviewed the licensee's root cause evaluation and operability evaluation for the SW pumps that remain in service. The team also reviewed system health reports, condition reports, work orders, and interviewed system engineers to assess the determination of operability for the service water system. The team also performed a walkdown of selected portions of the service water system, including the service water intake structure.

b. Findings and observations

No findings were identified. The licensee's evaluation noted that the potential exists for the conditions which contributed to the degradation and failure of the 2E SWP to be present in 5 of the 10 SWPs currently in service which are of the same design. Specifically, the identified factors/conditions which could affect the likelihood of pump failure were: the pump wear ring design and installation resulted in unusually high hoop stress being present, the potential for degradation of shaft bearing journal coatings and bearings, and the susceptibility to resonant vibration due to structural natural frequencies at or near normal pump running speed and the potential for minor misalignments, imbalances, and/or manufacturing tolerances to result in forcing functions at running speed.

The licensee's evaluation considered that conditions sufficient to cause pump failure due to wear ring fracture would be the result of bearing damage caused by degradation of pump shaft bearing journal coatings, and that the initial stages of degradation of this nature can be observed and trended by monitoring the characteristics of the current being drawn by the pump motor. The licensee's evaluation concluded that the pumps are considered non-conforming on the basis that they are of the same design and therefore susceptible to the same type of failure as the failed 2E SWP due to the factors that are associated with the same design and manufacturing processes, but that they remain operable until/unless the onset of any actual degradation is detected.

The inspectors concluded that the licensee's current assessment of the condition of the SW pumps as being operable but non-conforming is valid on the basis that the capability to detect the onset of abnormal degradation is in place in the form of motor current monitoring described in the next section of this report, and that reasonable assurance exists that the pumps remain capable of performing their design basis safety function in the absence of any such indications of degradation. The inspectors did not identify any additional issues which would pose a challenge to the current operability of the SW system.

.5 Assessment of reviews, preventative maintenance, or evaluations developed to support continued operation of the service water pumps. (Charter Item 5)

a. Inspection Scope

The team reviewed the licensee's actions and basis for continued operation of the current SW pumps to meet TS requirements. The inspectors interviewed engineering personnel and reviewed the licensee's operability determination for the SWPs that remain in service.

b. Findings and observations

No findings were identified. The licensee's determination that the SWPs remain in an operable condition is based on a motor current signature analysis (MCSA) monitoring technique, which involves analyzing the profile of the current being drawn by the pump

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motor across a frequency spectrum in addition to tracking overall amperage. This method allows for the detection of mechanical faults which result in variations in shaft torque in the form of “sideband” frequency peaks in the motor current signature profile. The sensitivity of this monitoring method is such that small perturbations in motor torque (as might result from interaction of shaft bearings with degrading journal coatings) result in visible indications on the current profile, which is sensitive to indications on the order of tenths of an amp. Based on this, the licensee’s evaluation concluded that the initial stages of any abnormal pump degradation would be detectable via this monitoring method, and that daily evaluation of motor current data would allow for the detection of any problems prior to pump operability being challenged.

This monitoring technique has been implemented since November 2009. No current abnormal/degraded conditions are indicated with the data now available. In March 2010, the 2D SWP which was installed in July 2007 was removed and disassembled for evaluation of its condition, since it was the next oldest (after the failed 2E SWP) of the 5 replacement design pumps that were installed. The inspectors observed the condition of the pump shaft bearings as well as other pump components following disassembly at the vendor’s facility. The bearings were in generally good condition with no signs of abnormal wear. The shaft bearing journal coatings also did not exhibit any visible signs of abnormal wear or degradation.

The inspectors also noted that the licensee has planned to replace the pump shafts and wear rings on the 5 subject SWPs with re-coated shaft bearing journals and improved wear ring hoop stresses by November 2010. The inspectors concluded that the actions and evaluations developed by the licensee to support continued operation of the SW system are adequate to meet TS requirements.

.6 Evaluation of any correlation between the seismic ring degradation and the 2E SWP failure. (Charter Item 6)

a. Inspection Scope

The inspectors reviewed design drawings, condition reports, station log entries, and root cause reports, and interviewed station personnel involved with the seismic ring degradation issue that preceded the pump failure to evaluate any potential correlation. The inspectors independently discussed the issue with licensee engineering personnel as well as pump vendor engineers.

b. Findings and observations

No findings of significance were identified. Both licensee and vendor root cause evaluations did not identify the seismic ring degradation as a contributing cause for the pump failure. Both licensee and vendor engineers expressed that the condition of the seismic ring did not have the potential to adversely affect pump operation or cause degradation in the pump which led to its failure. The team concluded that the seismic ring degradation was most likely not a factor which contributed to the pump failure. A Green NCV associated with the licensee’s failure to adequately monitor the condition of

Enclosure

the seismic support rings was previously documented in NRC Inspection Report 05000348/2009005 and 05000364/2009005.

.7 Evaluate the need for additional inspection activities at the vendor facilities. (Charter Item 7)

The licensee's root cause evaluation determined that the causes which contributed to the failure included vendor design and manufacturing issues such as material selection and interference fit parameters associated with the pump wear rings, inadequate commercial grade dedication evaluation and control associated with the process of coating the pump shafts at the bearing journal locations (a process which was sub-contracted by the pump vendor to a sub-vendor), and failure to meet the design specification for minimum rotor critical speed. Based on these conditions that were identified to have been contributing causes for the failure, in addition to the Part 21 notification issued by the vendor relative to the defective shaft coating, the team concluded that additional inspection at the vendor facilities was warranted.

The team collaborated with the NRC's Office of Nuclear Reactor Regulation (NRR) Quality and Vendor Branch (EQVB) regarding the need for additional inspection at the vendor facilities, including input as to the scope of vendor inspection activities. The lead inspector and Region II Branch Chief accompanied the EQVB inspection team at the vendor location during the week of March 22, 2010. The results of this inspection are documented in NRC Inspection Report 99901361/2010-201.

.8 Collect data necessary to support completion of the significance determination process. (Charter Item 8)

The inspectors interviewed licensee personnel and reviewed operations logs, licensee procedures, corrective action program documents, work orders, root cause evaluations, operability assessments, and engineering evaluations to gather data necessary to develop and assess the safety significance of any findings. The basis for the significance of one self-revealing non-cited violation is listed in section 4OA5.3 of this report.

.9 Identify any potential generic safety issues and make recommendations for appropriate follow-up action (e.g., Information Notices, Generic Letters, Bulletins). Review the related Part 21 concerning the Farley SW pump issue. (Charter Item 9)

a. Inspection Scope

The inspectors reviewed the licensee's root cause evaluation including relevant operating experience, corrective action program documents, work orders, and the NRC Operating Experience (OpE) database to determine the potential for generic safety issues related to the degraded conditions and causes pertaining to this event. The inspectors also reviewed the Part 21 report submitted by the vendor concerning the failure of the Farley 2E SWP due to degraded pump shaft journal coatings.

Enclosure

b. Findings and observations

No findings of significance were identified. Based on the information reviewed, the inspectors did not identify the potential for any additional generic safety issues beyond the scope of the information already promulgated with Revision 1 to the Part 21 notification dated February 1, 2010, which identified other licensees where a similar shaft coating condition may exist.

4OA6 Exit Meeting

On April 23, 2010, the special inspection team leader presented the preliminary inspection results to Mr. Randy Johnson, Farley Nuclear Plant Vice President, and members of his staff. The licensee acknowledged the inspection finding. The inspectors confirmed that no proprietary information was retained.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Achilles, Fleet Oversight
A. DeVilliers, Mechanical Equipment Reliability (Vibration)
G. Dykes, Service Water Pump Replacement Project Lead
K. Glandon, Equipment Reliability
B. Griner, Engineering Support Manager
R. Johnson, Site Vice President
T. Long, Equipment Reliability Manager
H. Mahan, Principal Licensing Engineer
S. Piedra, Fleet Oversight
C. Thornell, Engineering Director
T. Youngblood, Plant Manager

NRC Personnel

S. Shaeffer, Chief, Reactor Projects Branch 2, Division of Reactor Projects Region II
E. Crowe, Senior Resident Inspector, Farley Nuclear Plant
G. MacDonald, Senior Reactor Analyst

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

NCV 05000364/2010007-01	NCV	Inadequate Controls for Service Water Pump Procurement (Section 4OA5.3)
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Closed

None.

Opened

None.

Discussed

None.

LIST OF DOCUMENTS REVIEWED

Procedures

NMP-FO-201, "Supplier Quality Program Evaluation," version 2.0
NMP-FO-202, "Supplier Safety-Related Program Audits," version 1.0
NMP-FO-201, "Supplier Commercial Program Surveys," version 1.0
NMP-FO-201, "Supplier Audit/Survey Report Review," version 1.0
SCM-005, "Warehouse Operations," version 22.0
NMP-AD-012-F01, "Prompt Determination of Operability," version 2.0
FNP-2-STP-24.2, "2C, 2D, and 2E Service Water Pump Quarterly Inservice Test," version 54.0
ENG-009, "Engineering Procurement Request Process," version 3.0
NMP-GM-005-GL06, "Engineering Human Performance Tools," version 3.0
DS-PE-005, "Determining Acceptance Methods and Receipt Inspection Requirements," version 3.0
NMP-ES-048, "Engineering Procurement Request Process," version 1.0
NMP-GM-011, "Procurement, Receipt, and Control of Materials and Services," version 5.0

Corrective Action Documents

CR 2009109700, 2E SWP clanging noise
CR 2009111997, 2E SWP seismic ring degraded condition
CR 2009110325, 2E SWP failure
CR 2009110658, 2E SWP seismic ring contacted during pump installation
CR 2010103216, 2D SWP bearings swollen
CR 2009100116, Lack of vendor critical speed analysis

Work Orders

2072375301, 2C, 2D, 2E SWP quarterly inservice test
2051571403, Replace 2E SWP
2063307701, 2E SWP

Drawings

Johnston Turbine Pumps 40374-AN, "Bracket – 27" Pump Support – Wall Plate"
Johnston Turbine Pumps 40373-AN, "Ring – 27" Pump Support"
Sulzer Pumps (US) Inc. A74525, "Bearing, Stuffing Box"
Sulzer Pumps (US) Inc. A74524, "Throttle Bushing"
Sulzer Pumps (US) Inc. B52942, "Head Shaft"
Sulzer Pumps (US) Inc. A74526, "Bearing, Column"
Sulzer Pumps (US) Inc. A74693, "Bearing, Top Bowl"
Sulzer Pumps (US) Inc. A74529, "Bearing, Bottom Bowl"
Sulzer Pumps (US) Inc. A74537, "Bearing, Suction Bell"
Sulzer Pumps (US) Inc. B52948, "Pump Shaft"
Sulzer Pumps (US) Inc. B52944, "Line Shaft"

Miscellaneous

Sulzer Pumps (US) Inc., "Root Cause Determination and Corrective Actions for '2E' SW Pump Failure," Revision 2
Sulzer "Installation Operation and Maintenance Manual," Alabama Power Co., Farley Nuclear Plant, Service Water Pump Unit 2, Serial Number 08C02145/49

SNC Purchase Order QP060449

Sulzer Purchase Order 08407976

EPRI NP-7413, "Deep Draft Vertical Centrifugal Pump Maintenance and Application Guide"

FM-S-05-001, "Specification for Replacement Service Water Pumps for Joseph M. Farley

Nuclear Plant – Unit No. 1 and 2," version 1.0