



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

January 14, 2019

Mr. J. W. Shea
Vice President, Nuclear Regulatory
Affairs and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A
Chattanooga, TN 37402-2801

**SUBJECT: BROWNS FERRY NUCLEAR PLANT – NUCLEAR REGULATORY
COMMISSION TEAM INSPECTION REPORT 05000259/2018011,
05000260/2018011, AND 05000296/2018011**

Dear Mr. Shea:

On December 12, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Browns Ferry Nuclear Plant, Units 1, 2, and 3. The NRC inspectors discussed the results of this inspection with Mr. D. L. Hughes, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

The inspection examined activities conducted under your license as they relate to the implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders (EA-12-049 and EA-12-051) and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans, your compliance with the Commission's rules and regulations, and with the conditions of your operating license. Within these areas, the inspection involved examination of selected procedures and records, observation of activities, and interviews with station personnel.

The NRC inspectors did not identify any finding or violation of more than minor significance. This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

If you have any questions, please contact me at 404-997-4513.

Sincerely,

/RA/

Shane R. Sandal, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket Nos.: 50-259, 50-260, 50-296
License Nos.: DPR-33, DPR-52, DPR-68

Enclosure:
IR 05000259/2018011, 05000260/2018011
and 05000296/2018011

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers: 50-259, 50-260, and 50-296

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

Report Numbers: 05000259/2018011, 05000260/2018011, and 05000296/2018011

Enterprise Identifier: I-2018-011-0043

Licensee: Tennessee Valley Authority (TVA)

Facility: Browns Ferry Nuclear Plant, Units 1, 2, and 3

Location: Athens, Alabama

Inspection Dates: December 3 - 12, 2018

Inspectors: R. Rodriguez, Senior Project Engineer (Team Leader)
S. Freeman, Senior Reactor Analyst
S. Ninh, Senior Project Engineer
B. Bishop, Project Engineer

Approved By: S. Sandal, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Enclosure

SUMMARY

The NRC continued monitoring licensee's performance by conducting Temporary Instruction (TI) 2515/191, "Implementation of Mitigation Strategies and Spent Fuel Pool (SFP) Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," inspection (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18191B074) at Browns Ferry Nuclear Plant, Units 1, 2, and 3, 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

No findings or violations of more than minor significance were identified.

Additional Tracking Items

Type	Issue number	Title	Report Section	Status
TI	TI 2515/191	Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans	Other Activities	Closed

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INSPECTION SCOPE

Inspections were conducted using the appropriate portions of Temporary Instruction (TI) procedure 2515/191, "Implementation of Mitigation Strategies and Spent Fuel Pool (SFP) Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," (ADAMS Accession No. ML18191B074). Documents reviewed by inspectors are listed in the documents reviewed section of this report. 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.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

TI 2515/191 - Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans

Inspectors verified plans for complying with NRC Orders EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12056A045) and EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (ML12054A679) were in place and were being implemented by the licensee. Additionally, the inspection verified implementation of staffing and communications information provided in response to the March 12, 2012, request for information letter (ML12053A340) and dose assessment information provided per COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned," dated March 27, 2013 (ML12339A262).

- (1) Based on samples selected for review, the inspectors verified that the licensee satisfactorily implemented appropriate elements of the Diverse and Flexible Coping Strategies (FLEX) as described in the plant-specific submittals and the associated safety evaluation (ML18236A331) and determined that the licensee is in compliance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ML12056A045). The inspectors verified the licensee satisfactorily:
 - a) developed and issued FLEX Support Guidelines (FSGs) to implement the FLEX strategies for postulated external events;
 - b) integrated their FSGs into their existing plant procedures such that entry into and departure from the FSGs were clear when using existing plant procedures;
 - c) protected FLEX equipment from site-specific hazards;
 - d) developed and implemented adequate testing and maintenance of FLEX equipment to ensure their availability and capability;
 - e) trained their staff to ensure personnel proficiency in the mitigation of beyond-design basis events; and

- f) developed the means to ensure the necessary off-site FLEX equipment would be available from off-site locations.
- (2) Based on samples selected for review, the inspectors verified that the licensee satisfactorily implemented appropriate elements of the FLEX strategy as described in the plant specific submittals and the associated safety evaluation (ML18236A331) and determined that the licensee was in compliance with NRC Order EA-12-051, "Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation" (ML12054A679). The inspectors verified that the licensee satisfactorily:
- a) installed the spent fuel pool (SFP) instrumentation sensors, cabling and power supplies to provide physical and electrical separation as described in the plant specific submittals and safety evaluation;
 - b) installed the SFP instrumentation display in the location, environmental conditions and accessibility as described in the plant specific submittals;
 - c) trained their staff to assure personnel proficiency with the maintenance, testing, and use of the SFP instrumentation; and
 - d) developed and issued procedures for maintenance, testing and use of the reliable SFP instrumentation.
- (3) The inspectors reviewed information provided in the licensee's dose submittal and in response to the NRC's March 12, 2012, request for information letter (ML12053A340), and verified that the licensee satisfactorily implemented enhancements pertaining to Near-Term Task Force (NTTF) Recommendation 9.3 response to a large-scale natural emergency event that results in an extended loss of all alternating current (ac) power (ELAP) to all site units and impedes access to the site. The inspectors verified the following:
- a) the licensee satisfactorily implemented required staffing changes to support a ELAP scenario;
 - b) emergency preparedness (EP) communications equipment and facilities are sufficient for dealing with a ELAP scenario; and
 - c) the licensee implemented dose assessment capabilities (including releases from SFPs) using the licensee's site-specific dose assessment software and approach.

The inspectors verified that noncompliances with requirements, and standards identified during the inspection were entered into the licensee's corrective action program as appropriate.

INSPECTION RESULTS

No findings were identified.

EXIT MEETINGS AND DEBRIEFS

No proprietary information was retained by the inspectors or documented in this report.

On December 12, 2018, the inspectors presented the inspection results to Mr. D. L. Hughes, Site Vice President, and other members of the licensee's staff.

DOCUMENTS REVIEWED

Condition Reports Initiated as a Result of the Inspection

1449049- This CR is to document an issue identified during fulfillment of 1RFI-10 for the FLEX Inspection scheduled for December 2018.

CR 1470881 -The failure of the Turbine Marine Generator needs to be reviewed for applicability at BFN.

CR 1470889- During a FLEX peer team call an industry issue with FLEX Pumps freezing while in stand-by mode during staging activities was identified.

CR 1473014 - The NRC identified several electrical components referenced in the electrical strategy that did not have "FLEX" labelling.

CR 1473074- A revision of EPIP-12 Attachment 1 is needed to add a functional check of the portable satellite phones in the Technical Support Center (TSC).

CR 1474419 - NRC Identified: During FLEX Inspection NRC questioned placement of Step 3.0 in 0-FSI-3C, Attachment 6.

Procedures

0-AOI-57-1A, Station Blackout Flow Chart, Rev. 105

0-FSI-1, Flex Response, Rev. 2

0-FSI-2A FPS1 Setup and Operation (EECW Manifold), Rev. 1

0-FSI-2A, CILRT FLEX Pump System, Rev. 2

0-FSI-2B, FPS2 Setup and Operation (RHRSW B Manifold), Rev. 0

0-FSI-2C FPS3 Setup and Operation (RHRSW D Manifold), Rev. 1

0-FSI-2E FLEX Mechanical Hose Connections from EECW, Rev. 2

0-FSI-2F FLEX Mechanical Hose Connections from CILRT, Rev. 2

0-FSI-3A, 480V FLEX Generator Setup and Operation, Rev. 4

0-FSI-3C, 4KV FLEX Generator Setup and Operation, Rev. 5

0-FSI-3F, Load Shed of 250V Main Bank Battery 1, 2, 3, Rev. 2

0-FSI-4A, Control Bay/Reactor Building Lighting and Ventilation during ELAP Rev. 3

0-FSI-4B FLEX Communication System Operation, Rev. 0

0-FSI-6A, Damage Assessment, Rev. 1

0-FSI-6B, FLEX Long Term Fueling Operations, Rev. 0

0-FSI-6E FLEX Strategies during Severe Environments, Rev. 2

0-FSI-8C FLEX Tools and Equipment Inventory Checklist, Rev. 2

0-FSI-8D, BFN FLEX Implementation During Shutdown Modes, Rev. 0

0-FSI-8E BFN FLEX Equipment and Connection Administrative Instruction, Rev. 0

1-AOI-78-1, Fuel Pool Cleanup System Failure, Rev. 25

1-EOI Appendix-13 Emergency Venting Primary Containment Rev. 3

1-EOI, Appendix-20G Spent Fuel Pool Makeup/Spray using FLEX Pump System (EECW), Rev. 0

2-EOI Appendix-13 Emergency Venting Primary Containment, Rev. 8

2-EOI-3, Secondary Containment Control, Rev. 16

3-EOI Appendix-13, Emergency Venting Primary Containment, Rev. 5

3-EOI-1, RPV Control Unit 3 Browns Ferry Nuclear Plant Unit 3, Rev. 13

3-EOI-2, Primary Containment Control, Rev. 13
BFN-ODM-4.2, Radiological Emergency Plan (REP) Assignments, Rev. 5
CECC EPIP-17, Central Emergency Control Center Meteorologist Procedures, Rev. 23
CECC EPIP-6, CECC Plant Assessment Staff Control Center Procedure for Alert, Site
Emergency Plan Area Emergency, and Implementing General Emergency, Rev. 42
CECC EPIP-8, Dose Assessment Staff Activities Control Center during Nuclear Plant
Emergency Plan Radiological Emergencies, Rev. 47
EPIP-12, BFN UNIT 0 Emergency Equipment and Supplies, Rev. 20
EPIP-13, Dose Assessment, Rev. 24
OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking,
Rev. 21

Drawings

0-45E701-1, Wiring Diagram, Battery Board 1, Panels 1-7, Single Line, Rev. 69
0-45E702-1, Wiring Diagram, Battery Board 2, Panels 1-7, Single Line, Rev. 65
0-45E703-1, Wiring Diagram, Battery Board 3, Panels 1-7, Single Line, Rev. 53
1-45E712-1, Wiring Diagram, 250V Reactor MOV Board 1A, Single Line, Rev. 39
1-45E712-2, Wiring Diagram, 250V Reactor MOV Board 1B, Single Line, Rev. 43
1-45E712-3, Wiring Diagram, 250V Reactor MOV Board 1C, Single Line, Rev. 18
2-45E712-1, Wiring Diagram, 250V Reactor MOV Board 2A, Single Line, Rev. 40
2-45E712-2, Wiring Diagram, 250V Reactor MOV Board 2B, Single Line, Rev. 34
2-45E712-3, Wiring Diagram, 250V Reactor MOV Board 2C, Single Line, Rev. 23
3-45E712-1, Wiring Diagram, 250V Reactor MOV Board 3A, Single Line, Rev. 31
3-45E712-2, Wiring Diagram, 250V Reactor MOV Board 3B, Single Line, Rev. 44
3-45E712-3, Wiring Diagram, 250V Reactor MOV Board 3C, Single Line, Rev. 19
3-45E670-25, Wiring Diagram, ECCS Division I Analog Trip Units Schematic Diagram, Rev. 11
3-45E670-31, Wiring Diagram, ECCS Division II Analog Trip Units Schematic Diagram, Rev. 7
3-45E614-20, Wiring Diagram, 120V AC/250V DC Valves & Miscellaneous Schematic Diagram,
Rev. 14
3-730E933-1, Elementary Diagram, Primary Containment Instrumentation System, Rev. 37
3-730E938-11, Elementary Diagram, Residual Heat Removal System, Rev. 47
PIP-02-03, AC Electrical Distribution System, Browns Ferry Nuclear Plant
PIP-15-008, FESB Door Operation, Rev. 0
PIP-15-11, 480V Flex Portable Generator Alignment, Browns Ferry Nuclear Plant, Page 1
PIP-15-11, 480V Flex Portable Generator Alignment, Browns Ferry Nuclear Plant, Page 2
PIP-15-10, Spent Fuel Pool Levels, Rev. 5

Calculations

EDQ0009992013000202, 250V DC Unit Batteries 1, 2, & 3 Evaluation for Beyond Design Basis
External Event (BDBEE) Extended Loss of AC Power (ELAP), Rev. 6

Design Changes

DCN 71162A, Fukushima Battery Backed Power to Initial Coping Equipment-Unit 1
DCN 70745, Flex Equipment Storage Building

Condition Reports

1169435	1376974
1184214	1426238
1201447	1433400
1216091	1449049
1220088	1457721
1231022	1470881
1308903	1470889
1350052	1473074
1373017	

Other

Preventive Maintenance Vendor Data, dated September 24, 2018
Preventive Maintenance Vendor Data, Turbine Marine Inc, dated September 28, 2018
Preventive Maintenance Vendor Data, Turbine Marine Inc, dated January 12, 2016
Browns Ferry Mitigating Strategies Final Integrated Plan (FIP)
0-TPP-ENG-632 (Bases) Diverse and Flexible Coping Strategies (FLEX) Program Bases Document, Rev. 2
Flex Strategy Validation Report for BFN Units 1, 2, 3 Implementation, dated March 22, 2018
BFN- Mitigation Strategies for Beyond Design- Basis External Events – Final Integrated Plan, Dated 4/25/2018
CDQ0003602013000135, Flex Equipment Storage Building Civil Design Basis and Criteria, Rev. 0
0-TPP-ENG-632, (Bases) Diverse and Flexible Coping Strategies (FLEX) Program Bases Document, Rev. 4
NEI 12-01 Phase 2 Extended Loss of AC Power (ELAP) ERO Staffing Analysis Report, Rev. 1
BFN-50-7360, Browns Ferry Nuclear Plant Flex Mitigation System, Rev. 7
BFN-50-715, Browns Ferry Nuclear Plant Environmental Design, Rev. 12
FSAR, Section 2.3, Meteorology
Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Response Regarding Phase 2 Staffing Submittal Associated With Near –Term Task Force Recommendation 9.3 Related to The Fukushima Dai-Ichi Nuclear Power Plant Accident (TAC NOS. MF5689, MF5690 AND MF5691), Dated August 11, 2015
Simulator Exercise Guide (SEG), SEG # OPL173S359, Station Blackout and Extended Loss of AC Power (SBO/ELAP) Coping Strategies. NRC Order EA-12-049, Revision 2
OT-FLEX-001, BFN FLEX Overview, Rev. 0
OT-Flex-003, Flex Implementation, Rev. 0
OT-Flex-SBO-ELAP-001, SBO/ELAP 0-AOI-57-1A, Station Blackout Flow Chart