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

April 28, 2021

Mr. Jim Barstow
Vice President Nuclear Regulatory Affairs & Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT – INTEGRATED INSPECTION REPORT 05000259/2021001, 05000260/2021001 AND 05000296/2021001

Dear Mr. Barstow:

On March 31, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Browns Ferry Nuclear Plant. On April 27, 2021, the NRC inspectors discussed the results of this inspection with Mr. Matthew Rasmussen and other members of your staff. The results of this inspection are documented in the enclosed report.

Two self-revealed Severity Level IV violations without an associated finding are documented in this report. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations 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 Browns Ferry Nuclear 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/

Thomas A. Stephen, Chief
Reactor Projects Branch #5
Division of Reactor Projects

Docket Nos. 05000259, 05000260 and 05000296
License Nos. DPR-33, DPR-52 and DPR-68

Enclosure:
As stated

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SUBJECT: BROWNS FERRY NUCLEAR PLANT – INTEGRATED INSPECTION REPORT 05000259/2021001, 05000260/2021001 AND 05000296/2021001 DATED: APRIL 28, 2021

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ADAMS ACCESSION NUMBER: **ML21117A405**

OFFICE	RII: DRP	RII: DRP	RII: DRP	RII: DRP	RII: DRP	RII: DRP
NAME	M. Kirk	J. Steward	C. Safouri	N. Karlovich	S. Ninh	T. Stephen
DATE	4/22/2021	4/20/2021	4/19/2021	4/21/2021	4/16/2021	4/28/2021

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000259, 05000260 and 05000296
License Numbers:	DPR-33, DPR-52 and DPR-68
Report Numbers:	05000259/2021001, 05000260/2021001 and 05000296/2021001
Enterprise Identifier:	I-2021-001-0054
Licensee:	Tennessee Valley Authority
Facility:	Browns Ferry Nuclear Plant
Location:	Athens, Alabama
Inspection Dates:	January 01, 2021 to March 31, 2021
Inspectors:	N. Karlovich, Resident Inspector M. Kirk, Resident Inspector M. Magyar, Reactor Inspector C. Safouri, Acting Senior Resident Inspector J. Steward, Senior Resident Inspector
Approved By:	Thomas A. Stephen, Chief Reactor Projects Branch #5 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 Browns Ferry Nuclear 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

Unit 3 Main Steam Relief Valves (MSRVs) Lift Outside of Technical Specifications Limits			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000296/2021001-01 Open/Closed	Not Applicable	71153
A self-revealed Severity Level IV Non-cited Violation (NCV) of Technical specification (TS) 3.4.3 and TS 3.0.4 was identified when the licensee discovered, through as found test results, that two of 13 MSRVs that were removed for testing had as found lift settings outside of the +/-3 percent setpoint band required for their operability.			

Unit 2 Core Spray System Inoperable for Longer than Permitted by Technical Specifications			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000260/2021001-02 Open/Closed	Not Applicable	71153
A self-revealed Severity Level IV Non-cited Violation (NCV) of Technical specification (TS) 3.5.1, 3.0.4, and 3.0.3 was identified when the licensee discovered on July 6, 2020, through a failed autostart and failed manual attempts, the 2A Core Spray Room Cooler was non-functional, which rendered the Loop I Core Spray system inoperable.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000260/2020-001-00	LER 2020-001-00 For Browns Ferry Nuclear Plant, Unit 2, Core Spray System Inoperable for Longer than Permitted by Technical Specifications	71153	Closed
LER	05000296/2020-002-00	LER 2020-002-00 for Browns Ferry Nuclear Plant, Unit 3, Main Steam Relief Valves Lift Settings Outside of Technical Specifications Required Setpoints	71153	Closed

PLANT STATUS

Unit 1 began the inspection period at 100 percent rated thermal power (RTP). On February 13, 2021, the Unit performed a planned downpower to 50 percent RTP to perform a control rod sequence exchange and other planned maintenance. Unit 1 returned to RTP on February 14, 2021, where it remained through the end of the inspection period.

Unit 2 began the inspection period at RTP. On February 16, 2021, the Unit began the end of cycle coast down following final feedwater temperature reduction in preparation for the planned refueling outage (2R21). On February 26, 2021, from 89 percent RTP, the Unit was shut down and the main generator removed from service to commence 2R21. The Unit remained shut down in Mode 5 (Refueling) for the duration of the inspection period.

Unit 3 began the inspection period at RTP. On January 13, 2021, the 3B recirculation pump tripped which resulted in an unexpected power reduction to 67 percent RTP. Operators further reduced power to 40 percent RTP in accordance with operating instructions to support single loop operation on the 3A recirculation pump. On January 15, 2021, the Unit was returned to RTP following restoration of the 3B recirculation pump and loop to service. Unit 3 operated at or near RTP through the end of the inspection period.

INSPECTION SCOPES

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 Disease 2019 (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; conducted plant status activities as described in IMC 2515, Appendix D, “Plant Status”; 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 portions 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 cold temperatures for the following systems: Standby Liquid Control and Building Heating System on February 16, 2021.

Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather in the form of high winds, heavy rain and seasonal tornadoes on March 16, 2021 and March 25, 2021.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (1 Sample)

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

(1) Auxiliary Decay Heat Removal System on March 4, 2021

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (3 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) 16-M, Auxiliary Instrument Room 2 in the Unit 2 control building, elevation 593' on February 5, 2021.
(2) 16-A, Units 1, 2, and 3 Main Control Rooms on March 26, 2021.
(3) 26-A, Units 1, 2, and 3 Turbine Building on March 1, 2021 and March 22, 2021.

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 in the Unit 3 turbine building 586' elevation on January 20, 2021.

71111.06 - Flood Protection Measures

Cable Degradation (IP Section 03.02) (1 Sample)

The inspectors evaluated cable submergence protection in:

(1) Hand holes 15 and 26 containing safety related underground cables on January 11, 2021.

71111.08G - Inservice Inspection Activities (BWR)

BWR Inservice Inspection Activities Sample - Nondestructive Examination and Welding Activities (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated boiling water reactor non-destructive testing by reviewing the following examinations from February 22 – 26, 2021:
    1. Ultrasonic Testing (UT)
        a. TCS-2-422, Core Spray (CS) Pipe to Valve, ASME Class 1 (reviewed)
        b. C-3-4, RPV Ring 3 to Ring 4 Circ. Weld, ASME Class 1 (reviewed)
        c. V-1-C, Ring 1 Vertical Weld, ASME Class 1 (reviewed)
    2. Penetrant Testing (PT)
        a. 2-47B408S0063-IA, Welded Attachment, ASME Class 1 (reviewed)
        b. RFW-2-019-003 C0R0, Pipe to Valve, ASME Class 1 (reviewed)

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 the following activities:
- Single loop operation following the 3B Recirculation Pump trip on January 13, 2021
- Motor operated valve (MOV) strokes to support maintenance activities and testing on January 28, 2021
- Unit 2 shutdown and cooldown for refueling outage 2R21 on February 26, 2021

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

(1) The inspectors observed and evaluated a graded licensed operator requalification examination in the Unit 2 Simulator on January 21, 2021.

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (6 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) Unit 3 elevated risk, Yellow, due to planned Main Bank Battery #3 maintenance outage, on January 7, 2021
(2) Elevated Eel Grass risk, Red, due to observed floating plants upstream of intake area, on January 27, 2021
(3) Unit 1, Emergent work related to failure of the CS loop II minimum flow valve to stroke during a quarterly surveillance test procedure on February 19, 2021
(4) Unit 2, High risk evolution during lowered inventory and high decay heat following Unit 2 shutdown and cooldown on February 28 and March 1, 2021
(5) Unit 2, Review of Outage Safety Plan for Unit 2 Cycle R21 prior to start of the spring refueling outage
(6) Unit 2, Torus Pump Down High Risk evolution in preparation for weld repair on MSRV tailpipe T-Quencher RV-71K on March 29, 2021

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (3 Samples)

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

(1) C3 Emergency Equipment Cooling Water (EECW) strainer automatic and manual operation on January 15, 2021
(2) Residual Heat Removal (RHR) Loop I minimum flow valve 3-FCV-074-0007 not closing at expected flow on December 5, 2020
(3) 1-FCV-075-0037, CS Loop II Minimum Flow Valve Found in Hard Seat Condition on February 24, 2021

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) BFN-19-915, Permanent modification to Replace Obsolete or Failing Indoor Emergency Lights on February 23, 2021

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (8 Samples)

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

(1) Units 1, 2, and 3, Smoke testing of B Standby Gas Treatment train following completion of maintenance on January 11, 2021
(2) Units 1, 2, and 3, EECW South Header maintenance outage, on January 13, 2021
(3) Unit 3, Reactor Core Isolation Cooling system MOVs, 71-19, -6A, -6B, -25, and -18 on January 28, 2021
(4) Units 1, 2 and 3, Combined zone secondary containment drawdown and integrity test following repairs on outer equipment doors on February 11, 2021
(5) Unit 2 Main Steam Isolation Fast Closure Test for inboard MSIV line A, 2-FCV-1-14 on March 18, 2021
(6) Unit 2, Recirculation pump A discharge valve, 68-3, as left MOV diagnostics following replacement during the refueling outage on March 17, 2021
(7) Units 1 and 2, C EDG post maintenance run following planned maintenance on the cooling water heat exchangers on March 26, 2021
(8) Unit 2, Reactor Core Isolation Cooling steam line inboard isolation valve, 71-2, diagnostics and local leak rate testing following replacement during the refueling outage on March 11 and March 24, 2021, respectively

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage Sample (IP Section 03.01) (1 Partial)

(1) (Partial)
The inspectors evaluated the Unit 2 refueling outage (2R21) activities from February 26, 2021 through March 31, 2021. The refueling outage is extended due to emergent repairs required on the Core Shroud Access Hole Covers and inspection will continue into the second quarter.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (8 Samples)

(1) 3-SR-3.3.5.1.6(ADS B), Automatic Depressurization System Logic System Functional Test - Bus B Time Delay Relay Calibration and Bus Power Monitor Test, on January 24, 2021
(2) 3-SR-3.5.1.6(CS I), Core Spray Flow Rate Loop I, on February 4, 2021
(3) 0-SR-3.8.1.6, Common Accident Signal Logic testing on Division I on February 9-10, 2021
(4) 2-SR-3.3.1.2.5 & 6, Channel C Source Range Monitor Functional Test with Reactor Mode Switch Not in Run position on February 26-27, 2021
(5) 0-SR-3.8.1.9(B), Diesel Generator B Emergency Unit 2 Load Acceptance Test, on March 3-4, 2021
(6) 1-SR-3.3.5.1.6(ADS B), ADS Logic System Functional Test - Bus B Time Delay Relay Calibration and Bus Power Monitor Test on February 26, 2021
(7) 1-SI-A.2.3.1.5, Emergency High Pressure Makeup (EHPM) Annual Flow Rate Functional B Supplemental Diesel Generator (SDG) on March 24, 2021
(8) 2-SI-4.7.A.2.G-3/71A, Primary Containment Local Leak Rate Test RCIC Turbine Steam Supply: Penetration X-10 on March 4, 2021.

Inservice Testing (IP Section 03.01) (1 Sample)

(1) 2-SI-4.5.C.1(C), Residual Heat Removal Service Water Heat Exchanger C Valves Quarterly IST Test, on February 24, 2021
2-SI-4.5.C.1(A), Residual Heat Removal Service Water Heat Exchanger A Valves Quarterly IST Test, on February 24, 2021

Containment Isolation Valve Testing (IP Section 03.01) (1 Sample)

(1) 2-SI-3.2.74(RHR I), Pressure Isolation Valve Leakage Test RHR Loop I Shutdown Cooling Return for check valve 2-CKV-74-54 on March 21, 2021

71114.06 - Drill Evaluation

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

The inspectors evaluated:

(1) Classifications and notifications during an emergency response training evolution on February 10, 2021.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

BI01: Reactor Coolant System (RCS) Specific Activity Sample (IP Section 03.10) (3 Samples)

(1) Unit 1 (January 01, 2020 through December 31, 2020)
(2) Unit 2 (January 01, 2020 through December 31, 2020)
(3) Unit 3 (January 01, 2020 through December 31, 2020)

BI02: RCS Leak Rate Sample (IP Section 03.11) (3 Samples)

(1) Unit 1 (January 01, 2020 through December 31, 2020)
(2) Unit 2 (January 01, 2020 through December 31, 2020)
(3) Unit 3 (January 01, 2020 through December 31, 2020)

71153 - Followup of Events and Notices of Enforcement Discretion

Event Followup (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated an event that resulted in a smoke alarm and a small fire involving a single relay inside a relay panel located outside of the Unit 2 main control room during the performance of a planned surveillance test on February 10, 2021. The licensee responded immediately by sending operators to the scene and observed that the smoke and fire had self-extinguished within two minutes of receipt of the smoke alarm. In parallel, the fire brigade was dispatched in accordance with the fire response procedure. The cause of the event was determined to be a binding armature plate which caused a buildup of current in the coil resulting in failure of the single relay. This issue was placed in the licensee's corrective action program for relay replacement. There was no effect on any other equipment and the relay was safety related. The Inspectors followed up to perform an independent inspection to ensure that no other components or systems were affected in this event.

Event Report (IP Section 03.02) (2 Samples)

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

(1) LER 05000296/2020-002-00, Main Steam Relief Valves Lift Settings Outside of Technical Specifications Required Setpoints (ADAMS Accession No. ML20189A179)
The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER therefore no performance deficiency was identified. The inspection conclusions associated with this LER are documented in this report under Inspection Results Section 71153.
(2) LER 05000296/2020-001-00, Core Spray System Inoperable for Longer than Permitted by Technical Specifications (ADAMS Accession No. ML20244A273)
The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER therefore no performance deficiency was identified. The inspection conclusions associated with this LER are documented in this report under Inspection Results Section 71153.

INSPECTION RESULTS

Unit 3 Main Steam Relief Valves (MSRVs) Lift Outside of Technical Specifications Limits			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section

Not Applicable	Severity Level IV NCV 05000296/2021001-01 Open/Closed	Not Applicable	71153

A self-revealed Severity Level IV Non-cited Violation (NCV) of Technical specification (TS) 3.4.3 and TS 3.0.4 was identified when the licensee discovered, through as found test results, that two of 13 MSRVs that were removed for testing had as found lift settings outside of the +/-3 percent setpoint band required for their operability.

Description: The Browns Ferry Unit 3 TS 3.4.3 requires 12 of the 13 MSRVs to be operable while in Modes 1, 2, and 3. On May 8, 2020, the Tennessee Valley Authority was notified of as-found testing results that two MSRVs from Unit 3 were outside of the +/-3 percent setpoint band required for operability. It was determined that these MSRVs failed due to corrosion bonding between the pilot valve disc and seat. More than one MSRV were considered to be inoperable during the entire operating cycle from April 5, 2018 to February 22, 2020 and longer than permitted by TS. Additionally, TS 3.0.4 requires that when a limiting condition for operation (LCO) is not met, entry into an applicable Mode or specified condition is not permitted unless the associated actions permit continued operation. On November 25, 2019, following a forced outage to perform repairs on unrelated equipment , the licensee entered a TS 3.4.3 applicable Mode when the required actions for continued operation were not met.

The affected valves remained capable of maintaining reactor pressure below the American Society of Mechanical Engineers code limit of 1375 psig. All 13 of the MSRV pilot valves have been replaced during the Unit 3 Spring 2020 refueling outage. The previous corrective action from LER 05000260/2019-002-00 to apply a platinum coating to the pilot using the plasma enhanced magnetron sputtering deposition method (PEMS), which improves the quality and adhesion of the coating, had not yet been implemented.

Corrective Actions: The licensee replaced all 13 MSRV pilot valves during the Spring 2020 refueling outage. The installed valves have implemented corrective actions from past occurrences of corrosion bonding that include preparing the pilot discs in accordance with the revised procedure and vendor recommendations. The currently installed refurbished valves had platinum coatings applied utilizing the PEMS deposition method, and as-left values were verified to be within +/- one percent of their setpoints.

Corrective Action References: CRs 962223, 1286467, 1606785

Performance Assessment: The NRC determined this violation was not reasonably foreseeable and preventable by the licensee and therefore is not a performance deficiency.

Enforcement:

Severity: This violation is characterized as a Severity Level IV NCV based on its similarity to SLIV example 6.1.d.1 in the Enforcement Policy. The inspectors also reviewed NRC Enforcement Policy, Section 2.2.1, "Factors Affecting Assessment of Violations", which states, in part, that in determining the appropriate enforcement response to a violation, the NRC considers, whenever possible, risk information in assessing the safety or security significance of violations and assigning severity levels. The inspectors determined the issue to be of very low safety significance because the valves remained capable of performing their required safety function.

Violation:

Browns Ferry Nuclear Plant, Unit 3 TS Subsection 3.4.3, 'Safety/Relief Valves (S/RVs),' Condition A, requires that with one or more required S/RVs inoperable, that the unit be in Mode 3 within 12 hours and Mode 4 in 36 hours. Contrary to the above, one required S/RVs was inoperable from April 5, 2018, to February 22, 2020, and the unit did not enter Mode 3 and Mode 4 in 12 hours and 36 hours, respectively.

Browns Ferry Nuclear Plant, Unit 3 TS Section 3.0, 'LCO Applicability', Subsection LCO 3.0.4, requires, in part, that when an LCO is not met, entry into a mode or other specified condition in the applicability shall only be made when the associated actions to be entered permit continued operation in the mode or other specified condition in the applicability for an unlimited period of time. Contrary to the above, on November 25, 2019, Unit 3 entered a TS 3.4.3 applicable mode when LCO TS 3.4.3 required actions were not met.

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

Unit 2 Core Spray System Inoperable for Longer than Permitted by Technical Specifications			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000260/2021001-02 Open/Closed	Not Applicable	71153

A self-revealed Severity Level IV Non-cited Violation (NCV) of Technical specification (TS) 3.5.1, 3.0.4, and 3.0.3 was identified when the licensee discovered on July 6, 2020, through a failed autostart and failed manual attempts, the 2A Core Spray Room Cooler was non-functional, which rendered the Loop I Core Spray system inoperable.

Description: The Browns Ferry Unit 2 TS 3.5.1 requires the low pressure coolant injection subsystems associated with the Emergency Core Cooling System (ECCS) to be operable in Modes 1, 2 and 3. On July 6, 2020, the Tennessee Valley Authority identified that the 2A Core Spray Room Cooler would not auto-start in response to elevated room temperatures and could not be manually started. It was determined through troubleshooting that the 2A Core Spray Room Cooler Fan failed due to sporadic mechanical binding causing overcurrent trips on the motor's thermal overloads. This binding was due to a loose bearing in the motor. This motor bearing issue was not detectable from monitoring vibration data.

Previously the thermal overloads had been found tripped during surveillance testing on May 29, 2020 and July 1, 2020. The thermal overloads were reset each time. On July 2, 2020, the thermal overloads were replaced. On July 12, the 2A Core Spray Room cooler was declared functional after the completion of repair work and their associated post-maintenance tests. On July 17, 2020, an engineering evaluation determined that the non-functional 2A Core Spray Room Cooler caused inoperability of the Loop I Core Spray System from May 29, 2020 until July 12, 2020, for a period of approximately 44 days. This resulted in the inoperability of the 2A and 2C Core Spray pumps, which rendered the BFN, Unit 2 Loop I Core Spray System inoperable for longer than permitted by TS 3.5.1.

Additionally, on June 6, 2020 Unit 2 entered Mode 4 for a planned midcycle outage to perform maintenance associated with the main turbine condensers. On June 10, 2020,

following completion of the required maintenance on Unit 2, modes 3 and 2 were entered and the unit was returned to service. By entering Modes 3 and 2, BFN entered TS 3.5.1 applicable modes when the required actions of TS 3.5.1 were not met, which is contrary to the requirements of LCO TS 3.0.4.

On June 13, 2020, the Unit 2 Loop II Core Spray system was declared inoperable from 0257 CDT to 0315 CDT for routine surveillance testing, making both Core Spray subsystems inoperable during those times. Two ECCS subsystems inoperable in Mode 1 met the entry conditions for LCO TS 3.5.1, Condition H, which required an immediate entry into LCO TS 3.0.3. The required action for LCO TS 3.5.1, Condition H was unmet. While entry into LCO TS 3.0.3 was unmet, this equipment configuration was of low risk significance to the plant

Corrective Actions: The licensee replaced the motor, thermal overloads, temperature switch, and starter coil for the Core Spray Cooler Fan. They also are creating a preventative maintenance action to measure the current readings to the thermal overloads every two years, during the summer months when the fan is in high use.

Corrective Action References: CRs 1612226, 1620331, 1620905, 1621239

Performance Assessment: The NRC determined this violation was not reasonably foreseeable and preventable by the licensee and therefore is not a performance deficiency.

Enforcement:

Severity: Since a violation of technical specifications was identified for the core spray system, a bounding risk analysis was performed by a regional Senior Reactor Analyst (SRA). Using SAPHIRE 8 version 8.2.1 and the Brown's Ferry Unit 2 SPAR model version 8.57 dated February 27, 2017, the SRA conservatively assumed the supported core spray pumps would start but fail to continue running for their required mission time over the entire 44 day exposure period. The dominant accident sequence was a loss of condenser heat sink event with failure of suppression pool cooling, control rod drive pumps, condensate pumps, and low pressure injection. The change on core damage frequency was less than 1 E-7 events per year which corresponds to a finding of very low safety significance (Green) if evaluated under the ROP. Therefore, characterizing this issue as a Severity Level IV NCV is appropriate since no performance deficiency was identified

Violation:

Browns Ferry Nuclear Plant, Unit 2 TS Subsection 3.5.1, 'ECCS -Operating,' Condition A, requires that with one low pressure ECCS injection/spray subsystem inoperable the subsystem must be restored to operable status within 7 days. Condition B requires that if the required action and associated completion time of Condition A is not met then the unit must be in Mode 3 within 12 hours and be in Mode 4 within 36 hours. Contrary to the above, the required Core Spray system was inoperable from May 29, 2020, to July 12, 2020, and the unit did not enter Mode 3 and Mode 4 in 12 hours and 36 hours, respectively.

Browns Ferry Nuclear Plant Unit 2 TS Section 3.5.1 Condition H, requires immediate entry into TS LCO 3.0.3 when two or more low pressure ECCS spray subsystems were inoperable while in Mode 1. Contrary to the above, on the June 13, 2020 surveillance, two low pressure ECCS spray subsystems were inoperable for approximately 15 minutes, and LCO TS 3.0.3 was not entered.

Browns Ferry Nuclear Plant, Unit 2 TS Section 3.0, 'LCO Applicability', Subsection LCO 3.0.4, requires, in part, that when an LCO is not met, entry into a mode or other specified condition in the applicability shall only be made when the associated actions to be entered permit continued operation in the mode or other specified condition in the applicability for an unlimited period of time. Contrary to the above, on June 10, 2020, Unit 2 entered a TS 3.5.1 applicable mode when LCO TS 3.5.1 required actions were not met.

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

EXIT MEETINGS AND DEBRIEFS

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

- On April 27, 2021, the inspectors presented the integrated inspection results to Mr. Matthew Rasmussen and other members of the licensee staff.
- On March 19, 2021, the inspectors presented the ISI Exit Meeting inspection results to Quinn Leonard, Director of Site Engineering and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Procedures	0-AOI-100-7	Severe Weather	46
		0-GOI-200-1	Freeze Protection Inspection	93
		0-OI-44	Building Heating System	36
71111.04	Drawings	0-47E873-1-LR	License Renewal Flow Diagram Aux Decay Heat Removal System Sheet 1	Revision 0
		0-47E873-2	Flow Diagram Aux Decay Heat Removal System Sheet 2	Revision 8
	Procedures	0-OI-72	Auxiliary Decay Heat Removal System	Revision 67
		0-OI-72/ATT-1	Auxiliary Decay Heat Removal System Valve Lineup Checklist	Revision 55
		0-OI-72/ATT-2	Auxiliary Decay Heat Removal System Panel Lineup Checklist	54
		0-OI-72/ATT-3	Auxiliary Decay Heat Removal System Electrical Lineup Checklist	Revision 55
71111.05	Drawings	0-47E216-107	Ignition Source Drawings Plan El. 617.0 & 621.25	Revision 4
		0-47E216-108	Ignition Source Drawings Plan El. 606.0, 617.0, & 621.25	Revision 3
	Fire Plans	FPR Appendix F - FA 16	Fire Safety Analysis- Fire Area 16	Revision 4
		FPR-Volume 2	Fire Protection Report Volume 2 - Control Building Unit 1, 2, and 3 Elevation 617'	Revision 68
		NFPA 805 Fire Protection Report	Appendix F Fire Area 26	Revision 5
	Miscellaneous		NFPA 805 Fire Protection Report, Appendix F, Fire Area 16	Revision 4
	Procedures	FPDP-5	Development and Evaluation of Fire Drills	0006
		FPR-Volume 2	Fire Protection Report Volume 2	0067
		NPG-SPP-18.4.7	Control of Transient Combustibles	Revision 13
		TPD-FBT	Training Program Description	16
	Work Orders	WO 117448287	O-SI-4.11.G.1.B(2) Visual Inspection of Second Period Appendix R Fire Dampers	03/30/2017
71111.06	Work Orders	121126475		
71111.11Q	Miscellaneous	TVA-COLR-BF3C20	Browns Ferry Unit 3 Cycle 20 Core Operating Limits Report	1

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	Procedures	3-OI-68	Reactor Recirculation System	0099
		BFN-ODM-4.20	Strategies for Successful Transient Mitigation	Revision 7
		NPG-SPP-17.8.4	Conduct of Simulator Operations	Revision 7
71111.13	Calculations	MDG107520020079	MOV 1-FCV-075-0009 & 1-FCV-075-0037, Operator Requirements and Capabilities	Revision 4
	Miscellaneous		Daily Operational Focus Report	01/07/2021
			Operational Decision-Making Issue - CR 1579775	10/23/2020
			Operational Decision-Making Issue - CR 1579775	01/28/2020
			Operational Decision-Making Issue - CR 1579775	07/24/2020
		BFN-VTD-f990-0360	U-1 Flowserve Instruction Manual for 3" - Class 300 Double Disc Gate Valve	Revision 0
	Procedures	0-TPP-FPP-011	BFN NFPA 805 Non-Power Operations Fire Risk Management	Revision 4
		2-AOI-74-1	Loss of Shutdown Cooling	Revision 41
		2-AOI-78-1	Fuel Pool Cleanup System Failure	Revision 34
		BFN-ODM-4.18	Protected Equipment	0029
	Work Orders	122004311	Step Text for Draining the Unit 2 to and from Condensate Storage Tanks 4 and 5.	03/26/2021
71111.15	Calculations	MDQ0999910034	NRC Generic Letter 89-10 Motor Operated Valve Evaluation	Revison 25
		MDQ3074920421	MOV 3-FCV-0707 Operator Requirements and Capabilities	Revision 10
		NDQ0074880118	Evaluation of LPCI Flow to Reactor Pressure Vessel (RPV) with Failed Open Min-Flow Bypass Valve	Revision 7
	Corrective Action Documents	1656615		
		CR 1664613, 1664601, 1664478, 1442560		
	Miscellaneous	General Design Criteria Document, BFN-50-7067	Emergency Equipment Cooling Water System	Revision 25
	Operability Evaluations		Operability Evaluation for CR 1656615	
			Operability Evaluation for CR 1260785	
	Procedures	0-OI-67	Emergency Equipment Cooling Water System	Revision 126

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		OPDP-8	Operability Determination Process and Limiting Conditions for Operation Tracking	Revision 27
		OPDP-8	Operability Determination Process and Limiting Conditions for Operation Tracking	Revision 27
71111.18	Engineering Changes	BFN-19-915	Replace Obsolete or Failing Indoor Emergency Lights	0
71111.19	Corrective Action Documents	CR 1657494, 1652657		
		CR 1663238, 1664341, 1670187, 1670687		
		CR 1666877, 1666882, 1666962, 1667452, 1666983, 1667119		
	Drawings	3-47E813-1	Flow Diagram Reactor Core Isolation Cooling System	Revision 52
	Engineering Evaluations	IEE-TVA-2021-0016	Equivalency Evaluation between a carbon steel Flowserve Class gate valve without actuator and carbon steel Flowserve gate valve with actuator	Revision 0
	Miscellaneous		Radioiodine Test Report	January 16, 2021
		OPDP-1	BFN Operations Log - Selected Log Entries	03/25/2021
	Procedures	0-SR-3.6.4.1.3	Combined Secondary Containment Drawdown and Integrity Test	Revision 21
		0-SR-3.6.4.3.2(B)	Standby Gas Treatment Train B - Iodine Removal Efficiency	Revision 14
		2-SI-4.7.A.2.G-3/71A	Primary Containment Local Leak Rate Test RCIC Turbine Steam Supply: Penetration X-10	Revision 23
		2-SR-3.6.1.3.6	Main Steam Isolation Fast Closure Test	Revision 16
		3-SR-3.6.1.3.5(RCIC)	RCIC System MOV Operability	Revision 47
		MCI-0-000-GTV002	Double Disc, Pressure Seal Gate Valve	Revision 26
		MCI-0-068-VLV001	Reactor Recirculation Valves FCV-068-01, -03, -77 and -79 Disassembly, Inspection, Rework and Reassembly	Revision 13

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		MMTP-141	Routine Inspection and Maintenance of Limitorque Motor Actuators	Revision 2
		MMTP-144	Motor Operated Valve Diagnostic Testing	Revision 5
		PMT-0-000-TST001	Post Maintenance Testing Matrices	Revision 18
	Work Orders	118002879, 120597296, 120855145		
		121573120	Diesel Generator C Cooling Water Heat Exchanger C1	03/22/2021
		WO 119334050		
		WO 120837984	2-SR-3.6.1.3.6 Main Steam Isolation Valve Fast Closure Test	3/19/2021
		WO 121160921, 121160926, 121160923, 121599602, 117376270		
		WO 121165532, 121796964, 121165532		
		WO 121845916, 121847098, 121856197, 121909192, 121924223		
71111.20	Miscellaneous		U2 Cycle R21 Outage Safety Plan	02/22/2021
	Procedures	NPG-SPP-07.2.11	Shutdown Risk Management	14
71111.22	Corrective Action Documents	CR 1673948, 1674528, 1665091		
		CR 1679082, 1679284, 1676190		
	Drawings	2-47E811-1	Flow Diagram Residual Heat Removal System	Revision 76
	Engineering Evaluations	09-2-IST-023-387	Baseline reference value for the opening of valves 2-FCV-023-0034 and 2-FCV-023-0040	05/28/2009
		13-0-IST-023-486	Reference values for the closing of valves 2-FCV-23-34. 2-	04/06/2013

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			FCV-23-40, and other valves	
	Procedures	0-SR-3.8.1.6	Common Accident Signal Logic	Revision 33
		0-SR-3.8.1.9(B)	Diesel Generator B Emergency Unit 2 Load Acceptance Test	Revision 0022
		1-SI-A.2.3.1.5	EHPM Annual Flow Rate Functional B SDG	5
		1-SR-3.3.5.1.6(ADS B)	ADS Logic System Functional Test - Bus B Time Delay Relay Calibration and Bus Power Monitor Test	Revision 12
		2-SI-3.2.74(RHR I)	Pressure Isolation Valve Leakage Test RHR Loop I Shutdown Cooling Return	Revision 17
		2-SI-4.5.C.1(A)	RHRSW HX A Valves Quarterly IST Test	Revision 9
		2-SI-4.5.C.1(C)	RHRSW HX C Valves Quarterly IST Test	Revision 9
		2-SI-4.7.A.2.G-3/71-A	Primary Containment Local Leak Rate RCIC Turbine Steam Supply: Penetration X-10	23
		2-SR-3.3.1.2.5 & 6	Source Range Monitor Functional Test with Reactor Mode Switch Not in Run Position	Revision 17
		3-SR-3.3.5.1.6	ADS Logic System Functional Test - Bus B Time Delay Relay Calibration and Bus Power Monitor Test	0021
		3-SR-3.5.1.3(CS I)	Core Spray Flow Rate Loop I	Revision 37
	Work Orders	120837669, 120982486		
		120838215		
		121166343, 121166345		
		WO 120588202, 120588219		
		WO 121165757		
		WO 1219788693	2-CKV-74-54 Disc Seating Leakage Measurement	Revision 3
71151	Procedures	1-SR-3.4.6.1	Dose Equivalent Iodine 131 Concentration	8
		2-SR-2	Instrument Checks and Observations	Revision 86
	Work Orders	12013360, 120133365, 120898236		
71153	Corrective Action Documents	CR 962223, 1157981, 1252419,		

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		1286467, 1294336, 1410577, 1416473, 1475055, 1521190, 1606785		
	Miscellaneous		Unit 3 MSRV As-found Safety Valve Test Data	
	Procedures	0-AOI-26-1	Fire Response	21
		EPIP-17	Fire Emergency Procedure	36