UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

August 10, 2020

Ms. Kim Maza
Site Vice President
Shearon Harris Nuclear Power Plant
5413 Shearon Harris Road
Mail Code HNP01
New Hill, NC 27562-9300

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT – INTEGRATED INSPECTION REPORT 05000400/2020002

Dear Ms. Maza:

On June 30, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Shearon Harris Nuclear Power Plant. On July 29, 2020, 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.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at Shearon Harris Nuclear Power Plant.

If you disagree with a cross-cutting aspect assignment 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; and the NRC Resident Inspector at Shearon Harris Nuclear Power Plant.

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 Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Stewart N. Bailey, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket No. 05000400
License No. NPF-63

Enclosure:
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SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT – INTEGRATED INSPECTION REPORT 05000400/2020002 dated August 10, 2020

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000400
License Number:	NPF-63
Report Number:	05000400/2020002
Enterprise Identifier:	I-2020-002-0065
Licensee:	Duke Energy Progress, LLC
Facility:	Shearon Harris Nuclear Power Plant
Location:	New Hill, NC 27562
Inspection Dates:	April 01, 2020 to June 30, 2020
Inspectors:	J. Zeiler, Senior Resident Inspector A. Patz, Resident Inspector S. Sanchez, Senior Emergency Preparedness Inspector J. Walker, Emergency Response Inspector
Approved By:	Stewart N. Bailey, Chief Reactor Projects Branch 4 Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Shearon Harris Nuclear Power Plant, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Inoperability of 'B' Train ESCW Chiller Due to Trip on High Compressor Oil Temperature Results in Condition Prohibited by Technical Specifications			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000400/2020002-01 Open/Closed	[P.2] - Evaluation	71153
A self-revealed Green non-cited violation (NCV) of Technical Specification (TS) 3.7.13, "Essential Services Chilled Water System," was identified as a result of the 'B' train ESCW system being inoperable for a period greater than 78 hours between July 13 through July 16, 2019, after the 'B' ESCW chiller tripped on high compressor oil temperature due to low compressor oil level, low refrigerant level, and excessive service water side biofouling in the chiller condenser heat exchanger.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000400/2019-002-00	'B' Train Chiller for the Essential Services Chilled Water System Tripped on High Compressor Oil Temperature	71153	Closed

PLANT STATUS

Unit 1 operated at or near rated thermal power (RTP) until June 5, 2020, when a planned downpower to 30 percent RTP was initiated to repair a condenser tube leak. On June 9, 2020, following condenser tube repairs, the licensee initiated power escalation and returned the unit to near RTP on June 10, 2020. Unit 1 remained there for the remainder of the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time the resident inspectors performed periodic site visits each week and during that time conducted plant status activities as described in IMC 2515, Appendix D; observed risk significant activities; and completed on site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather Sample (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of seasonal hot temperatures on May 22, 2020

Impending Severe Weather Sample (IP Section 03.02) (2 Samples)

(1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather for a tornado watch and severe thunderstorm warning on April 13, 2020
(2) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather for Tropical Storm Bertha and an associated tornado warning on May 27, 2020

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

(1) 'A' containment spray (CS) system with 'B' CS system out of service for scheduled motor lubrication preventive maintenance on May 7, 2020
(2) 'B' centrifugal and charging injection pump (CSIP) while 'A' CSIP was unavailable for preventive maintenance on May 19, 2020
(3) 'A' essential services chilled water (ESCW) system while 'B' ESCW system was unavailable for corrective maintenance on May 26, 2020

Complete Walkdown Sample (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated system configurations during a complete walkdown of the main steam relief system on June 15, 2020.

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

(1) Reactor auxiliary building (RAB) 305' elevation termination cabinet room and rod control cabinet room (fire zones 12-A-6-RT1 and 12-A-6-RCC1) on April 23, 2020
(2) RAB 305' and 324' elevation heating, ventilating, and air conditioning areas (fire zones 12-A-6-CHF1&2 and 12-A-7-HV) on May 4, 2020
(3) RAB 261' elevation steam tunnel area (fire zone 1-A-46-ST) on May 14, 2020
(4) Fuel handling building 261' elevation emergency ventilation exhaust equipment rooms (fire zones 5-F-3-CHFA, 5-F-3-CHFB, 5-F-3-CHF-BAL, 5-F-3-DMNZ1, and 5-F-3-DMNZ2) on May 20, 2020
(5) 'B' emergency diesel generator (EDG) room and support equipment areas (fire zones 1-D-1-DGB-RM, 1-D-3-DGB-ES, 1-D-DTB, 1-D-1-DGB-ASU, 1-D-1-DGB-ER, and 1-D-2-DGB-HVD) on June 3, 2020

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated the onsite fire brigade training and performance during an announced fire drill on June 19, 2020. The fire drill scenario involved a service air dryer heater electrical fire on the turbine building 261' elevation.

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

(1) RAB 305' and 324' elevations on May 27, 2020

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

(1) The inspectors observed and evaluated licensed operator performance in the control room during a downpower and return to full power for repairs to condenser tubes in the west condenser water box during June 5-10, 2020.

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

(1) The inspectors observed and evaluated a simulator scenario for operator training involving a loss of 'A' emergency AC safety bus followed by a loss of all AC power on May 7, 2020.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

(1) 'B' EDG lube oil keep warm pump failure to start due to breaker motor starter contactor coil failure on December 3, 2019
(2) 'B' ESCW chiller tripped on compressor low oil pressure due to compressor oil filter piping leak on January 18, 2020

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

(1) Elevated (Green) risk during planned unavailability of the 'A' EDG due to emergent repair of a fuel oil supply header line leak on April 24, 2020
(2) Elevated (Green) risk during planned unavailability of the 'A' ESCW and 'A' CSIP systems on May 19, 2020
(3) Elevated (Green) risk during unplanned unavailability of the 'B' ESCW system due to emergent failure of the chiller hot gas bypass valve actuator on May 26-28, 2020
(4) Elevated (Green) risk during scheduled unit downpower to 30 percent power to repair condenser tube leakage between June 5-9, 2020
(5) Elevated (Green) risk during unplanned unavailability of Delta T/Tavg Loop T-0412 due to emergent failure of a reactor protection system circuitry card on June 17-18, 2020

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (5 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

(1) 'A' EDG right bank fuel supply header line leak (NCR 02324923) on April 13, 2020
(2) 'A' boric acid transfer pump differential pressure trending up for unknown reason (NCR 02325201) on April 15, 2020
(3) 'B' EDG jacket water heater failure to de-energize at designated setpoint (NCR 02328399) on May 4, 2020
(4) 'A' electrical penetration area cooling fan AH-24X failed to remain running following repeated starts due to failed breaker auxiliary contacts (NCR 02332720) on May 30, 2020
(5) 'C' component cooling water (CCW) pump outboard seal has 50 drops per minute leakage (NCR 02334636) on June 11, 2020

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

(1) Permanent modification engineering changes (ECs) 0000416868 and 0000417450, 'B' and 'A' ESCW chiller hot gas bypass valve and pre-rotation vane setpoint changes, implemented on April 28 and May 20, 2020

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (6 Samples)

The inspectors evaluated the following post maintenance test activities to verify system operability and functionality:

(1) Work Order (WO) 20354041 post-maintenance test instructions following 'B' CS pump motor bearing oil replacement on May 7, 2020
(2) Operations Surveillance Test (OST)-1104, Containment Isolation Valve Inservice Inspection Valve Test Quarterly Interval Modes 1-6, following scheduled air filter regulator replacements for main steam isolation bypass valves 1MS-81, 1MS-83, and 1MS-85 on May 14, 2020
(3) OST-1007, Chemical and Volume Control System/Safety Injection System Operability, Train A, Quarterly Interval, Modes 1-4, following scheduled maintenance on safety injection minimum flow valves on May 19, 2020
(4) Post-modification testing via Operations Periodic Test (OPT)-1512, Essential Chilled Water Turbopak Units Quarterly Inspection/Checks Modes 1-6, following implementation of EC 0000416868 on 'A' ESCW chiller on May 20, 2020
(5) OPT-1512, following repair of 'B' ESCW chiller due to emergent failure of the hot gas bypass valve actuator on May 28, 2020

(6) Maintenance Surveillance Test (MST)-I0140, Delta T/Tavg Loop (T-0412) Operational Test, following emergent replacement of failed circuitry card on June 18, 2020

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (2 Samples)

(1) OPT-1529, Alternate Seal Injection Pump Operability Test Quarterly Intervals Modes 1-3, on April 29, 2020
(2) OST-1122, Train A 6.9 kV Emergency Bus Undervoltage Trip Actuating Device Operational Test and Contact Check, Modes 1-6, on June 24, 2020

Inservice Testing (IP Section 03.01) (1 Sample)

(1) OST-1215, Emergency Service Water System Operability Train B Quarterly Interval Modes 1 2 3 4 5 6 Defueled, on June 5, 2020

FLEX Testing (IP Section 03.02) (1 Sample)

(1) WOs 20367683, 20307610, and 20290674, perform six-year inspection and testing of FLEX auxiliary feedwater and reactor coolant system pumps, on June 2-3, 2020

71114.02 - Alert and Notification System Testing

Inspection Review (IP Section 02.01-02.04) (1 Sample)

(1) The inspectors evaluated the maintenance and testing of the alert and notification system during the week of April 20, 2020.

71114.03 - Emergency Response Organization Staffing and Augmentation System

Inspection Review (IP Section 02.01-02.02)

The inspectors evaluated the readiness of the Emergency Response Organization (ERO) during the week of April 20, 2020. However, the inspectors were unable to complete this inspection procedure (IP) in its entirety. The aspect that remains to be inspected is the verification of a sample of key ERO personnel's training qualifications and response times from home to the site.

The necessary documentation used by the inspectors to verify this information is considered personally identifiable information, which the inspectors chose not to handle while performing this inspection remotely. The remainder of this IP will be completed at a later date.

71114.04 - Emergency Action Level and Emergency Plan Changes

Inspection Review (IP Section 02.01-02.03) (1 Sample)

(1) The inspectors evaluated submitted Emergency Action Level, Emergency Plan, and

Emergency Plan Implementing Procedure changes during the week of April 20, 2020. This evaluation does not constitute NRC approval.

71114.05 - Maintenance of Emergency Preparedness

Inspection Review (IP Section 02.01 - 02.11)

The inspectors evaluated the maintenance of the emergency preparedness program during the week of April 20, 2020. However, the inspectors were unable to complete this inspection procedure in its entirety. The aspects that remain to be inspected are the verification of radiation monitors used in the EALs to ensure proper scale readout of the instrumentation, emergency response facility's readiness, including field monitoring team vehicles and go-kits used for emergencies. The remainder of this IP will be completed at a later date.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

EP01: Drill/Exercise Performance (IP Section 02.12) (1 Sample)

(1) April 1, 2019, through December 31, 2019

EP02: ERO Drill Participation (IP Section 02.13) (1 Sample)

(1) April 1, 2019, through December 31, 2019

EP03: Alert & Notification System Reliability (IP Section 02.14) (1 Sample)

(1) April 1, 2019, through December 31, 2019

MS05: Safety System Functional Failures (SSFFs) Sample (IP Section 02.04) (1 Sample)

(1) Unit 1 (April 1, 2019 – March 31, 2020)

BI01: Reactor Coolant System (RCS) Specific Activity Sample (IP Section 02.10) (1 Sample)

(1) Unit 1 (April 1, 2019 – March 31, 2020)

BI02: RCS Leak Rate Sample (IP Section 02.11) (1 Sample)

(1) Unit 1 (April 1, 2019 – March 31, 2020)

71152 - Problem Identification and Resolution

Semiannual Trend Review (IP Section 02.02) (1 Sample)

(1) The inspectors reviewed the licensee's corrective action program for potential adverse trends that might be indicative of a more significant safety issue.

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

(1) Review of multiple failures of contactors and auxiliary contacts in safety-related and nonsafety-related 480 volt motor control center electrical breakers (NCRs 02305600, 02318759, 02325498, and 02332720)

71153 - Followup of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (1 Sample)

The inspectors evaluated the following licensee event reports (LERs):

(1) LER 05000400/2019-002-00, 'B' Train Chiller for the Essential Services Chilled Water System Tripped on High Compressor Oil Temperature (ADAMS Accession No. ML19259A072). The inspection conclusions associated with this LER are documented in this report under Inspection Results Section 71153.

INSPECTION RESULTS

Observation: Semi-Annual Trend Review	71152

The inspectors reviewed issues entered into the licensee's corrective action program and associated equipment performance databases to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on repetitive 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 2020 through July 2020, although some examples may have 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.

As a result of the semi-annual trend review, the inspectors noted a continued negative trend in equipment performance challenges associated with the ESCW system; specifically, with the 'B' train ESCW chiller. Performance problems and issues with the ESCW chillers were previously documented in NRC Inspection Report 05000400/2019004, dated February 20, 2020. Continued equipment performance issues during the latest semi-annual trend review period with the 'B' ESCW chiller were documented in the following licensee NCRs:

- NCR 02311457, 'B' ESCW chiller tripped on compressor low oil pressure due to oil leak from compressor oil filter assembly pipe nipple through-wall crack on January 18, 2020

- NCR 02331982, ‘B’ ESCW chiller declared TS inoperable due to high compressor motor winding temperature and inability to control chill water outlet temperature within the required temperature setpoint on May 26, 2020

The licensee acknowledged the existence of continued equipment reliability issues with the ESCW system. As a result of the January 18, 2020, ‘B’ ESCW chiller failure, ‘B’ train ESCW exceeded its 10 CFR 50.65 (Maintenance Rule) reliability performance monitoring criteria goal of less than four functional failures in a rolling 36-month monitoring period. In response to exceeding this performance monitoring criteria, the ‘B’ train ESCW was placed in Maintenance Rule (a)(1) monitoring condition, requiring the licensee to evaluate the system performance issues in detail and develop an action plan with corresponding improvement goals to address the unacceptable equipment performance. The inspectors reviewed the licensee’s (a)(1) evaluation results documented in NCR 02311457 and determined that it met the requirements of 10 CFR 50.65. On April 28, 2020, the licensee completed implementation of a major (a)(1) corrective action item designed to improve reliability of the ‘B’ ESCW chiller. This improvement initiative involved implementation of a modification to mitigate the likelihood of the chiller operating in surge/stall conditions when normally operating in a lightly loaded condition by adjusting the chiller hot gas bypass valve and pre-rotation vane setting to place greater load on the chiller during normal operation. The inspectors noted, however, that a subsequent ‘B’ ESCW chiller problem occurred on May 26, 2020, following the implementation of this reliability improvement item, indicating continued licensee attention was needed to address the adverse equipment performance problems with the ESCW system.

Inoperability of 'B' Train ESCW Chiller Due to Trip on High Compressor Oil Temperature Results in Condition Prohibited by Technical Specifications			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000400/2020002-01 Open/Closed	[P.2] - Evaluation	71153

A self-revealed Green non-cited violation (NCV) of Technical Specification (TS) 3.7.13, “Essential Services Chilled Water System,” was identified as a result of the ‘B’ train ESCW system being inoperable for a period greater than 78 hours between July 13 through July 16, 2019, after the ‘B’ ESCW chiller tripped on high compressor oil temperature due to low compressor oil level, low refrigerant level, and excessive service water side biofouling in the chiller condenser heat exchanger.

Description: On July 14, 2019, at 9:48 p.m., the ‘B’ ESCW chiller tripped on high compressor oil temperature after being started 1.5 hours earlier and operating for the entire time in a surge condition. Chiller surge occurs when the refrigerant reverses flow and moves backwards from the condenser through the compressor and back into the evaporator creating increased chiller vibrations and compressor bearing loads resulting in higher oil temperatures. The chiller was declared TS inoperable at the time of the trip and the action statement for TS Limiting Condition for Operation (LCO) 3.7.13 was entered requiring the ‘B’ ESCW chiller to be restored to operability within 72 hours or be in Mode 3 (hot standby) with the next 6 hours and in Mode 5 (cold shutdown) within the following 30 hours. Chiller troubleshooting and investigation identified both slightly low compressor oil levels and refrigerant levels, as well as excessive condenser tube biofouling on the service water side of the condenser heat exchanger. It was determined that as a result of the condenser biofouling,

the reduction in heat transfer between the refrigerant and service water along with slightly reduced oil and refrigerant volumes likely increased the pressures in the compressor's oil sump disrupting the proper operation of the refrigerant oil reclaim system causing the high oil temperature trip setpoint to be reached. Following the addition of a small amount of compressor oil and refrigerant, the 'B' ESCW system was tested and declared operable on July 16, 2019, at 10:14 p.m.; however, during the operability testing, the chiller continued to exhibit some surging, although to a lesser extent than prior to the addition of compressor oil and refrigerant. Subsequently, on July 17, 2019, the chiller was removed from service to mechanically clean the chiller condenser heat exchanger tubes, at which time, significant biofouling was confirmed.

The inspectors noted that evidence of unexpected biofouling in other plant heat exchangers cooled by normal and emergency service water systems was identified as far back as April 2019; however, actions to address potential adverse impact from biofouling in the ESCW system had not been adequately considered up until the time of the 'B' ESCW chiller trip. In addition, other weaknesses in licensee chiller heat exchanger performance monitoring were identified. Specifically, condenser and evaporator approach temperatures, which provide early indication of degrading heat transfer in the chiller, were not being monitored or trended, even though the raw data was being collected during routine chiller testing. The inspectors also noted that unexpected chiller surging was identified during 'B' chiller operations dating back to May 27, 2019, and continued to get longer in duration leading up to the chiller trip. These surging conditions were indicative of degrading heat transfer due to increasing chiller condenser fouling and the naturally occurring increase in service water temperature that occurs during the summer period.

Due to the extent of the 'B' chiller degradation, the licensee determined that most likely, it was unable to perform its safety function prior to the actual time of the trip on July 14, 2019. Based on the last time the chiller was operated successfully, the time of initial inoperability was moved to July 13, at 3:50 p.m. This resulted in the 'B' ESCW chiller being inoperable for over 78 hours (i.e., from July 13, at 3:50 p.m. through July 16, at 10:14 p.m.). Consequently, TS LCO 3.7.13, which requires an inoperable ESCW chiller be restored within 72 hours or be in Mode 3 within 6 hours, was not met. On September 16, 2019, an LER was submitted to the NRC under 10 CFR 50.73(a)(2)(i)(B), for an operation or condition which was prohibited by the plant's Technical Specifications.

Corrective Actions: The licensee completed cleaning of both the 'A' and 'B' ESCW condenser heat exchangers to remove biofouling buildup. A service water margin recovery program initiative was implemented to evaluate the conditions causing the unexpected service water biofouling conditions in order to address long-term corrective actions. ESCW chiller operational test procedures were revised to include condenser and evaporator monitoring of approach temperatures to provide an early indication of degrading heat transfer conditions.

Corrective Action References: NCRs 02278242, 02281819, and 02286887

Performance Assessment:

Performance Deficiency: The licensee failed to adequately monitor and identify degrading 'B' ESCW chiller operational performance issues resulting from excessive biofouling in the ESCW chiller condenser heat exchanger.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the finding resulted in the 'B' ESCW chiller tripping on high compressor oil temperature, rendering the chiller inoperable and causing a condition prohibited by TS.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding was screened by Exhibit 2, "Mitigating Systems Screening Questions," under Section A, "Mitigating SSCs and PRA Functionality," and it was determined the performance deficiency required a detailed risk evaluation because the degraded condition represented a loss of probabilistic risk analysis (PRA) function of one train of a multi-train TS system for greater than its TS allowed outage time. A detailed risk evaluation of the performance deficiency was performed by a Region II Senior Reactor Analyst (SRA) in accordance with NRC IMC 0609, Appendix A. The SRA conservatively assumed the 'B' ESCW chiller would fail to run for its mission time over a 50-day exposure period and chiller supported equipment would also fail in order to bound this condition. Using SAPHIRE 8 Version 8.1.8 and Harris SPAR Model Version 8.54, dated February 26, 2017, the SRA set CHW-CHL-FR-1B ('B' ESCW chiller fails to run) to True. The dominant accident sequence was a Small Break Loss of Coolant Accident with a failure of High Pressure Safety Injection Pumps and Failure of Secondary Side Reactor Coolant System Cooldown. Change in plant risk for this conservative bounding analysis was less than 2.0 E-7 per year, corresponding to a finding of very low safety significance (Green).

Cross-Cutting Aspect: P.2 - Evaluation: The organization thoroughly evaluates issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, the license failed to thoroughly evaluate unexpected service water biofouling in the 'B' ESCW chiller condenser as evidenced by increased surging conditions during chiller operation resulting in the chiller tripping on high compressor oil temperature.

Enforcement:

Violation: Shearon Harris TS 3.7.13, "Essential Services Chilled Water System," requires two ESCW systems to be operable in Modes 1 through 4, and if one ESCW system is inoperable, it shall be returned to an operable condition within 72 hours or the unit shall be shut down and be in Mode 3 (hot standby) within the next 6 hours and in Mode 5 (cold shutdown) within the following 30 hours.

Contrary to the above, from July 13, 2019, to July 16, 2019, while operating in Mode 1, the licensee failed to follow the action requirements of TS 3.7.13, in that, following 72 hours of inoperability associated with the 'B' ESCW system, the licensee failed to be in hot standby within the following 6 hours or restore the 'B' ESCW to an operable condition.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

The disposition of this violation closes LER 05000400/2019-002-00, 'B' Train Chiller for the Essential Services Chilled Water System Tripped on High Compressor Oil Temperature.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On July 29, 2020, the inspectors presented the integrated inspection results to Kim Maza and other members of the licensee staff.
- On May 20, 2020, the inspectors presented the Emergency Preparedness Program inspection results to Kim Maza and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Corrective Action Documents Resulting from Inspection	Procedure Revision Request (PRR) 02332256	Change AP-301 Attachment 5 Hot Weather Monitoring of Critical Plant Equipment	05/27/2020
	Procedures	AP-300	Severe Weather Response	Rev. 34
		AP-301	Seasonal Weather Preparations and Monitoring	Rev. 86
71111.04	Corrective Action Documents Resulting from Inspection	Nuclear Condition Report (NCR) 02335261	Reactor auxiliary building steam tunnel roof leak	6/16/2020
	Procedures	OP-107	Chemical and Volume Control System	Rev. 117
		OP-112	Containment Spray System	Rev. 46
		OP-126	Main Steam, Extraction Steam, and Steam Dump Systems	Rev. 41
		OP-148	Essential Services Chilled Water System	Rev. 80
71111.05	Fire Plans	CSD-HNP-PFP-DGB	Diesel Generator Building Pre-Fire Plan	Rev. 1
		CSD-HNP-PFP-FHB	Fuel Handling Building Pre-Fire Plan	Rev. 1
		CSD-HNP-PFP-RAB-261	Reactor Auxiliary Building Elevation 261 Pre-Fire Plan	Rev. 1
		CSD-HNP-PFP-TB	Turbine Building Pre-Fire Plan	Rev. 3
	Procedures	AD-EG-ALL-1520	Transient Combustible Control	Rev. 13
		AD-EG-ALL-1522	Duties of a Compensatory Fire Watch	Rev. 11
		AD-OP-ALL-0207	Fire Brigade Administrative Controls	Rev. 3
		CSD-HNP-PFP-RAB-305-324	Reactor Auxiliary Building Elevations 305 and 324 Pre-Fire Plan	Rev. 4
		FPP-001	Fire Protection Program Manual	Rev. 44
		FPP-002	Fire Emergency	Rev. 45
71111.06	Corrective Action Documents Resulting from	NCR 02332277	Pipe Break Exemptions for Rod Control Cabinet and Termination Cabinet Rooms (RAB 305) Not Documented	05/27/2020

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Inspection			
	Engineering Evaluations	PRA-F-E-0008	Reactor Auxiliary Building Unit 1 El. 305' Internal Flooding Analysis	Rev. 3
	Miscellaneous	Design Basis Document (DBD)-323	High Energy and Moderate Energy Line Breaks	Rev. 1
71111.11Q	Corrective Action Documents	NCR 02333785	AOP-012 Entry for Partial Loss of Condenser Vacuum	06/06/2020
	Miscellaneous		Reactivity Manipulation Plan (H1C23 Condenser Tube Leakage Repair)	Rev. 0
	Procedures	AD-EP-ALL-0111	Control Room Activation of the ERO	Rev. 1
		AD-OP-ALL-1000	Conduct of Operations	Rev. 17
		AD-OP-ALL-1001	Conduct of Abnormal Operations	Rev. 3
		AOP-025	Loss of One Emergency AC Bus (6.9KV) or One Emergency DC Bus (125V)	Rev. 45
		EOP-ECA-0.0	Loss of All AC Power	Rev. 10
		GP-005	Power Operation (Mode 2 to Mode 1)	Rev. 107
		GP-006	Normal Plant Shutdown from Power Operation to Hot Standby (Mode 1 to Mode 3)	Rev. 92
71111.12	Corrective Action Documents	NCR 02305600	Replace blown control power fuse in 'B' EDG lube oil keep warm pump breaker	12/03/2019
		NCR 02311457	1CY014 fitting oil leak caused WC-2B chiller trip	01/18/2020
	Procedures	AD-EG-ALL-1210	Maintenance Rule Program	Rev. 2
	Work Orders	WOs 20378550 and 20383218	Repair of WC-2B chiller following 1CY-14 fitting oil leak caused chiller trip	01/18/ 2020
71111.13	Calculations	HNP-F/PSA-0011	Online EOOS PSA Model	Rev. 15
		HNP-F/PSA-0119	Online Phoenix PRA Model	Rev. 1
	Corrective Action Documents Resulting from Inspection	Work Request 20176244	Heater Drain Pump 1A-NNS Discharge to 4-1A-NNS Conduit Knocked Loose by Vibration	06/10/2020
	Procedures	AD-NF-ALL-0501	Electronic Risk Assessment Tool (ERAT)	Rev. 5
		AD-WC-ALL-0200	On-Line Work Management	Rev. 17
		AD-WC-ALL-0240	On-Line Risk Management Process	Rev. 2

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		AD-WC-ALL-0410	Work Activity Integrated Risk Management	Rev. 10
		CSD-WC-HNP-0240-00	HNP ERAT Guidance	Rev. 0
	Work Orders	WO 20393846	'A' EDG emergent repair of fuel oil supply header line leak	04/24/2020
71111.15	Corrective Action Documents	NCR 00725359	'C' CCW pump seal leak	01/03/2015
		NCR 02334865	'C' CCW pump seal leakage degraded	06/15/2020
	Miscellaneous	NRC IMC 0326	Operability Determinations	10/01/2019
		Nuclear Energy Institute (NEI) 18-03	Operability Determination	Rev. 0
	Procedures	AD-OP-ALL-0105	Operability Determinations	Rev. 6
	Work Orders	WO 20173158	'B' EDG jacket water heater stuck energized	05/04/2020
71111.18	Engineering Evaluations	Action Request (AR) 02319363	10 CFR 50.59 evaluation of EC 0000416868	03/05/2020
	Procedures	AD-EG-ALL-1132	Preparation and Control of Design Change Engineering Changes	Rev. 16
		AD-EG-ALL-1133	Preparation and Control of Design Equivalent Change Engineering Changes	Rev. 12
71111.19	Procedures	AD-EG-ALL-1155	Post Modification Testing	Rev. 4
		MPT-M0084	Motor Lubrication, Westinghouse	Rev. 13
		PLP-400	Post Maintenance Testing	Rev. 64
	Work Orders	WO 20331475	Replace air filter regulators for main steam isolation bypass valves 1MS-81, 1MS-83, and 1MS-85	05/14/2020
		WO 20382530	Implement EC 0000416868 on 'A' ESCW	05/20/2020
		WO 20382531	Implement EC 0000416868 on 'B' ESCW	04/28/2020
		WO 20388899	Delta T/Tavg Loop (T-0412) Operational Test	6/17-18/2020
		WO 20395322	Implement EC 0000417450 on 'B' ESCW	04/28/2020
		WO 20397486	Implement EC 0000417450 on 'A' ESCW	05/19/2020
		WO 20401697	Repair 'B' ESCW chiller failure to maintain chill water outlet temperature within setpoint	05/28/2020
		WOs 20275346 and 20267416	Limitorque stem lubrication on 'A' CSIP recirculation valves 1CS-745 and 1CS-182	05/19/2020
71151	Miscellaneous	2019 - 2020		

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		Licensee Event Reports		
		2019 - 2020 Operator Log Entries		
	Procedures	AD-PI-ALL-0700	Performance Indicators	Rev. 4
		OST-1026	Reactor Coolant System Leakage Evaluation, Computer Calculation Daily Interval, Mode 1-4	Rev. 53
71152	Corrective Action Documents	AD-PI-ALL-0100	Corrective Action Program	Rev. 23
		AD-PI-ALL-0101	Root Cause Evaluation	Rev. 7
		AD-PI-ALL-0102	Apparent Cause Evaluation	Rev. 4
		AD-PI-ALL-0106	Cause Investigation Checklists	Rev. 4