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

May 3, 2023

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

SUBJECT: BROWNS FERRY NUCLEAR PLANT – INTEGRATED INSPECTION REPORT 05000259/2023001, 05000260/2023001 AND 05000296/2023001

Dear Mr. Barstow:

On March 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Browns Ferry Nuclear Plant. On April 17, 2023, the NRC inspectors discussed the results of this inspection with Mr. Manu Sivaraman and other members of your staff. The results of this inspection are documented in the enclosed report.

One Severity Level IV violation without an associated finding is documented in this report. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

No NRC-identified or self-revealing findings were identified during this inspection.

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 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,

Signed by McKown, Louis
on 05/03/23

Louis J. McKown, II, 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 05000259/2023001, 05000260/2023001 AND 05000296/2023001 Dated May 03, 2023

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ADAMS ACCESSION NUMBER: **ML23122A221**

X SUNSI Review		X Non-Sensitive ☐ Sensitive		X Publicly Available ☐ Non-Publicly Available	
OFFICE	RII/DRP	RII/DRP	RII/DRP		
NAME	J. Steward	S. Ninh	L. McKown		
DATE	05/02/2023	05/03/2023	05/03/2023		

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000259, 05000260 and 05000296
License Numbers:	DPR-33, DPR-52 and DPR-68
Report Numbers:	05000259/2023001, 05000260/2023001 and 05000296/2023001
Enterprise Identifier:	I-2023-001-0018
Licensee:	Tennessee Valley Authority
Facility:	Browns Ferry Nuclear Plant
Location:	Athens, Alabama
Inspection Dates:	January 01, 2023 to March 31, 2023
Inspectors:	N. Karlovich, Resident Inspector B. Kellner, Senior Health Physicist M. Magyar, Reactor Inspector A. Nielsen, Senior Health Physicist K. Pfeil, Resident Inspector J. Steward, Senior Resident Inspector
Approved By:	Lou J. McKown, II, 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

Severity Level (SL) IV Non-cited Violation (NCV) associated with Licensee Event Report (LER) 2022-001-00 for Browns Ferry Nuclear Plant, Unit 3, Main Steam Relief Valves Lift Settings Outside of Technical Specifications Required Setpoints			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000296/2023001-01 Open/Closed	Not Applicable	71153
A self-revealed Severity Level IV 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 4 of 13 Main Steam Relief Valves (MSRVs) that were removed for testing had lift settings outside of the +/- 3 percent setpoint band required for their operability.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000296/2022-001-00	LER 2022-001-00 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 full (100 percent) rated thermal power (RTP). On January 30, 2023, the unit was taken off-line to commence a forced outage (F109) to repair an electro-hydraulic control (EHC) fluid leak on main turbine control valve (MTCV) #2. Following corrective actions, the unit was restarted on February 1, 2023, connected to the electric grid on February 2, 2023, and returned to full RTP on February 6, 2023, where it operated at or near this level for the remainder of the inspection period.

Unit 2 began the inspection period at full RTP. On January 11, 2023, the unit began coastdown in preparation for a planned refueling outage (2R22) which began on February 17, 2023. During the refueling outage, the licensee discovered a cracked weld on the drain valve for reactor recirculation pump A discharge valve. This condition resulted in elevated unidentified floor drain leakage observed during the previous operating cycle. The unit was restarted on March 22, 2023, and returned to full RTP on March 27, 2023, where it operated at or near this level for the remainder of the inspection period.

Unit 3 began the inspection period at full RTP. On January 27, 2023, operators lowered reactor power to 70 percent RTP to complete planned condenser circulating water (CCW) system tube leak repairs to the C2 CCW water box and perform a planned control rod sequence exchange. On January 29, 2023, the unit was returned to full RTP. On February 8, 2023, operators lowered reactor power to 70 percent RTP to perform planned maintenance to repair tube leaks identified on the A2 CCW water box. On February 11, 2023, following completion of planned corrective maintenance, the unit was returned to full RTP, where it operated at or near this level 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 performed activities described in IMC 2515, Appendix D, “Plant Status,” observed risk significant activities, and completed on-site portions of IPs. 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.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

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 of a tornado watch on January 3, 2023.

(2) 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 rains and potential for tornadoes on February 16, 2023.

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) Unit 3 Core Spray (CS) Loop I while CS Loop II was undergoing planned maintenance on January 19, 2023.

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (4 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) Fire Area 3-1, which includes the Unit 3 Reactor Building NW and SW quadrants on Elevation 519' on January 24, 2023
(2) Fire Area 26, which includes the Unit 1 Turbine Building Elevations 565' and 604', Unit 2 Turbine Building Elevation 586', and Unit 3 Turbine Building Elevation 617' on February 2, 2023
(3) Fire Area 04, which includes the Unit 1, Electrical Board Room 1B Elevation 593 on February 23, 2023
(4) Fire Area 26, specifically Unit 2 Moisture Separator Room after leaking EHC oil was discovered on March 20 and 21, 2023

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 located in the Unit 1 Mechanical Equipment Room, Control Bay Elevation 606' on January 10, 2023.

71111.06 - Flood Protection Measures

Flooding Sample (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated flooding mitigation protections for the underground cables associated with the residual heat removal service water system in manhole covers 15 and 26 on January 9, 2023

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 20 - March 2, 2023:

03.01.a - Nondestructive Examination and Welding Activities.

1. Ultrasonic Testing (UT)
    a. DSC-2-07, Elbow to Elbow, Augmented Exam (observed)
    b. GMS-2-24, Pipe to Tee, Class 1 (observed)
    c. N10-1, Tee to Safe-end, Class 1 (observed)

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 evolutions:
- Unit 1 manual scram, depressurization and cooldown due to EHC system repairs on MTCV #2 as part of F109 on January 30, 2023
- Unit 1 control rod withdrawal to criticality and point of adding heat (POAH) following restart from F109 on February 1, 2023
- Unit 2 manual scram, depressurization and cooldown as part of entering 2R22 on February 17, 2023
- Unit 2 control rod withdrawal to criticality and POAH following restart from 2R22 on March 21, 2023

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

(1) The inspectors observed and evaluated a licensed operator requalification training session which included a H2/O2 Analyzer failure, a condensate pump trip, an EHC system leak, a recirculation pump trip, a drywell leak, and a high-power anticipatory transient without scram (ATWS) on the Unit 2 simulator on January 23, 2023. This training session required the crew to enter various abnormal operating instructions (AOI), emergency operating instructions (EOI) and emergency plan implementing procedures (EPIP) to control the plant and appropriately classify the emergency.

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) Unit Common B condensate transfer pump breaker tripped per CRs 1818171 and 1827523 on February 27, 2023

(2) Unit 2 reactor recirculation discharge valves A and B body drain valve replacement per work orders 123498959 and 123489241 on March 21, 2023

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 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) Medium site aggregate risk and protected equipment alignment per NPG-SPP-07.3.4, Protected Equipment established for Unit 2 maneuvering power greater than 10 percent per 2-GOI-100-12, Power Maneuvering in preparation for 2R22 on February 17, 2023
(2) Elevated yellow risk for shutdown cooling within 24 hours of shutdown verified protected equipment was in correct alignment per the 2R22 Outage Safety Plan (OSP) on February 18, 2023
(3) High Risk Evolution (HRE) per National Fire Protection Association (NFPA) 805, per the 2R22 OSP from the period of reactor cavity drain down through reactor pressure vessel (RPV) head fully tensioned on March 11, 2023
(4) Unit 2, review of risk mitigation plans and the OSP for the 2R22 outage covering February 17, 2023 through March 17, 2023

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (6 Samples)

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

(1) During performance of Control Room Air Conditioning System Performance, 0-SR-3.7.4.1(CW A), desired flow was found to be outside of acceptance criteria on February 9, 2023
(2) Unit 1 HPCI turbine oil leak per CR 1828718 on February 10, 2023
(3) Unit 3 Standby Liquid Control (SLC) tank slowly rising per CR 1834284 on February 13, 2023
(4) Unit 3 High Pressure Coolant Injection (HPCI) turbine insulation installed incorrectly per CR 1840358 on March 8, 2023
(5) Unit 2 pressure boundary Leakage discovered at the body drain valve for reactor recirc A discharge valve, BFN-2-FCV-068-0003 on March 9, 2023
(6) Unit 2 BFN-2-HCU-085-38-55 was leaking from control rod drive hydraulic control unit water accumulator excessively per CR 1836573 on March 10, 2023

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) Unit Common control bay chiller A and B fan fuse permanent reconfiguration per BFN-21-005 on March 23, 2023

71111.20 - Refueling and Other Outage Activities

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

(1) The inspectors evaluated various activities associated with a planned Unit 2 refueling outage from February 17 through March 22, 2023

71111.24 - Testing and Maintenance of Equipment Important to Risk

The inspectors evaluated the following testing and maintenance activities to verify system operability and/or functionality:

Post-Maintenance Testing (PMT) (IP Section 03.01) (6 Samples)

(1) Unit 3 Residual Heat Removal (RHR) pump A shutdown cooling suction valve, 3-MVOP-074-0002 post maintenance testing following the performance of motor operated valve analysis and test system (MOVATS) testing on January 3, 2023
(2) Emergency Diesel Generator (EDG) B battery charger A low output voltage, not charging batteries following repairs and post maintenance testing per work order (WO) 123392855 on January 19, 2023
(3) Unit 1 HPCI steam line condensate outboard drain valve, 1-FCV-073-0006B post maintenance testing following diaphragm replacement on January 26, 2023
(4) Unit 1 MTCV No. 2 emergent repairs following (EHC) oil leak from flared fitting per WO 123442555 on February 3, 2023
(5) Unit 2 Residual Heat Removal Service Water (RHRSW) Heat Exchanger (HX) 2A Inlet Valve, 2-SHV-023-0031 post maintenance testing following internal valve repair per WO 123523396 on March 8, 2023
(6) Unit 2 B inboard MSIV, 2-FCV-001-0026 post maintenance testing following refurbishing of needle valve due to leak on dashpot reservoir per WO 123553250 on March 21, 2023.

Surveillance Testing (IP Section 03.01) (6 Samples)

(1) Unit 2 Reactor Core Isolation Cooling (RCIC) rated flow at normal operating pressure, 2-SR-3.5.3.3, per WO 122525136 on January 4, 2023
(2) Unit 2 Core Spray Flow Rate Loop II, 2-SR-3.5.1.6(CS II) on January 13, 2023
(3) Unit 1 reactor cooldown rate monitoring surveillance on February 1, 2023
(4) Unit 2 reactor cooldown rate monitoring surveillance on February 18, 2023
(5) Unit 1 RCIC rated flow at normal operating pressure, 1-SR-3.5.3.3, per WO 122744406 on March 2, 2023
(6) Unit 2 15-year containment integrated leak rate test (CILRT) on March 27, 2023

Inservice Testing (IST) (IP Section 03.01) (1 Sample)

(1) Unit 2 Quarterly RHR System Rated Flow Test - Loop I, 2-SR-3.5.1.6(RHR I) on March 9, 2023

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

(1) Unit 2 Primary Containment Local Leak Rate Test Recirculation Pump-A Seal Injection for valves 2-CKV-68-508 and 2-CKV-68-550, 2-SI-4.7.A.2-3/68a on February 25, 2023

71114.06 - Drill Evaluation

Select Emergency Preparedness Drills and/or Training for Observation (IP Section 03.01) (1 Sample)

(1) The inspectors reviewed and evaluated the emergency response organization drill response during a Unit 2 Mode 1 scenario that involved on onsite fire lasting greater than 15 minutes, followed by a trip of the reactor recirculation pump concurrent with the loss of torus temperature monitoring capability. This led to the control room operators evaluating the emergency plan implementing procedures to execute required action to make timely notifications of the event to the state and regulatory agency. The scenario continued with a leak developing in the drywell, which found its way into the secondary containment resulting in the crew taking action to emergency depressurize and activate the emergency facilities to assist in setting priorities to mitigate the emergency situation on January 25, 2023.

RADIATION SAFETY

71124.01 - Radiological Hazard Assessment and Exposure Controls

Radiological Hazard Assessment (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated how the licensee identifies the magnitude and extent of radiation levels and the concentrations and quantities of radioactive materials and how the licensee assesses radiological hazards.

Instructions to Workers (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated how the licensee instructs workers on plant-related radiological hazards and the radiation protection requirements intended to protect workers from those hazards.

Contamination and Radioactive Material Control (IP Section 03.03) (2 Samples)

The inspectors observed/evaluated the following licensee processes for monitoring and controlling contamination and radioactive material:

(1) Workers exiting the Radiologically Controlled Area
(2) Controls for highly radioactive material in the spent fuel pool

Radiological Hazards Control and Work Coverage (IP Section 03.04) (4 Samples)

The inspectors evaluated the licensee's control of radiological hazards for the following radiological work:

(1) 2-FCV-68-79 valve maintenance

(2) Contaminated pipe end grinding in Unit 2 steam tunnel
(3) Local power-range monitor maintenance
(4) 2-FCV-68-3 valve maintenance

High Radiation Area and Very High Radiation Area Controls (IP Section 03.05) (3 Samples)

The inspectors evaluated licensee controls of the following High Radiation Areas and Very High Radiation Areas:

(1) Unit 2 traversing incore probe room
(2) Refuel floor alternate decay heat removal heat exchanger
(3) Unit 3 turbine building

Radiation Worker Performance and Radiation Protection Technician Proficiency (IP Section 03.06) (1 Sample)

(1) The inspectors evaluated radiation worker and radiation protection technician performance as it pertains to radiation protection requirements.

71124.03 - In-Plant Airborne Radioactivity Control and Mitigation

Permanent Ventilation Systems (IP Section 03.01) (1 Sample)

The inspectors evaluated the configuration of the following permanently installed ventilation systems:

(1) Main control room emergency ventilation system

Temporary Ventilation Systems (IP Section 03.02) (2 Samples)

The inspectors evaluated the configuration of the following temporary ventilation systems:

(1) High efficiency particulate air (HEPA) unit 664, steam vault/main steam isolation valve room
(2) HEPA unit 618, refuel floor contaminated area exit downdraft

Use of Respiratory Protection Devices (IP Section 03.03) (1 Sample)

(1) The inspectors evaluated the licensee’s use of respiratory protection devices.

Self-Contained Breathing Apparatus for Emergency Use (IP Section 03.04) (1 Sample)

(1) The inspectors evaluated the licensee’s use and maintenance of self-contained breathing apparatuses.

71124.04 - Occupational Dose Assessment

Source Term Characterization (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated licensee performance as it pertains to radioactive source term characterization.

External Dosimetry (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated how the licensee processes, stores, and uses external dosimetry.

Internal Dosimetry (IP Section 03.03) (2 Samples)

The inspectors evaluated the following internal dose assessments:

(1) Reviewed results of five 'for cause' whole body counting and internal dose assessments performed for follow up to facial contamination or portal monitor alarms.
(2) Reviewed pre-dive, periodic, and final tritium bioassay results and internal dose assessment of torus divers during October 2022 dive activities.

Special Dosimetric Situations (IP Section 03.04) (3 Samples)

The inspectors evaluated the following special dosimetric situations:

(1) Reviewed declared pregnant worker records for three workers from February 2021 thru February 2023
(2) Reviewed extremity dosimetry monitoring results of workers performing Control Rod Drive changeout during the fall 2022 Unit 3 refueling outage.
(3) Reviewed extremity dosimetry monitoring results of workers performing torus diving during the fall 2022 Unit 3 refueling outage.

71124.05 - Radiation Monitoring Instrumentation

Walkdowns and Observations (IP Section 03.01) (9 Samples)

The inspectors evaluated the following radiation detection instrumentation during plant walkdowns:

(1) Area Radiation Monitors located at various in the Turbine and Reactor Buildings
(2) Portable friskers located at various locations in the Turbine and Reactor Buildings
(3) Continuous air monitors located at various locations in the Turbine and Reactor Buildings
(4) ARGOS-5AB Zeus (beta, gamma, and alpha) personnel contamination monitors located at the main radiologically controlled area exit
(5) GEM-5 portal type personnel contamination monitors located at the protected area exit
(6) Portable ion chamber dose rate meters available for use, or in use, in the Unit 2 drywell
(7) Portable telescoping and auto-ranging Geiger-Mueller (GM) dose rate meters available for use in multiple locations
(8) Small article/equipment monitors located at the main radiologically controlled area exit
(9) Air sample counting and analysis equipment (Sodium Iodide, Zinc sulfide, and thin window GM tube) located in the air sample lab

Calibration and Testing Program (IP Section 03.02) (14 Samples)

The inspectors evaluated the calibration and testing of the following radiation detection instruments:

(1) Eberline AMS 4, TVA ID # 860209, 07/20/2021
Eberline AMS 4, TVA ID # 860288, 9/10/2020 and 10/20/2022
Eberline AMS 4, TVA ID # 860396, 11/16/2020 and 10/20/2022
(2) Canberra iCAM, TVA ID # iCAM 5860, 11/1/2021 and 11/30/2022
(3) Ludlum 9-3 Ion Chamber dose rate meter, TVA ID # 951572, 3/30/2022
(4) Ludlum 12 w/43-92 Probe (alpha/beta frisker), TVA ID # 951018, 12/21/2020 and 3/29/2022
(5) Ludlum Model 177 frisker, TVA ID # 524085, 11/21/2021 and 12/13/2022
(6) Ludlum Model 3/3A frisker, TVA ID # 951710, 1/25/2021 and 3/16/2022
(7) Low volume air sampler, TVA ID # 860186, 10/1/2021 and 9/14/2022
(8) Canberra ARGOS-5AB / Zeus (alpha, beta, gamma) personnel contamination monitor, TVA ID # 00RE90-205, 2/5/2022 and 9/14/2022
Canberra ARGOS-5AB / Zeus (alpha, beta, gamma) personnel contamination monitor, TVA ID # 00RE90-206, 2/9/2022 and 9/22/2022
(9) Canberra Cronos-4 Small Article Monitor, TVA ID # 00RE90-CR212, 4/22/2022
(10) Unit 3 Drywell post-accident high range radiation monitors, 3-RM-90-272A and 3-RM-90-273A
(11) Main Control Room Radiation Monitor, 0-RM-090-008
(12) Unit 3 Reactor Building ventilation exhaust radiation monitor, 3-RM-250
(13) Counting Room Gamma Spectroscopy Systems - Detector 11 and Detector 12
(14) Eberline SAM-11 Small Article Monitor, TVA ID # 841990, 8/2/2022

Effluent Monitoring Calibration and Testing Program Sample (IP Sample 03.03) (3 Samples)

The inspectors evaluated the calibration and maintenance of the following radioactive effluent monitoring and measurement instrumentation:

(1) Liquid Radioactive Waste radiation monitor, 0-RM-90-130
(2) Main Stack Radiation Monitor, 0-RM-147 and 148
(3) Plant Vent Stack Wide Range Gaseous Effluent Monitoring System, 0-RE-90-93, 0-RE-90-98A, and 0-RE-90-98B (Normal, Mid, and High range)

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 02.10) (3 Samples)

(1) Unit 1 (January 1, 2022 through December 31, 2022)
(2) Unit 2 (January 1, 2022 through December 31, 2022)
(3) Unit 3 (January 1, 2022 through December 31, 2022)

BI02: RCS Leak Rate Sample (IP Section 02.11) (3 Samples)

(1) Unit 1 (January 1, 2022 through December 31, 2022)
(2) Unit 2 (January 1, 2022 through December 31, 2022)
(3) Unit 3 (January 1, 2022 through December 31, 2022)

OR01: Occupational Exposure Control Effectiveness Sample (IP Section 02.15) (1 Sample)

(1) March 5, 2022 through March 17, 2023

PR01: Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (RETS/ODCM) Radiological Effluent Occurrences Sample (IP Section 02.16) (1 Sample)

(1) January 1, 2022 through January 31, 2023

71152A - Annual Follow-up Problem Identification and Resolution

Annual Follow-up of Selected Issues (Section 03.03) (1 Sample)

(1) Corrective actions and work order associated with 2C inboard main steam isolation valve (MSIV) 2-FCV-1-37 failed stroke time criteria for technical specification (TS) surveillance requirement 3.6.1.3.6 on February 18, 2023.

71153 - Follow Up 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 50-296/2022-001-00 for Browns Ferry Nuclear Plant, Unit 3, Main Steam Relief Valve Lift Setting Outside of Technical Specifications Required Setpoints. The inspection conclusions associated with this LER are documented in this report under the Inspection Results Section.

INSPECTION RESULTS

Severity Level (SL) IV Non-cited Violation (NCV) associated with Licensee Event Report (LER) 2022-001-00 for Browns Ferry Nuclear Plant, Unit 3, Main Steam Relief Valves Lift Settings Outside of Technical Specifications Required Setpoints			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000296/2023001-01 Open/Closed	Not Applicable	71153
A self-revealed Severity Level IV 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 4 of 13 Main Steam Relief Valves (MSRVs) that were removed for testing had 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 10, 2022, the Tennessee Valley Authority was notified of as-found testing results that four 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 to the valve seats and non-quantifiable leakage known as simmering. More than one MSRV was considered to be inoperable during the entire operating cycle from March 25, 2020 to February 26, 2022 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 two separate occasions (April 3, 2020 and April 5, 2020) 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 2022 refueling outage.

Corrective Actions: The licensee replaced all 13 MSRV pilot valves during the Spring 2022 refueling outage. As left testing verified that these refurbished pilot valves were within +/- 1 percent of their setpoints. As most recently discussed in LER 50-260/2021-002-00, a flaking issue has been noted with the platinum coated pilot discs. The Boiling Water Reactor Owners' Group (BWROG) is continuing to work toward a solution to improve the quality and adhesion of the platinum coating on the discs. The corrective actions suggested by the BWROG will be incorporated by BFN as part of CA 1775232-003, to correct setpoint drift. To reduce the probability of seat leakage occurring in the future, pilot seat rebuilds will be performed in valves that have low stellite in the seat. In addition, on March 30, 2023, BFN submitted a BWROG endorsed technical specification request for amendment for NRC review and approval that revises the performance frequency of existing MSRV surveillance requirements and provides an alternative to demonstrate the capability of the relief valves to open when manually actuated during startup.

Corrective Action References: CRs 962223, 1286467, 1410577, 1521190, 1658693, 1699286, and 1775232

Performance Assessment: The NRC determined this violation was not reasonably foreseeable and preventable by the licensee and therefore is not a performance deficiency. Inspectors reviewed vendor procedure, "NWS-R-72, NWS Technologies Repair of Browns Ferry Target Rock "Interim" 2-Stage Main Steam Safety Relief Valves, Rev 3", used to rebuild the pilot valve and main valve disc assemblies and concluded the procedure was satisfactory.

Significance: A regional Senior Reactor Analyst (SRA) performed a bounding risk assessment of the underlying condition using SAPHIRE 8 Version 8.2.8 and the Browns Ferry Unit 3 Standardized Plant Analysis Risk (SPAR) model version 8.80, dated May 26, 2022. The SRA conservatively set the exposure time to a maximum of one year. Since BFN-3-PCV-001-0022 lifted above system design pressure, this valve considered to be unable to perform its American Society of Mechanical Engineers (ASME) code or Probabilistic Risk Assessment (PRA) function and was set to be true. The PRA function success criteria is that 11 of 13 relief valves open upon demand. The remaining three out of tolerance valves would open well below the system design pressure, but greater than the 3 percent above the technical specification lift set point. The calculation of record shows if 11 of 13 safety relief valves open by +3 percent of their technical specification lift points, maximum system pressure will remain below 110 percent of design pressure and meet ASME code function. Therefore, for safety relief valves BFN-3-PCV-004, 034, and 041, the SRA considered that each Browns Ferry operating unit has a non-safety related electrical logic system (MSRV Actuation Logic) installed, which provides defense in depth against MSRV

setpoint drift by electrically opening MSRV groups based upon setpoints at 1135 psig, 1145 psig and 1155 psig. The SRA conservatively adjusted the failure probability from a nominal failure probability of 2.11 E-3 to 2.5 E-1, using engineering judgement since the oxide binding only affected the pilot valve mechanical lift setpoint and not the operation of the main valve. The dominant accident sequence would be a plant transient caused by a main steam isolation valve going closed, with a failure of the Reactor Protection System (RPS) to trip the unit and 3 safety relief valves failing to open electrically or mechanically such that system pressure exceeded 110 percent of design pressure. The resulting change in core damage frequency was less than 1.0 E-6 corresponding to a finding of very low safety significance (Green).

Enforcement: This violation is characterized as a Severity Level IV NCV based on its similarity to SLIII example 6.1.c.1 in the Enforcement Policy.

Severity: This issue is considered within the traditional enforcement process because there was no performance deficiency associated with the violation of NRC requirements. Inspection Manual Chapter (IMC) 0611, "Power Reactor Inspection Reports," Section 11 states, in part, that "traditional enforcement is used to disposition violations receiving enforcement discretion or violations without a performance deficiency". The inspectors also reviewed NRC Enforcement Policy, Section 2.2.1, Factors Affecting Assessment of Violations", which states, in part, that "whenever possible the NRC uses risk information in assessing the safety significance of violations". Accordingly, after considering that the condition represented very low safety significance, the inspectors concluded that the violation would be best characterized as Severity Level IV under the traditional enforcement process.

Violation: Browns Ferry Nuclear Plant, Unit 3 TS LCO 3.4.3 requires the safety function of 12 S/RVs shall be operable in Modes 1, 2, and 3. 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, three required S/RVs were inoperable from March 25, 2020 to February 26, 2022, 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 April 3, 2020 and April 5, 2020, 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.

EXIT MEETINGS AND DEBRIEFS

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

- On April 17, 2023, the inspectors presented the integrated inspection results to Mr. Manu Sivaraman and other members of the licensee staff.
- On March 2, 2023, the inspectors presented the Inservice Inspection Exit Meeting inspection results to Manu Sivaraman, Site VP and other members of the licensee staff.

- On March 17, 2023, the inspectors presented the Radiation protection inspection exit meeting inspection results to Manu Sivaraman 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	Rev 50
71111.04	Drawings	3-47E814-1	Flow Diagram Core Spray System	Rev 35
	Procedures	3-OI-75	Core Spray System	Rev 78
		3-OI-75/ATT-1	Core Spray System Attachment 1 Valve Lineup Checklist	Rev 55
		3-OI-75/ATT-2	Core Spray System Attachment 2 Panel Lineup Checklist	Rev 56
		3-OI-75/ATT-3	Core Spray System Attachment 3 Electrical Lineup Checklist	Rev 56
		3-OI-75/ATT-4	Core Spray System Attachment 4 Instrument Inspection Checklist	Rev 55
		BFN-ODM-4.18	Protected Equipment	Rev 31
71111.05	Fire Plans	FPR Appendix F - FA 04	NFPA 805 Fire Protection Report Appendix F Fire Area 04	Rev 4
		FPR-Volume 2	Fire Protection Report Volume 2	Rev 74
	Miscellaneous	00082402	Fire Drill Evaluation Report for U1 Control Bay Mechanical Equipment Room	01/10/2023
	Procedures	NPG-SPP-18.4.7	Control of Transient Combustibles	Rev 17
		OPDP-3	Administration Of Pre-fire Plans, Fire Emergency Response, and Development/Evaluation of Fire Drills	Rev 0
71111.06	Corrective Action Documents	CR 1827993		01/09/2023
	Engineering Evaluations	B43060127001	Moisture Impervious Medium Voltage Cable	01/31/2006
	Miscellaneous	SS-E12.6.02	5-15kv Cable, Moisture Impervious, Ethlyene-Propylene Rubber Insulated	Rev 1
	Work Orders	WO 119139269 and 119297170		
71111.11Q	Miscellaneous		H2/02 Analyzer Failure, Condensate Pump Trip EHC leak, RR Reboot, DW leak, ATWS >5%	Rev 0
	Procedures	1-AOI-100-1	Reactor Scram	Rev 32
		1-GOI-100-12A	Unit Shutdown from Power Operation to Cold Shutdown and Reductions in Power During Power Operations	Rev 40
71111.12	Engineering Changes	BFN 23-018	Unit 2 Reactor Recirculation FCV-68-3 Drain Line Replacement and Plug	Rev 0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Work Orders	WO 123313822		
71111.13	Miscellaneous	Unit 2 2R22 Outage Safety Plan	Unit 2 Cycle R22 Outage Safety Plan	Rev 0
	Procedures	2-GOI-100-12	Power Maneuvering	Rev 50
		NPG-SPP-07.3.4	Protected Equipment	Rev 13
71111.15	Corrective Action Documents	1833383		02/09/2023
		CR 177206		
		CR 1828718		
		CR 1834284		
		CR 1836573		
	Engineering Evaluations	PDO 1507015	Prompt Determination of Operability for CR 1507015	04/12/2019
	Miscellaneous	EPRI TR-100759	Terry Turbine Maintenance Guide, HPCI application	11/2002
	Procedures	0-SR-3.7.4.1(CWA)	Control Room Air Conditioning System Performance	Rev 1
		3-SR-3.1.7.3	SLC SYS Enriched Sodium Pentaborate (SPB) Solution Concentration, Quantity Calculation, and ATWS Equivalency Calculation	Rev 55
		OPDP-8	Operability Determination Process and Limiting Conditions for Operations Tracking	Rev 30
	Work Orders	122281694		02/09/2023
		WO 123468351		
71111.18	Corrective Action Documents	1788301		03/23/2023
	Engineering Changes	BFN-21-005	Control Bay Chiller Fan Fuses	Rev 1
71111.24	Calibration Records	Calibration Certificate 250655	Report of Calibration for Fluke infrared thermometer E59812	11/17/2022
	Corrective Action Documents	1826922		
		1830955		01/24/2023
		1839434, 1839439		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Miscellaneous	ANSI/ANS-56.8-2002	Containment System Leakage Testing Requirements	11/27/2002
		BFN-50-7071	Reactor Core Isolation Cooling System Design Criteria Document	Rev 23
	Procedures	1-SR-3.3.3.1.4(G)	Verification of Remote Position Indicators for High Pressure Coolant Injection System Valves	Rev 7
		1-SR-3.4.9.1.(1)	Reactor Heatup and Cooldown Rate Monitoring	Rev 14
		1-SR-3.5.3.3	RCIC System Rated Flow at Normal Operating Pressure	Rev 48
		1-SR-3.6.1.3.5(HPCI)	HPCI System Motor Operated Valve Operability	Rev 26
		2-SI-4.7.A.2-3/68a	Primary Containment Local Leak Rate Test Recirculation Pump-A Seal Injection: Penetration X-37C	Rev 16
		2-SI-4.7.A.2.a-f	Primary Containment Integrated Leak Rate Test	Rev 17
		2-SI-4.7.A.2.a-f	Primary Containment Integrated Leak Rate Test	Rev 16
		2-SR-3.4.9.1(1)	Reactor Heatup and Cooldown Rate Monitoring	Rev 29
		2-SR-3.5.1.6(RHR I)	Quarterly RHR System Rated Flow Test - Loop I	Rev 49
		2-SR-3.5.3.3	RCIC System Rated Flow at Normal Operating Pressure	Rev 79
	Work Orders	123390778 and 123392855		01/19/2023
		123553250		03/21/2023
		WO 122303354		
		WO 122378622		02/18/2023
		WO 122525136		01/04/2023
71124.01	Corrective Action Documents	CR 1807401		
		CR 1820842		
		CR 1842611		
	Corrective Action Documents Resulting from Inspection	CR 1839367		
	Procedures	NISP-RP-004	Radiological Posting and Labeling	Rev 1
	Radiation Surveys	M-20221006-33	M0113 Unit 1 RXB 565' A&C RHR Hx Room	10/06/2022

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71124.03	Procedures	FP-0-000-INS027	Self Contained Breathing Apparatus	Rev 19
71124.04	Calculations		BFN Trend Analysis of In-Vivo Measurements [Semi-Annual evaluation including random whole body counts] January 2021 through December 2022	Various
		R38 230125 1063	Browns Ferry Nuclear Plant (BFN) - Prospective Determination for Occupational Exposure Calendar Year 2022	01/25/2023
	Corrective Action Documents		Condition Reports (CRs) 1729768, 1741186, 1743964, 1754023, 1756829, 1756905, 1758176, 1764395,1764740, 1771144, 1772646, 1781121, 1807415, 1808265, 1813387, and 1828855	Various
	Miscellaneous	22-011	Dosimetry Investigation Report (DIR) for CR 1756772	02/23/2022
		22-096	DIR for CR 1816731	11/14/2022
		NVLAP LAB CODE: 100518-0	Vendor dosimetry provider National Voluntary Laboratory Accreditation Program (NVLAP) Certificate of Accreditation for the period 01/10/2021 through 12/31/2023	Various
	Self-Assessments	1605001	Dosimetry Self Assessment	10/03/2020
71124.05	Corrective Action Documents		Condition Reports (CRs) 1755731, 1695165, 1705606, 1738589, 1739622, 1744743, 1735682, 1760402, 1776558, 1782357, 1808091, 1810217, 1824302, and 1828623	Various
	Miscellaneous		Browns Ferry Nuclear Plant Quarterly Instrument Failure Report [RP Portable and semi-fixed instruments], January 2021 through December 2022.	Various
	Work Orders	119696113	Work Order # 119696113, Wide Range Gaseous Effluent Radiation Monitor System Mid & High Range Calibration, 0-RE-90-98A and 98B	01/30/2020
		120133661	Work Order # 120133661, Wide Range Gaseous Effluent Radiation Monitor System Normal Range Calibration, 0-RE-90-093	07/08/2020
		120899316	Work Order # 120899316, Containment High Range Radiation Monitor Calibration, 3-RM-90-272A	11/23/2021
		121296047	Work Order# 121296047, Main Stack Effluent Radiation Monitor Calibration, 0-RM-90-147 and 148	10/29/2021
		121379766	Work Order # 121379766, Liquid Rad Waste Monitor	10/18/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Calibration, 0-RM-90-130	
		121682683	Work Order # 121682683, Containment High Range Radiation Monitor Calibration, 3-RM-90-273A	09/13/2022
		122418232	Work Order# 122418232, Main Stack Effluent Radiation Monitor Calibration	01/27/2023
71151	Corrective Action Documents		Condition Reports (CRs) 1661007, 1796759, 1803731, 1810217, 1811440, 1817265, and 1841724	Various
		CR 1840376		
	Miscellaneous		BFN 2021 Annual Radioactive Effluent Release Report	05/02/2022
			2022 Liquid and Gas Maximum Dose Summary Report (entire year)	01/19/2023
			January 2023 Liquid and Gas Maximum Dose Summary Report (year to date)	01/30/2023
			BFN 2020 Annual Radioactive Effluent Release Report	04/30/2021
	Work Orders	WO 122439969, 122425905, 122418649, 12249253, 122454002, 122426039		
71152A	Corrective Action Documents	1836565		02/18/2023
	Drawings	2-730E927-10		Rev 21
	Procedures	2-SI-5.5.6(MSIV)	Main Steam Isolation Valve Stroke Time Test	Rev 5
	Work Orders	122097702	Implement temporary modification to install a DC to DC converter (Tmod BFN-2-2021-001-003)	02/18/2023
71153	Corrective Action Documents	962223, 1286467, 1410577, 1521190, 1658693, 1699286, and 1775232		