



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

July 19, 2017

Ms. Tanya Hamilton
Site Vice President
Shearon Harris Nuclear Power Plant
M/C HNP01
New Hill, North Carolina 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT – NRC INTEGRATED
INSPECTION REPORT 05000400/2017002

Dear Ms. Hamilton:

On June 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Shearon Harris Nuclear Power Plant, Unit 1. On July 12, 2017, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any finding or violation of more than minor significance.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Phillip K. Niebaum, Acting Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket No.: 50-400
License No.: NPF-63

Enclosure:
IR 05000400/2017002
w/Attachment: Supplemental Information

cc: Distribution via ListServ

T. Hamilton

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SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT – NRC INTEGRATED
INSPECTION REPORT 05000400/2017002 July 19, 2017

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REGION II

Docket No.: 50-400

License No.: NPF-63

Report No.: 05000400/2017002

Licensee: Duke Energy Progress, Inc.

Facility: Shearon Harris Nuclear Power Plant, Unit 1

Location: 5413 Shearon Harris Road
New Hill, NC 27562

Dates: April 1, 2017 through June 30, 2017

Inspectors: J. Zeiler, Senior Resident Inspector
D. Retterer, Acting Senior Resident Inspector
A. Patz, Resident Inspector
J. Dodson, Senior Project Engineer (Section 40A2)

Approved by: Phillip K. Niebaum, Acting Chief
Reactor Projects Branch 4
Division of Reactor Projects

Enclosure

SUMMARY

Integrated Inspection Report 05000400/2017002; April 1, 2017, through June 30, 2017; Duke Energy Progress, Inc., Shearon Harris Nuclear Power Plant, Unit 1.

The report covered a three-month period of inspection by resident inspectors and a senior project engineer. The NRC's program for overseeing the safe operations of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6. No findings or violations of greater than minor significance were identified.

REPORT DETAILS

Summary of Plant Status

Unit 1: The plant operated at or near 100 percent rated thermal power for the entire inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 2 samples)

a. Inspection Scope

.1 Summer Readiness of Offsite and Alternate AC Power System

The licensee did not implement equipment or procedure changes that potentially affect operation or reliability of offsite and alternate AC power systems since the last time the inspectors assessed grid reliability. The inspectors reviewed the material condition of offsite and onsite alternate AC power systems including switchyard and transformers by performing a walkdown of these areas. The inspectors reviewed the corrective action program (CAP) database to ensure that switchyard and transformer related degraded conditions were being adequately identified and resolved. Documents reviewed are listed in the Attachment.

.2 Seasonal Extreme Weather Conditions

The inspectors conducted a detailed review of the station's adverse weather procedures written for extreme high temperatures. The inspectors verified that weather-related equipment deficiencies identified during the previous year had been placed into the work control process and/or corrected before the onset of seasonal extremes. The inspectors evaluated the licensee's implementation of adverse weather preparation procedures and compensatory measures before the onset of and during seasonal extreme weather conditions. Documents reviewed are listed in the Attachment.

The inspectors evaluated the following risk-significant systems:

- 'A' and 'B' switchgear room heating, ventilation, and air-conditioning (HVAC) systems
- 'A' and 'B' emergency diesel generator (EDG) building HVAC systems

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04 – 5 samples)

a. Inspection Scope

.1 Partial Walkdown

The inspectors verified that critical portions of the selected systems were correctly aligned by performing partial walkdowns. The inspectors selected systems for

assessment because they were a redundant or backup system or train, were important for mitigating risk for the current plant conditions, had been recently realigned, or were a single-train system. The inspectors determined the correct system lineup by reviewing plant procedures and drawings. Documents reviewed are listed in the Attachment.

The inspectors selected the following systems or trains to inspect:

- 'B' EDG during 'A' EDG system maintenance
- Containment cooling system during containment cooling air handling unit AH-4 system maintenance
- 'B' essential services chilled water (ESCW) system during 'A' ESCW system maintenance
- 'B' containment spray (CS) system during 'A' CS system maintenance

.2 Complete Walkdown

The inspectors verified the alignment of the high head safety injection system. The inspectors selected this system for assessment because it is a risk-significant mitigating system. The inspectors determined the correct system lineup by reviewing plant procedures, drawings, the updated final safety analysis report (UFSAR), and other documents. The inspectors reviewed records related to the system's outstanding design issues, maintenance work requests, and deficiencies. The inspectors verified that the selected system was correctly aligned by performing a complete walkdown of accessible components.

The inspectors observed whether there was indication of degradation, and if so, verified degradation was being appropriately managed in accordance with an aging management program, if applicable, and it had been entered into the licensee's CAP at the appropriate threshold.

To verify the licensee was identifying and resolving equipment alignment discrepancies, the inspectors reviewed corrective action documents, including condition reports and outstanding work orders. The inspectors also reviewed periodic reports containing information on the status of risk-significant systems, including maintenance rule reports and system health reports. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05Q – 5 samples)

a. Inspection Scope

Quarterly Inspection

The inspectors evaluated the adequacy of selected fire plans by comparing the fire plans to the defined hazards and defense-in-depth features specified in the fire protection program. In evaluating the fire plans, the inspectors assessed the following items:

- control of transient combustibles and ignition sources
- fire detection systems

- water-based fire suppression systems
- gaseous fire suppression systems
- manual firefighting equipment and capability
- passive fire protection features
- compensatory measures and fire watches
- issues related to fire protection contained in the licensee's CAP

The inspectors toured the following fire areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the Attachment.

- 'A' and 'B' emergency service water (ESW) pump room (fire zone 12-I-ESWPA/B)
- Reactor auxiliary building (RAB) HVAC room (fire zone 12-A-6-HV7)
- RAB HVAC equipment area (fire zone 12-A-7-HV)
- 'A' and 'B' essential switchgear and battery rooms (fire zones 1-A-SWGRA, 1-A-BATA, 1-A-SWGRB, 1-A-BATB)
- 'A' and 'B' residual heat removal (RHR) and CS pump rooms (fire zones 1-A-1-PA and 1-A-1-PB)

b. Findings

Introduction: An unresolved item (URI) was identified by the inspectors during the walkdown of the 'A' and 'B' RHR and CS pump rooms, involving the use of unapproved non-fire retardant plastic sheeting to contain contamination on the 'A' RHR piping. Additionally, the inspectors identified that the fire pre-plan for fire brigade response delineates a hose station that did not contain adequate fire hose length.

Description: The inspectors identified two issues of concern during the fire protection walkdown of the 'A' and 'B' RHR and CS pump rooms as follows:

- 1) Use of Unapproved Plastic for Contamination Control: The inspectors noted that an approximately 30 foot section of the 'A' RHR pump suction piping had been wrapped with multiple layers of plastic sheeting materials that included radiation protection yellow "Caution – Radioactive Materials" stamped plastic sheeting overlaid with clear stretch wrap plastic. The section of RHR piping where this plastic was installed included the motor-operated RHR suction valves from the containment recirculation sump (valve 1SI-310) and the refueling water storage tank supply (valve 1SI-322). The inspectors were concerned that these valves could be adversely impacted from a potential fire involving this plastic material. The inspectors questioned whether this plastic was fire retardant material or had been evaluated and allowed under the licensee's transient combustible control procedure. The licensee subsequently determined that none of the plastic material was fire retardant or met the requirements of National Fire Protection Association (NFPA) 701, "Standard Methods of Fire Tests for Flame Propagation of Textiles and Films," and no previous transient combustible evaluation could be found that allowed the use of the non-fire retardant plastic in the RHR pump room. In addition, radiation protection personnel indicated that there could be other areas where this plastic was used since it was a typical practice to use the material to prevent the spread of contamination from leaking piping connections, valves, and valve packing. The licensee subsequently removed the plastic from the 'A' RHR piping and initiated NCR 02132781 to evaluate this issue of concern.

- 2) Inadequate Fire Hose Length in Hose Station Described in Fire Pre-Plan: During review of the fire pre-plan procedure (FPP-012-02-RAB190-216) for the 'A' and 'B' RHR/CS pump rooms on the RAB 190' elevation, the inspectors noted that the procedure described two fire hose stations intended to be used during fire brigade response for a fire in either of the pump rooms. These two hose stations were the respective hose stations located just inside the access door to each of the two RHR/CS pump rooms. The procedure states that an extra 100 feet of hose would be needed to account for the additional distance for the hose from the opposite train pump room. However, the inspectors identified that even with the extra 100 feet added to the existing 100 feet that is already in each hose station, there would still not be adequate length for this second hose to reach the opposite train pump room with the fire. The inspectors measured the actual distance between the two locations and estimated the hose would have to be over 300 feet in length in order to be effective in fighting a fire in either of the rooms. A separate hose station on the 216' RAB elevation may provide adequate backup coverage. However, the inspectors were concerned that the issue with the fire pre-plan hose station use could cause confusion or pose an unnecessary delay in fire brigade response for a fire in either of the rooms. The licensee subsequently initiated NCR 02134163 to evaluate this issue of concern.

Pending completion of additional evaluations needed to determine whether the above issues of concern represented performance deficiencies and if so, whether the performance deficiencies were of more than minor significance, this issue is identified as URI 05000400/2017002-01, Evaluate Fire Protection Discrepancies in RHR/CS Pump Rooms.

1R11 Licensed Operator Regualification Program and Licensed Operator Performance (71111.11 – 2 samples)

a. Inspection Scope

.1 Resident Inspector Quarterly Review of Licensed Operator Regualification

On April 19, 2017, the inspectors observed a simulator scenario conducted for training of an operating crew for regualification. The training scenario included operator response to a leaking primary power operated relief valve as well as response to a loss of feed water and anticipated transient without scram (ATWS).

The inspectors assessed the following:

- licensed operator performance
- the ability of the licensee to administer the scenario and evaluate the operators
- the quality of the post-scenario critique
- simulator performance

Documents reviewed are listed in the Attachment.

.2 Resident Inspector Quarterly Review of Licensed Operator Performance in the Actual Plant/Main Control Room

On June 21, 2017, the inspectors observed licensed operator performance in the main control room during removal of the 'A' EDG from service to perform a scheduled barring evolution that verified the engine cylinders were free of moisture accumulation.

The inspectors assessed the following:

- use of plant procedures
- control board manipulations
- communications between crew members
- use and interpretation of instruments, indications, and alarms
- use of human error prevention techniques
- documentation of activities
- management and supervision

Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12 – 2 samples)

a. Inspection Scope

The inspectors assessed the licensee's treatment of the issues listed below to verify the licensee appropriately addressed equipment problems within the scope of the maintenance rule (10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"). The inspectors reviewed procedures and records to evaluate the licensee's identification, assessment, and characterization of the problems as well as their corrective actions for returning the equipment to a satisfactory condition. Documents reviewed are listed in the Attachment.

- NCR 02070031, Motor breaker for 2&3B-SB spent fuel pool cooling pump tripped on attempted start
- NCR 02064857, Actuator casing rupture on ESW auxiliary reservoir suction valve 1SW-3

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 samples)

a. Inspection Scope

The inspectors reviewed the maintenance activities listed below to verify that the licensee assessed and managed plant risk as required by 10 CFR 50.65(a)(4) and licensee procedures. The inspectors assessed the adequacy of the licensee's risk assessments and implementation of risk management actions. The inspectors also verified that the licensee was identifying and resolving problems with assessing and managing maintenance-related risk using the CAP. Additionally, for maintenance resulting from unforeseen situations, the inspectors assessed the effectiveness of the licensee's planning and control of emergent work activities. Documents reviewed are listed in the Attachment.

- April 4, 2017, Tornado watch during a 24-hour run of 'B' EDG (Green Risk)
- April 18, 2017, 'A' EDG system outage (Green Risk)
- May 4, 2017, 'B' solid state protection system testing (Green Risk)
- May 30, 2017, 'B' ESCW system outage (Green Risk)
- June 19, 2017, 'A' CS system outage (Green Risk)

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 5 samples)

a. Inspection Scope

Operability and Functionality Review

The inspectors selected the operability determinations or functionality evaluations listed below for review based on the risk-significance of the associated components and systems. The inspectors reviewed the technical adequacy of the determinations to ensure that technical specification (TS) operability was properly justified and the components or systems remained capable of performing their design functions. To verify whether components or systems were operable, the inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee's evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

- NCR 02112651, Control room emergency filtration heater failed surveillance
- NCR 02115471, ERFIS calorimetric failure due to power supply ripple
- NCR 02115784, EDG building exhaust fan belt is cracked
- NCR 02124014, 'B' ESCW chiller tripped during start on overcurrent
- NCR 02130286, Pressurizer level indication (LI-460) approaching 5 percent deviation limit

b. Findings

Introduction: The inspectors opened a URI to facilitate the completion of inspection and determination of whether a performance deficiency was associated with the start failure of the 'B' ESCW chiller on May 13, 2017.

Description: On May 13, 2017, while attempting to start the 'B' ESCW chiller, the motor compressor immediately tripped on 'C' phase instantaneous overcurrent relay actuation. The chiller was declared inoperable and immediate troubleshooting was conducted to determine the cause of the trip. The licensee's initial investigation did not identify any electrical or mechanical issues with the compressor motor, supply breaker and electrical bus, or other chiller control components. While the calibration of the 'C' phase instantaneous overcurrent relay was checked and found to be within specification, the licensee determined the most probable cause of the trip was an intermittent failure of this relay. The relay was replaced and subsequent post-maintenance testing of the chiller

was successfully performed without any other chiller operational problems being identified. The chiller was returned to operability early May 14, 2017, following the completion of this post-maintenance testing. At the end of the inspection period, the licensee's investigation into the cause of the start failure had just completed. A URI is being opened for the NRC to review the licensee's failure analysis and causal evaluation to determine whether the chiller start failure was reasonably within the licensee's ability to predict or prevent and therefore a performance deficiency. This issue is being tracked as URI 05000400/2017002-02, 'B' ESCW Chiller Failure to Start.

1R18 Plant Modifications (71111.18 – 1 sample)

a. Inspection Scope

The inspectors verified that the plant modification listed below did not affect the safety functions of important safety systems. The inspectors confirmed the modification did not degrade the design bases, licensing bases, and performance capability of risk significant structures, systems and components. The inspectors also verified modification performed during plant configurations involving increased risk did not place the plant in an unsafe condition. Additionally, the inspectors evaluated whether system operability and availability, configuration control, post-installation test activities, and changes to documents, such as drawings, procedures, and operator training materials, complied with licensee standards and NRC requirements. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with modification. Documents reviewed are listed in the Attachment.

- Engineering Change (EC) 408116, Evaluate replacement voltage suppression diode for EDG unit parallel relay

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 7 samples)

a. Inspection Scope

The inspectors either observed post-maintenance testing or reviewed the test results for the maintenance activities listed below to verify the work performed was completed correctly and the test activities were adequate to verify system operability and functional capability.

- WO 13542229, Replace 'B' EDG Air Accumulator Relief Valve with spare, April 5, 2017
- WO 20156439, Replace EDG Unit Parallel Relay Coil Diode Surge Suppressor, April 3, 2017
- WO 20022990, MPT-I0479 Diesel Generator 1A-SA Engine Control Panel Pneumatic Pressure Instrument Calibration, April 20, 2017
- WO 20161969, 1C Accumulator Containment Isolation Valve Inoperable, May 4, 2017
- WO 20166122, Perform Motor Testing in Accordance with MNT-NGG-C0013, May 14, 2017

- WOs 20109983, 20109985, and 20116522, 'B' EDG sequencer relay calibrations, May 23, 2017
- WO 13482634, 'A' CS pump motor inspections, June 19, 2017

The inspectors evaluated these activities for the following:

- Acceptance criteria were clear and demonstrated operational readiness
- Effects of testing on the plant were adequately addressed
- Test instrumentation was appropriate
- Tests were performed in accordance with approved procedures
- Equipment was returned to its operational status following testing
- Test documentation was properly evaluated

Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with post-maintenance testing. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 4 samples)

a. Inspection Scope

The inspectors reviewed the surveillance tests listed below and either observed the test or reviewed test results to verify testing adequately demonstrated that the affected SSCs remained capable of performing the intended safety functions (under conditions as close as practical to design bases conditions or as required by TSs) and maintained their operational readiness.

The inspectors evaluated the test activities to assess for preconditioning of equipment, procedure adherence, and equipment alignment following completion of the surveillance. Additionally, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with surveillance testing. Documents reviewed are listed in the Attachment.

Routine Surveillance Tests

- Operations Surveillance Test (OST)-1011, Auxiliary Feedwater System Operability

In-Service Tests (IST)

- OST-1104, Containment Isolation Inservice Inspection Valve Test
- OST-1040, Essential Services Chilled Water Systems Operability Quarterly Interval Modes 1-6

Reactor Coolant System Leak Detection

- OST-1026, Reactor Coolant System Leakage Evaluation

b. Findings

No findings were identified.

4. OTHER ACTIVITIES4OA1 Performance Indicator Verification (71151 – 3 samples)a. Inspection Scope

The inspectors reviewed a sample of the performance indicator (PI) data, submitted by the licensee, for the Unit 1 PIs listed below. The inspectors reviewed plant records compiled between April 2016 and March 2017 to verify the accuracy and completeness of the data reported for the station. The inspectors verified that the PI data complied with guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Performance Indicator Guideline," and licensee procedures. The inspectors verified the accuracy of reported data that were used to calculate the value of each PI. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with PI data. Documents reviewed are listed in the Attachment.

Cornerstone: Mitigating Systems

- safety system functional failures

Cornerstone: Barrier Integrity

- reactor coolant system leak rate
- reactor coolant system specific activity

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 2 samples).1 Routine Review

The inspectors screened items entered into the licensee's CAP to identify repetitive equipment failures or specific human performance issues for follow-up. The inspectors reviewed condition reports, attended screening meetings, or accessed the licensee's computerized corrective action database.

.2 Annual Follow-up of Selected Issuesa. Inspection Scope

The inspectors conducted a detailed review of the following condition reports:

- NCR 02068223, Reactor trip and safety injection actuation during turbine generator mechanical overspeed trip testing
- NCR 02112651, 'A' control room emergency filtration unit inlet duct heater failure to meet kilowatt acceptance criteria during surveillance testing

NCR 02068223 was selected for review since events involving reactor trips and safety injection actuations represent significant plant transients that can pose challenges to safe and reliable plant operations. NCR 02112651 was selected for review based on the safety importance of the control room ventilation systems.

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors reviewed issues entered in the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on repetitive ESCW equipment issues, but also considered the results of inspector daily condition report screenings, licensee trending efforts, and licensee human performance results. The review nominally considered the 6-month period of January 2017 through June 2017, although some examples extended beyond those dates when the scope of the trend warranted. The inspectors compared their results with the licensee's analysis of trends. Additionally, the inspectors reviewed the adequacy of corrective actions associated with a sample of the issues identified in the licensee's trend reports. The inspectors also reviewed corrective action documents that were processed by the licensee to identify potential adverse trends in the condition of structures, systems, and/or components as evidenced by acceptance of long-standing non-conforming or degraded conditions. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified. However, the inspectors noted that the licensee continues to be challenged by equipment performance issues with the ESCW chillers as demonstrated by the following list of issues documented in the CAP between 2016 and 2017:

- NCR 02046128, July 15, 2016, trip of the 'A' ESCW chiller on low oil pressure due to oil leakage from a vibration induced failure of a threaded oil tubing connection to an oil pressure instrument

- NCR 02047870, July 22, 2016, trip of the 'A' ESCW chiller on low oil pressure due to failure of the same oil tubing connection that occurred on July 15, 2016
- NCR 02056715, August 25, 2016, trip of the 'A' ESCW chiller due to binding of the pre-rotational valve actuator linkage
- NCR 02065594, September 26, 2016, trip of the 'A' ESCW chiller on low oil pressure due to excessive oil foaming
- NCR 02124014, May 13, 2017, trip on start of the 'B' ESCW chiller on instantaneous overcurrent protection relay

The inspectors noted that as a result of these performance issues with the 'A' ESCW chiller, the licensee had appropriately determined that it had exceeded its maintenance rule reliability criteria and the chiller was moved into maintenance rule (a)(1) monitoring status as of September 29, 2016. Subsequently, licensee management directed that a chiller improvement team be established in order to develop and implement a chiller reliability improvement plan to examine chiller system operation and maintenance to identify areas to improve the chiller reliability. This improvement plan was implemented in March 2017 and focused on identifying and resolving chiller compressor oil foaming and excessive chiller vibration issues that occur, especially during hot weather periods. The inspectors determined that the licensee was taking appropriate actions to address the adverse trend in chiller performance, however, the latest trip of the 'B' ESCW chiller on May 13, 2017, was indicative that continued challenges still persist. The inspectors will continue to monitor licensee actions to address ESCW chiller reliability issues.

4OA3 Follow-up of Events (71153 – 2 samples)

.1 (Closed) Licensee Event Report (LER) 05000400/2016002-00, 'A' Essential Services Chilled Water Chiller Trip due to Oil Leak from Failed Tube Fitting

On September 19, 2016, the licensee submitted a LER documenting the July 22, 2016, trip of the 'A' ESCW chiller on low oil pressure due to oil leakage from a brass tubing connection on an oil pressure differential sensing line to the lubrication system. This sensing line and fitting was replaced on July 15, 2016, following identification of the leakage. The licensee reported the event as a condition prohibited by TS since the 'A' ESCW was considered inoperable from July 15 through July 22, which exceeded the allowed 72-hour TS limiting condition for operation outage time. The licensee determined the cause of the fitting leakage was vibration-induced cyclic stress-driven fatigue cracking with stress corrosion cracking having a secondary role. This LER was entered into the licensee's CAP as NCR 02047870. The inspectors verified the accuracy of the LER and NCR, the adequacy of the licensee's causal evaluation, and the appropriateness of completed and proposed corrective actions. The NRC previously reviewed the circumstances of this event as part of the closeout of an URI in Section 4OA5 of NRC Inspection Report 05000400/2016004. No additional findings were identified during review of this LER. This LER is closed.

.2 (Closed) LER 05000400/2015005-00, Unrecognized Impact of Opening of Barrier Doors on High Energy Line Break Analysis

On August 17, 2015, the licensee submitted a LER documenting NRC inspector identification of the uncontrolled opening of two doors from the RAB and main steam tunnel during a planned maintenance activity. Unbeknownst to the personnel opening the doors, this hazard barrier was credited with being secured in the high energy line break (HELB) and internal flooding analysis during power operations. This barrier prevents potentially harsh environment conditions in the main steam tunnels during

steam line or feedwater piping break events from adversely impacting important equipment in the RAB. The licensee determined the cause of the event was engineering failure to develop and implement control measures for hazard barriers credited for mitigating HELB events. This LER was entered into the licensee's CAP as NCR 754721. The inspectors verified the accuracy of the LER and NCR, the adequacy of the licensee's causal evaluation, and the appropriateness of completed and proposed corrective actions. The enforcement aspects associated with the performance deficiency leading to the original event is documented in Section 4OA2.1 of NRC inspection report 05000400/2015003. A subsequent event involving the uncontrolled opening of a flood barrier (floor plug) was identified by the licensee on March 22, 2017, following implementation of corrective actions from the original event. The enforcement aspects associated with this incident are documented in Section 4OA7 of NRC inspection report 05000400/2017001. The inspectors reviewed the adequacy of the actions taken for this second incident documented in NCR 02110596. While the actual safety impact from this second incident were minimal, the licensee conducted a re-evaluation of the adequacy of the corrective actions from the original event and identified numerous immediate and planned actions to address the enhancement of controls for opening HELB and flood barriers. No additional findings were identified during review of this LER. This LER is closed.

4OA6 Meetings, Including Exit

On July 12, 2017, the resident inspectors presented the inspection results to Ms. Tanya Hamilton, Site Vice President, and other members of the licensee's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

L. Faulk, Director, Plant Security
P. Fisk, Plant Manager
D. Griffith, Manager, Training
T. Hamilton, Site Vice President
B. Jones, Director, Organizational Effectiveness
J. Keltner, Manager, Chemistry
B. McCabe, Manager, Nuclear Oversight
T. Mitchell, Manager, Maintenance
S. O'Connor, General Manager, Engineering
M. Parker, Manager, Radiation Protection
J. Robertson, Manager, Regulatory Affairs
S. Scott, Operations Manager
G. Simmons, Manager, Emergency Planning
F. Womack, Senior Project Director, Major Projects

NRC personnel

P. Niebaum, Acting Chief, Reactor Projects Branch 4, Division of Reactor Projects, Region II

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000400/2017002-01	URI	Evaluate Fire Protection Discrepancies in RHR/CS Pump Rooms (Section 1R05)
05000400/2017002-02	URI	'B' ESCW Chiller Failure to Start (Section 1R15)

Closed

05000400/2016002-00	LER	'A' Essential Services Chilled Water Chiller Trip due to Oil Leak from Failed Tube Fitting (Section 4OA3.1)
05000400/2015005-00	LER	Unrecognized Impact of Opening of Barrier Doors on High Energy Line Break Analysis (Section 4OA3.2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Summer Readiness of Offsite and Alternate AC Power System

NGGM-IA-0003, Transmission Interface Agreement for Operation, Maintenance, and Engineering Activities at Nuclear Plants
IA-EG-ALL-0002, Plant Side Distribution Interface Agreement
AD-WC-ALL-0101, Nuclear Generation Department Generation Planning and Communications
AD-WC-ALL-0260, Nuclear Generation Response to High or Low Grid System Load
AOP-028, Grid Stability
OP-156.02, AC Electrical Distribution
NCR 02132251, Main Transformer "C" phase fast pressure rise channel found in alarm by NRC
NCR 02111973, Changes to transmission interface agreement involving switchyard
NCR 02045803, Startup transformer 1A and 1B dissolved combustible gas increase in sample results
NCR 02042513, Debris in switchyard following storm

Seasonal Extreme Weather Conditions

AP-301, Seasonal Weather Preparations and Monitoring
AD-WC-ALL-0230, Seasonal Readiness
EC 290494, Replacement of Automatic Voltage Regulator
NCR 02082728, 'A' Switchgear Room increasing temperature trend on 11/29/16
NCR 02017582, Both Hot Machine Shop Cooling Units are Out of Service
NCR 02026922, Unexpected Alarm ALB-021/8-5 Computer Alarm Circ Wtr Systems

Section 1R04: Equipment Alignment

Partial System Walkdown

OP-169, Containment Cooling and Ventilation System
CAR-2168-G-517, HVAC Air Flow Diagram, Containment Building
OP-155, Diesel Generator Emergency Power System
OP-148, Essential Services Chilled Water System
OP-112, Containment Spray System

Complete System Walkdown

OP-110, Safety Injection System
Design Basis Document (DBD)-104, Safety Injection System
Drawing 2165-S-5-G-0808, Flow Diagram Safety Injection System, Sheets 1-3
UFSAR Section 6.3, Emergency Core Cooling Systems

Section 1R05: Fire Protection

FPP-001, Fire Protection Program Manual
FPP-013, Fire Protection – Minimum Requirements, Mitigating Actions and Surveillance Requirements
FPP-012-02-RAB305-324, Reactor Auxiliary Building Elevations 305 and 324 Fire Pre-Plan
FPP-012-08-SEC, Out Building Fire Pre-Plan
FPP-012-02-RAB286, Reactor Auxiliary Building Elevation 286 Fire Pre-Plan
FPP-012-02-RAB190-216, Reactor Auxiliary Building Elevation 190 and 216 Fire Pre-Plan

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Resident Inspector Quarterly Review of Licensed Operator Requalification

AD-TQ-ALL-0420, Conduct of Simulator Training and Evaluation
EOP-SIM-17.55

AOP-010, Feedwater Malfunctions
 EOP-E-0, Reactor Trip or Safety Injection
 EOP-FR-S.1, Response to Nuclear Generation/ATWS

Resident Inspector Quarterly Review of Licensed Operator Performance in the Actual Plant/Main Control Room

AD-OP-ALL-1000, Conduct of Operations
 OMM-001, Operations Administrative Requirements
 OP-155, Diesel Generator Emergency Power System
 AP-002, Plant Conduct of Operations

Section 1R12: Maintenance Effectiveness

NUMARC 93-01, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants
 AD-EG-ALL-1210, Maintenance Rule Program
 CM-E0010, Molded Case Circuit Breaker Test
 EC 405093 Molded Case Circuit Breaker Size and Setting Evaluation for Margin
 OP-116, Fuel Pool Cooling System
 WO 20095596, Implement Revised Breaker Setpoint

Section 1R13: Maintenance Risk Assessments and Emergent Work

OMM-001, Operations Administrative Requirements
 AD-NF-ALL-0501, Electronic Risk Assessment Tool (ERAT)
 AD-WC-ALL-0200, On-Line Work Management
 AD-WC-ALL-0410, Work Activity Integrated Risk Management
 AD-OP-ALL-0201, Protected Equipment
 WCM-001, On-line Maintenance
 OP-103, Reactor Protection
 MST-I0320, Train B Solid State Protection System Actuation Logic & Master Relay Test
 MST-I0658, SSPS Trains A and B Installation/Removal
 OP-148, Essential Services Chilled Water System
 OST-1040, Essential Services Chilled Water Systems Operability

Section 1R15: Operability Determinations and Functionality Assessments

AD-OP-ALL-0105, Operability Determinations and Functionality Assessments
 AR02113097, 50.59 screening for CREFS heater
 OWP-HVAC, Emergency Ventilation
 DBD-140, Diesel Generator Building HVAC Systems
 OP-177, Diesel Generator Building HVAC Systems
 OP-107, Chemical and Volume Control System
 EC 409076, LT-460 Channel Check Margin Recovery
 WR 20075466, LI-01RC-0460SBW Approaching 5% Deviation Limit

Section 1R18: Plant Modifications

AD-EG-ALL-1103, Procurement Engineering Products
 AD-EG-ALL-1180, Engineering Change Walk Downs
 OP-155, Diesel Generator Emergency Power System
 CAR-SH-IN-049, EDG Governor Controls Upgrade Functional Requirement Specification
 CAR 2166-B-401-1991R12, Control Wiring Diagram, Diesel Generator 1A-SA Excitation Control
 CAR 2166-B-401-2011R13, Control Wiring Diagram, Diesel Generator 1B-SB Excitation Control
 AR 02118888, Fuel Oil Storage Tank Dike Modification
 AR 02119959, WC-3 Compressor Suction Piping Modification
 NCR 02116292, Add RV/VL Stainless Steel Configuration to Service Water Program

Section 1R19: Post Maintenance Testing

PLP-400, Post Maintenance Testing
 EST-201, VT-2 Examination Sheet
 OP-155, Diesel Generator Emergency Power System
 MPT-I0479 Diesel Generator 1A-SA Engine Control Panel Pneumatic Pressure Instrument Calibration
 OST-1038, Sampling, Chemical Addition and Main Steam Drain Systems ISI Valve Test
 OP-148, Essential Services Chilled Water System
 OST-1040, Essential Services Chilled Water Systems Operability
 OWP-ECW-01, Essential Services Chilled Water
 MNT-NGGC-0013, Inspection, Testing, and Maintenance of Electric Motors
 PIC-E069, Sequencer Electromechanical Timing Relays: D.C. Pick-Up, D.C. Drop-Out, A.C. Pick-up, and A.C. Drop-Out
 OPT-1537, Emergency Safeguards Sequencer System Test – Train A Quarterly Interval Modes 1-6
 TE-MN-ALL-0300, Inspection, Testing, and Maintenance of Electric Motors
 MPT-E0004, Environmentally Qualified 480 VAC Motor Electrical Inspection
 OP-112, Containment Spray System
 OST-1118, Containment Spray Operability Train A Quarterly Interval Modes 1-4

Section 1R22: Surveillance Testing

OST-1011, Auxiliary Feedwater System Operability
 OST-1104, Containment Isolation Inservice Inspection Valve Test
 OST-1040, Essential Services Chilled Water Systems Operability
 OST-1026, Reactor Coolant System Leakage Evaluation
 ISI-801, Inservice Testing of Valves

Section 4OA1: Performance Indicator Verification

NEI 99-02, Regulatory Assessment Performance Indicator Guideline
 AD-LS-ALL-0004, NRC Performance Indicators and Monthly Operating Report
 OST-1026, Reactor Coolant System Leakage Evaluation
 Operator logs from April 2016 through March 2017
 LERs from April 2016 through March 2017
 RCS chemistry sample data (for raw I-131 and dose equivalent iodine I-131) from April 2016 through March 2017
 Action Requests 02079677, 02117026, 02094182, and 02115520

Section 4OA2: Problem Identification and Resolution

AD-PI-ALL-0100, Corrective Action Program
 AD-PI-ALL-0101, Root Cause Evaluation
 AD-PI-ALL-0102, Apparent Cause Evaluation
 OWP-RM-08, Radiation, Effluent, and Explosive Gas Monitoring
 HPP-780, Maintenance Surveillance Test, MST-E0022, Emergency HVAC Heater Maintenance and KW Verification
 WO 13349767, Perform MST-E0022, Emergency HVAC Heater Maintenance and KW Verification
 WO 20102176, Quality Record, 04/14/17
 ARs 02062139, 02063783, 02109994, and 02113097
 NCR 02084476, Operations performance gap for self-check/CCV
 NCR 02086964, Performance trending forum identified safety culture issues
 NCR 02094652, Performance trend with CR problem descriptions
 NCR 02095723, Site performance trend in work management execution
 NCR 02100222, RP performance trend in clean area contamination documentation

NCR 02100416, RP performance trend in radiation protection industrial safety
NCR 02101423, Organizational effectiveness trend in leveraging human performance crew learnings
NCR 02103544, Performance trend in electronic controller failures
NCR 02116242, Improvement trend needed in consequence biased risk approach
NCR 02131541, Trend declared during first quarter 2017 operational trend meeting
NCR 02132570, Trend in closeout of closeout documentation rigor
NCR 02133432, Trend in ineffective vertical communications

Section 40A3: Follow-up of Events

EC 401386, HELB/MELB design basis environmental protection features
Calculation PRA-W-SI-3026-1A-100, Determination of postulated break locations and rupture restraint locations for safety injection piping
AP-046, Control of Environmental Protective Features
GP-005, Power Operation (Mode 2 to Mode 1)
OPT-1075, Turbine Mechanical Overspeed Trip Test 18 Month Interval Mode 1-2
PIC-I100, Pressure and Differential Pressure Switch Inspection and Calibration
LER 2016-004-00, Reactor Trip and Safety Injection during Turbine Control Testing at Low Power
NCR 02043878, Water intrusion into diesel fuel oil storage building from breached penetrations
NCR 02111628, Control of environmental protective features
NCR 02112008, Extent of condition for PIRT on removed environmental protective features
NCR 02080005, Effectiveness review for HELB door propped open extended