



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

March 30, 2022

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

**SUBJECT: BROWNS FERRY NUCLEAR PLANT – TRIENNIAL FIRE PROTECTION
INSPECTION REPORT 05000259/2022010 AND 05000260/2022010 AND
05000296/2022010 AND APPARENT VIOLATION**

Dear Mr. Barstow:

On February 17, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Browns Ferry Nuclear Plant and discussed the results of this inspection with Mr. Daniel Komm and other members of your staff. The results of this inspection are documented in the enclosed report.

Section 71111.21N.05 of the enclosed report discusses a finding with an associated apparent violation for which the NRC has not yet reached a preliminary significance determination. The inspectors identified a finding and associated Apparent Violation of License Condition C.13, C.14, and C.7 for Units 1, 2, and 3 respectively when the licensee failed to perform adequate testing on credited incipient fire detection systems.

We intend to issue our final safety significance determination and enforcement decision, in writing, within 90 days from the date of this letter. The NRC's significance determination process (SDP) is designed to encourage an open dialogue between your staff and the NRC; however, neither the dialogue nor the written information you provide should affect the timeliness of our final determination. We ask that you promptly provide any relevant information that you would like us to consider in making our determination. We are currently evaluating the significance of this finding and will notify you in a separate correspondence once we have completed our preliminary significance review. You will be given an additional opportunity to provide additional information prior to our final significance determination unless our review concludes that the finding has very low safety significance (i.e., Green).

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 McCoy, Gerald
on 03/30/22

Gerald J. McCoy, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 05000259, 05000260,
and 05000296

License Nos. DPR-33, DPR-52,
and DPR-68

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV

SUBJECT: BROWNS FERRY NUCLEAR PLANT – TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000259/2022010 AND 05000260/2022010 AND 05000296/2022010 AND APPARENT VIOLATION DATED MARCH 30, 2022

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OFFICE	RII/DRS	RII/DRS	RII/DRS	RII/DRS	
NAME	W. Monk	D. Strickland	P. Braaten	G. McCoy	
DATE	03/30/2022	03/30/2022	03/30/2022	03/30/2022	

**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 05000259, 05000260, and 05000296

License Numbers: DPR-33, DPR-52, and DPR-68

Report Numbers: 05000259/2022010, 05000260/2022010, and 05000296/2022010

Enterprise Identifier: I-2022-010-0025

Licensee: Tennessee Valley Authority

Facility: Browns Ferry Nuclear Plant

Location: Decatur, AL

Inspection Dates: January 31–February 18, 2022

Inspectors: P. Braaten, Senior Reactor Inspector
W. Monk, Senior Reactor Inspector
D. Strickland, Reactor Inspector

Approved By: Gerald J. McCoy, Chief
Engineering Branch 2
Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a triennial fire protection 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

Failure to perform adequate testing on incipient fire detection systems.			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Pending AV 05000259,05000260,05000296/202201 0-01 Open	None (NPP)	71111.21N.05
The inspectors identified a finding and associated Apparent Violation of License Condition C.13, C.14, and C.7 for Units 1, 2, and 3, respectively, when the licensee failed to perform adequate testing on credited incipient fire detection systems.			

Additional Tracking Items

None.

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.

REACTOR SAFETY

71111.21N.05 - Fire Protection Team Inspection (FPTI)

Structures, Systems, and Components (SSCs) Credited for Fire Prevention, Detection, Suppression, or Post-Fire Safe Shutdown Review (IP Section 03.01) (4 Samples)

The inspectors verified that components and/or systems will function as required to support the credited functions stated for each sample. Additional inspection considerations are located in the fire hazards analysis (FHA) or safe shutdown analysis (SSA).

- (1) Unit 3 System 74 - Low Pressure Coolant Injection
- (2) Unit 2 System 211 - 4kV Shutdown Boards A, B, C, and D
- (3) Unit 2 Auxiliary Instrument Room Incipient Fire Detection System - Compartment 16-M
- (4) Unit 1 General Area Pre-Action Sprinkler System - Compartment 01-04

Fire Protection Program Administrative Controls (IP Section 03.02) (1 Sample)

The inspectors verified that the selected control or process is implemented in accordance with the licensee's current licensing basis. If applicable, ensure that the licensee's FPP contains adequate procedures to implement the selected administrative control. Verify that the selected administrative control meets the requirements of all committed industry standards.

- (1) Transient Combustible Control Program

Fire Protection Program Changes/Modifications (IP Section 03.03) (1 Sample)

The inspectors verified the following:

- a. Changes to the approved FPP do not constitute an adverse effect on the ability to safely shutdown.
- b. The adequacy of the design modification, if applicable.
- c. Assumptions and performance capability stated in the SSA have not been degraded through changes or modifications.
- d. The FPP documents, such as the Updated Final Safety Analysis Report, fire protection report, FHA, and SSA were updated consistent with the FPP or design change.
- e. Post-fire SSD operating procedures, such as abnormal operating procedures, affected by the modification were updated.

- (1) DCN 70943

INSPECTION RESULTS

Failure to perform adequate testing on incipient fire detection systems.			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Pending AV 05000259,05000260,05000296/ 2022010-01 Open	None (NPP)	71111.21N.05
<p>The inspectors identified a finding and associated Apparent Violation of License Condition C.13, C.14, and C.7 for Units 1, 2, and 3, respectively, when the licensee failed to perform adequate testing on credited incipient fire detection systems.</p> <p><u>Description:</u> As part of transitioning to a risk informed fire protection program at Browns Ferry, the site installed air sampling incipient fire detection systems in several fire areas. The Auxiliary Instrument rooms on all three units were determined to be risk significant areas and the prompt detection provided from incipient fire detection provided the requisite risk reductions needed to fully transition to a risk informed fire protection program under 10 CFR 50.48(c). The incipient fire detection systems provided this risk reduction by providing a means to promptly detect a fire or even potential fire by sampling air in selected electrical cabinets. In order for these systems to function properly and within their design basis, the systems must show a balanced air flow from all sampling points. Additionally, the time required to detect products of combustions, known as the transport time, must be within a certain threshold. Annual verification of the transport time is required to determine system operability.</p> <p>While reviewing the work orders that documented the completion of the annual testing of the incipient fire detection systems at Browns Ferry, the inspectors noted that the annual surveillance test did not include a transport time test. The inspectors requested the vendor manual for the installed systems as well as the code of record and licensing commitments for the detection systems. In reviewing the vendor manual and the applicable National Fire Protection Association code, NFPA 72-2010, "National Fire Alarm and Signaling Code," the inspectors noted that the annual testing of air sampling detection devices must include a transport time test.</p> <p>The NRC inspectors raised these concerns with the licensee who acknowledged that the affected systems only completed the requisite transport time test as part of system commissioning and had not been subsequently tested. The licensee declared the systems inoperable and implemented appropriate compensatory actions. The site then initiated a test to validate the transport time for all the installed incipient systems that are credited for risk reduction, systems 1/2/3-SDET-026-0103A, which are installed in the associated units Auxiliary Instrument room. Upon completion of these tests, the licensee indicated that the installed systems did not pass the transport time requirements of the NFPA codes and NRC commitments.</p> <p>Corrective Actions: The licensee declared the incipient detection systems inoperable and established fire watches in the affected fire areas.</p> <p>Corrective Action References: The licensee captured this in CR 1751964.</p>			

Performance Assessment:

Performance Deficiency: The licensee's failure to perform adequate testing of the installed air sampling incipient fire detection systems was a performance deficiency. Specifically, the licensee failed to conduct annual transport time testing of the systems as required by NFPA codes.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Response to Contingency Events 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 loss of the incipient fire detection systems greatly reduces the licensee's ability to promptly detect and respond to a significant plant fire in a timely manner.

Significance: The inspectors assessed the significance of the finding using Appendix F, "Fire Protection and Post - Fire Safe Shutdown SDP." The issue was determined to impact Fixed Fire Protection Systems and was screened with question 1.4.2-A. The inspectors answered No and determined that further screening is required. Per section 1.5 of the SDP, the NRC is utilizing the fire PRA of the licensee to assess the risk. Given the scope of the issue, the licensee is working to provide an accurate risk assessment of the issue for the NRC to review.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance. The licensee completed transition to NFPA 805 in October 2015 and all programs and surveillances were developed and implemented at that time. Therefore, this issue is not indicative of current licensee performance.

Enforcement:

Violation: Brown's Ferry operating license condition C.13, C.14, and C.7 for Units 1, 2, and 3, respectively, states that the site shall implement and maintain in effect all provisions of the approved protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c). NFPA 805, as incorporated by 10 CFR 50.48(c), section 3.2.3, "Procedures," states that procedures shall be established for implementation of the fire protection program.

Contrary to the above, since October 28, 2015, the licensee did not establish adequate testing procedures for the incipient fire detection system. Specifically, the licensee was not conducting the required annual transport time testing as specified by NFPA codes.

Enforcement Action: This violation is being treated as an apparent violation pending a final significance (enforcement) determination.

EXIT MEETINGS AND DEBRIEFS

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

- On February 17, 2022, the inspectors presented the triennial fire protection inspection results to Mr. Daniel Komm and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N.05	Calculations	0-TI-641	Time Critical Operator Actions	08/31/2021
		BFN-0-22-016	Browns Ferry Nuclear Incipient Detection FPRA Sensitivity	Rev. 0
		EDQ0009992012000115	Non-Power Operations Analysis	Rev. 35
		EDQ099920110010	Nuclear Safety Capability Analysis	Rev. 57
		R06 160202 313	BFN Verification and Validation NFPA 05 FSS Operator Actions	02/02/2016
		RIMS R06 160202 314	Verification and Validation NFPA 805 Recovery Actions for FA 1-1	
		RIMS R06 160202 342	Verification and Validation for NFPA 805 Recovery Actions for FA 16-1	
		RIMS R06 160202 361	Verification and Validation for NFPA 805 Recovery Actions for 3-FSS-16-2	
	Corrective Action Documents	CR 1488947	BFN 2019 TFPI - BFN 2019 TFPI - CO2 Boundary Door Found Unsecured	02/06/2019
		CR 1489212	BFN 2019 TFPI Procedure Change for Quarterly Inspection of Emergency Equipment	02/07/2019
		CR 1489222	BFN 2019 TFPI Conduction of Fire Ops Procedural Enhancement	02/07/2019
		CR 1490451	BFN 2019 TFPI Fire Extinguisher Placement Exceeds Allowable Distance	02/12/2019
		CR 1490459	BFN 2019 TFPI Need WO to Add Fire Extinguishers in the U-1/2 & U-3 Diesel Bldgs.	02/12/2019
		CR 1490658	BFN 2019 TFPI – NFPA 805 Licensing Basis Potential Non-Conformance	02/13/2019
		CR 1730278	2021 BFN NFPA 805 Fire Protection Self-Assessment – Learning Opportunity	10/22/2021
CR 1731951	2021 BFN NFPA 805 Fire Protection Self-Assessment – Learning Opportunity	10/29/2021		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Corrective Action Documents Resulting from Inspection	CR 1751964	NRC 2022 TFPI - Incipient Detection Systems not tested IAW NFPA Codes and Vendor Recommendations	02/02/2022
		CR 1753800	0-FSS-2-3 Valve Location Discrepancy	02/09/2022
		CR 1754884	Revise 0-FSS-1-4	02/14/2022
		CR 1755019	Error in Attachment G of the BFN NFPA 805 License Amendment Request (LAR)	02/15/2022
		CR 1752054	0-FSS-001 Attachment 4 Posted in 480V Shutdown Board Rooms	02/02/2022
		CR 1752451	NRC 2022 TFPI - Portable Space Heater Does Not Meet Procedural Requirements	02/03/2022
		CR 1753102	NRC 2022 FPTI - EDQ099920110010 Error	02/07/2022
		CR 1755115	NRC 2022 TFPI - Learning Opportunity - Transient Combustibles Found Under Stairwell	02/15/2022
		CR 1755125	2022 NRC Triennial Fire Protection Inspection - Performance Deficiency	02/15/2022
		CR 1755346	Electrical Raceway Fire Barrier System (ERFBS) for Conduit 2B98-IID has Damage	02/16/2022
		CR 1755414	NRC 2022 TFPI - Material found not meeting Chemical Traffic Control Requirements	02/16/2022
	Drawings	3-47E610-74-1	Mechanical Control Diagram Residual Heat Removal System	Rev. 36
		3-47E811-1	Flow Diagram Residual Heat Removal System	Rev. 73
		3-47E811-1	Unit 3 Flow Diagram Residual Heat Removal System	04/20/1970
		8.4-3	4160V Shutdown Auxiliary Power Schematic Diagram	Rev. 28
	Engineering Changes	DCN 70943	Reroute Cables 3ES3027-II Out of FZ 03-01 and 03-03	Rev. A
	Engineering Evaluations	RIMS R69 210810 438	Retiming Validation for FSS Procedures	07/22/2021
	Fire Plans	FPR-Volume 2, Attachment 1	Pre-Fire Plans for Browns Ferry Nuclear Plant Reactor Building Unit 1	Rev. 68

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		FPR-Volume 2, Attachment 3	Pre-Fire Plans for Browns Ferry Nuclear Plant Reactor Building Unit 3	Rev. 68
		FPR-Volume 2, Attachment 5	Pre-Fire Plans for Browns Ferry Nuclear Plant Control Bay U-2	Rev. 68
	Miscellaneous	BFN-VTD-CI05-0010	Safe Fire Detection Inc. / Cirrus Pro Series Engineers Manual	Rev. 0
	Procedures	0-FSS-001	Fire Safe Shutdown Procedure for Fire Entry	Rev. 7
		0-FSS-16-1	Fire Safe Shutdown Procedure for FA 16-1	Rev. 15
		0-FSS-16-2	Fire Safe Shutdown Procedure for FA 16-2	Rev. 10
		0-FSS-2-4	Fire Safe Shutdown Procedure	Rev. 10
		BFN-50-7026	HIGH PRESSURE FIRE PROTECTION SYSTEM	Rev. 12
		BFN-50-7500	NFPA 805 Fire Protection	Rev. 1
		G-40	Installation, Modification and Maintenance of Electrical Conduit, Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems	Rev. 22
		G-98	INSTALLATION, MODIFICATION, AND MAINTENANCE OF ELECTRICAL RACEWAY FIRE BARRIER SYSTEMS	Rev. 15
		NPG-SPP-18.4.5	Fire Protection Quality Assurance	Rev. 3
		NPG-SPP-18.4.7	Control of Transient Combustibles	Rev. 15
		NPG-SPP-22.300	Corrective Action Program	Rev. 23
	Work Orders	119644375	Loop I RHR Simulated Actuation Test	02/26/2020
		120134724	Diesel Generator B Operability Test (4KV Shutdown Board Operation)	12/21/2020
		120134950	0-SI-4.11.A.1 - Annual Smoke Detector Functional Test	06/25/2020
		120561594	0-SI-4.11.A.2(2) - Supervised Fire System Circuits Operability Test	03/22/2022
		121165782	0-SI-4.11.A.2(2) - Supervised Fire System Circuits Operability Test	01/14/2021
		121352032	0-SI-4.11.A.1 - Annual Smoke Detector Functional Test	04/24/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		121379875	0-SI-4.11.A.2(2) - Supervised Fire System Circuits Operability Test	07/24/2021
		121533972	52 Week RHR HX 3B Performance Testing	08/16/2021
		121165837	O-SI-4.11.G.1.A(1) - VISUAL INSPECTION OF FIRE WRAPS	01/19/2021
		121701306	0-SI-4.11.B.1.F(2) – Electric Fire Pump Capability Test	12/15/2021