August 15, 2005

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN, P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket No. 50-259
Tennessee Valley Authority	)	

BROWNS FERRY NUCLEAR PLANT (BFN) – UNIT 1 – RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING THE RESTART TESTING PROGRAM (TAC NO. MC7208)

This letter provides additional information concerning the BFN Unit 1 Restart Test Program (RTP) as requested by NRC letter dated June 15, 2005, (Reference 1).

As requested, the enclosure to this letter provides a detailed description of the modifications completed or in progress in support of BFN Unit 1 restart and a description of the testing planned as part of the BFN Unit 1 RTP. For comparison purposes, the enclosure also identifies whether the modifications and testing being implemented were performed for BFN Units 2 and 3 during their restart programs. The enclosure also gives a background of the BFN RTP development, a description of the BFN Unit 1 RTP, and a description of the power ascension testing planned for BFN Unit 1 and comparison to the BFN Unit 3 power ascension testing program.

With the exception of modifications planned to implement Extended Power Uprate, most of the modifications planned for BFN Unit 1 were previously implemented on BFN Units 2 and 3. In addition to testing being performed as part of the RTP, TVA is also performing system and component post-maintenance, post-modification, calibration, normal surveillance, and power ascension testing to ensure systems will operate in accordance with their design requirements.

TVA previously provided a description of the RTP for BFN Units 1 and 3 by letter dated September 27, 1991 (Reference 2), as supplemented by several

additional letters (see the "Background" section in the enclosure to this letter). In Reference 2, TVA indicated it did not plan to perform a complete Loss of Offsite Power/Loss of Coolant Accident (LOP/LOCA) test for BFN Units 1 and 3 as was performed for BFN Unit 2. As stated in Reference 2, the Unit 2 RTP demonstrated the operation of the electrical system for all three units down to the shutdown board level and the operation of all eight diesel generators, and required Technical Specification diesel generator surveillance testing that simulates LOP/LOCA. As all eight BFN diesel generators have been maintained in an operable condition to support operation of BFN Units 2 and 3, TVA maintains that the testing performed to date, and existing surveillance testing requirements are sufficient to ensure that the BFN Unit 1 diesel generators and electrical system could support safe shut down under a LOP/LOCA event. Therefore, as stated previously in Reference 2, TVA does not intend to perform a complete LOP/LOCA test for BFN Unit 1 as part of the BFN Unit 1 RTP.

There are no new regulatory commitments associated with this submittal. If you have any questions concerning this letter, please contact me at (256) 729-2636.

Sincerely,

Original signed by:

William D. Crouch
Manager of Licensing and
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Enclosure:

Response to Request for Additional Information Regarding the Restart Testing Program.

Reference:

1. NRC letter to TVA "Browns Ferry Nuclear Plant, Unit 1- Request for Additional Information Regarding Restart Testing Program (TAC No. MC7208)," dated June 15, 2005.

2. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Restart Test Program (RTP) for Units 1 and 3," dated September 27, 1991.

Enclosure:
(Via NRC Electronic Distribution)

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT
UNIT 1

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING THE RESTART TESTING PROGRAM

I. INTRODUCTION

The following discussion provides TVA's response to the NRC's June 15, 2005 request for additional information regarding the BFN Unit 1 Restart Test Program (RTP) (Reference 1). The BFN Unit 1 RTP is consistent with the BFN Unit 3 RTP as described in previous correspondence with the NRC and as summarized in Section II below. Section III provides a description of the BFN Unit 1 RTP development, and a description of the procedures and administrative controls for the program. This response provides a line-item description of the BFN Unit 1 RTP testing planned and comparison to the testing previously performed under the BFN Units 2 and 3 RTP. This response also provides a description of the modifications being implemented as part of BFN Unit 1 restart and a comparison to modifications performed for BFN Units 2 and 3.

II. BACKGROUND

Following the shutdown of the BFN units in 1985, and as part of activities to restart the units, TVA developed the Restart Test Program for BFN Unit 2, the lead plant for restart. The primary purpose of the RTP was to verify, following extensive plant modifications and resolution of plant configuration issues, that plant systems were capable of meeting their safe shutdown requirements.

The BFN Unit 2 RTP was initially submitted to the NRC by letter dated October 7, 1986 (Reference 2). By letter dated March 3, 1987 (Reference 3), the NRC requested that TVA provide further information concerning the BFN Unit 2 RTP. TVA responded to the NRC's request by letter dated July 13, 1987 (Reference 4), and resubmitted the BFN Unit 2 RTP description in its entirety to reflect refinements made in the program.

On April 26, 1988, TVA met with the NRC staff to discuss the BFN Unit 2 RTP in detail (Reference 5). During that meeting, the staff requested that TVA describe the differences between industry typical pre-operational test programs, as described in NRC Regulatory Guide 1.68, "Initial Test Programs For Water-Cooled Nuclear Power Plants," Revision 2, August 1978, and the

BFN Unit 2 RTP. During a follow-up meeting, on June 21, 1988, TVA described these differences (Reference 6). The primary difference was the BFN Unit 2 RTP scope was limited to those system functions that were required to support safe shutdown of the plant considering design basis accidents and transients, and special events.

By letter dated August 12, 1988 (Reference 7), the NRC submitted its Safety Evaluation Report documenting approval of the BFN RTP for Unit 2. The NRC concluded that the BFN Unit 2 RTP was consistent with Regulatory Guide 1.68, Revision 2, and that it would ensure proper verification of the functional integrity of the BFN Unit 2 safety systems.

During this same time frame, TVA submitted to the NRC its Nuclear Performance Plan (NPP) for the restart of the Browns Ferry units. The BFN NPP was initially submitted August 28, 1986 (Reference 8), and subsequently revised. The current version of the NPP (Revision 2) was submitted to the NRC by letter dated October 24, 1988 (Reference 9). The BFN Nuclear Performance Plan included a summary description of the BFN RTP.

On April 14, 1989 (Reference 10), the NRC issued its Safety Evaluation Report on the BFN Nuclear Performance Plan. The NRC's conclusions in that SER concerning acceptability of the BFN RTP were consistent with its earlier conclusions documented in Reference 7. Following completion of activities required to support its restart, including implementation and completion of the RTP, BFN Unit 2 returned to service in May, 1991.

By letter dated September 27, 1991 (Reference 11), TVA submitted a description of the BFN Units 1 and 3 Restart Test Program for NRC review. As discussed in that letter, TVA modified implementation of the RTP for BFN Units 1 and 3 to incorporate lessons learned during implementation of the BFN Unit 2 RTP. These changes included the coordination of RTP testing with post-modification, post-maintenance, and normal surveillance testing, and use of existing surveillance and testing procedures to the maximum extent possible. TVA also indicated it did not plan to perform a complete Loss of Offsite Power/Loss of Coolant Accident (LOP/LOCA) test as was performed for BFN Unit 2. TVA stated that the Unit 2 RTP demonstrated the operation of the electrical system for all three units down to the shutdown board level and the operation of all eight diesel generators. TVA indicated further that it planned to take credit for the Technical Specification diesel generator surveillance testing that simulates LOP/LOCA.

In response to an NRC request, TVA provided additional information concerning the BFN Units 1 and 3 RTP in a letter dated February 18, 1992 (Reference 12). That letter documented how the BFN Unit 1 and 3 RTP compared to the criteria contained in Regulatory Guide 1.68, Revision 2, and provided a Unit 3 RTP test matrix comparing the testing planned for BFN

Unit 3 under the RTP to the testing actually performed under the BFN Unit 2 RTP. The response provided similar information for the BFN Units 1 and 3 Power Ascension Testing (PAT) Program. TVA indicated that there were no differences in the comparison of the BFN Units 1 and 3 RTP testing criteria to Regulatory Guide 1.68, Revision 2 over that provided previously for BFN Unit 2 during its June 21, 1988, meeting with the NRC. Differences in testing planned for BFN Units 1 and 3 under the RTP and that actually performed for BFN Unit 2 under its RTP were categorized as follows:

- TVA did not plan to re-perform BFN Unit 2 RTP tests that fully satisfied the requirements for Units 1 and 3;

- Testing to address shared system modes (functions) between Units 2 and 3, and between Units 1, 2, and 3 might be required; and

- Testing to address the addition of new system modes might be required.

Reference 12 also indicated that as of the date of that letter, TVA had not yet completed development of the BFN Unit 3 Baseline Test Requirements Documents, and would update the Unit 3 RTP test matrix upon completion of that effort. By letters dated December 28, 1992 (Reference 13) and July 19, 1993 (Reference 14), TVA provided updates to the BFN Unit 3 RTP test matrix.

On December 14, 1993, TVA met with the NRC to discuss the BFN Units 1 and 3 RTP in further detail (Reference 15). In Reference 15, the NRC Staff documented its position that it would evaluate the differences between the BFN Units 1 and 3 restart programs and those previously approved for BFN Unit 2. Those programs that remain the same would not be re-evaluated. Therefore, the purpose of the December 14, 1993 meeting was to ensure that the NRC had a thorough understanding of the BFN Units 1 and 3 RTP, with an emphasis on the differences between the BFN Units 1 and 3 RTP and the BFN Unit 2 RTP. During that meeting, TVA committed to send the NRC a detailed description of the differences between the BFN Units 1 and 3 RTP, and the BFN Unit 2 RTP as described in the associated NRC safety evaluations. By letter dated February 2, 1994 (Reference 16), TVA provided that additional information.

By letter dated August 30, 1994 (Reference 17), the NRC issued a safety evaluation accepting the RTP program for BFN Unit 3. In the cover letter, the NRC indicated that much of the information contained in TVA's February 18, 1992, December 28, 1992, and July 19, 1993 letters pertained only to BFN Unit 3. This refers to the BFN Unit 3 RTP testing matrices provided with TVA's February 18, 1992 letter, and updated by the December 28, 1992 and July 19, 1993 letters that described, on a line-item basis, the BFN Unit 3

specific testing planned under the RTP and its comparison to testing performed under the BFN Unit 2 RTP.

The cover letter stated further that the NRC Staff's review included examination of procedures developed to support the BFN Unit 3 RTP, which might not be representative of procedures which may be used to support BFN Unit 1 recovery. On this basis, Reference 17 stated that the staff considered only that set of information sufficient to determine the adequacy of the BFN Unit 3 RTP, and should TVA subsequently decide to pursue restart of BFN Unit 1, TVA should submit similar documentation for BFN Unit 1 planned testing.

By letter dated December 13, 2002 (Reference 18), and as supplemented by letter dated February 28, 2003 (Reference 19), TVA submitted to the NRC the proposed regulatory framework for the restart of BFN Unit 1. In that letter, TVA indicated its intent to implement the remaining special programs, including the RTP, in accordance with the implementation precedent and criteria used to restart Unit 3. By letter dated August 14, 2003 (Reference 20), the NRC accepted TVA's proposed approach.

By letter dated June 15, 2005 (Reference 1), the NRC requested that TVA provide detailed information concerning modifications being made as part of BFN Unit 1 restart and a detailed description of the testing planned under the BFN Unit 1 RTP. To provide a more complete picture of the BFN Unit 1 RTP and how it relates to the BFN Unit 3 RTP, Section III below provides a description of the BFN Unit 1 RTP, including a description of the procedures under which the program was developed and is controlled. Section IV below discusses and provides the specific information requested by the NRC RAI, including a line-item description of the specific testing planned under the BFN Unit 1 RTP, and a comparison to that performed under the BFN Units 2 and 3 RTP.

III. DESCRIPTION OF BFN UNIT 1 RESTART TEST PROGRAM DEVELOPMENT

As a component of the BFN Design Basis Verification Program (DBVP), the primary purpose of the BFN Unit 1 RTP is to verify that plant systems are capable of meeting their safe shutdown requirements. To accomplish this objective, TVA performed a Safe Shutdown Analysis (SSA) as part of the BFN DBVP. The SSA, which addresses all three BFN units, is a systematic and comprehensive analysis of the requirements for ensuring the safe shutdown of BFN Units 1, 2, and 3 for transients, accidents, and special events. It documents the safety system actions for which credit has been taken in the UFSAR, reload analyses, and other communications addressing transients, accidents, and special events within the BFN licensing bases. The events considered in the SSA included:

- Generator Trip
- Turbine-Generator Trip with Bypass Failure
- Pressure Regulator Failure – Closed
- Turbine Trip
- Isolation of all Main Steam Lines
- Closure of One Main Steam Isolation Valve
- Loss of Condenser Vacuum
- Loss of Feedwater Heater
- Shutdown Cooling (RHRS) Malfunction (Temperature Decrease)
- Inadvertent Pump Start
- Control Rod Withdrawal Error
- Fuel Assembly Insertion
- Control Rod Removal Error
- Pressure Regulator Failure – Open
- Inadvertent Opening of All Bypass Valves
- Inadvertent Opening of a Safety/Relief Valve
- Loss of Feedwater Flow
- Loss of Offsite AC Power
- Recirculation Control Failure-Decrease
- Recirculation Pump Trip (One Pump Trip)
- Recirculation Pump Trip (Two Pump Trip)
- Recirculation Pump Seizure
- Recirculation Flow Controller Failure Increasing Flow
- Startup of Idle Reactor Recirculation Pump
- Loss of Shutdown Cooling
- Feedwater Controller Failure – Maximum Demand
- Control Rod Drop Accident
- Pipe Break Inside Containment – Large Break
- Intermediate Pipe Break Inside Containment
- Small Pipe Break Inside Containment
- Pipe Break Inside – Containment and Radiological Effect
- Fuel Handling Accident
- Pipe Break Outside Containment
- Shutdown From Outside of Control Room
- Shutdown Without Control Rods
- Overpressure Protection (MSIV Closure – Backup Scram)
- Rotated or Mis-located Bundle
- Flood
- Low Reservoir Downstream Dam Failure
- Tornado
- Earthquake
- Fire
- Loss of Fuel Pool Cooling/Makeup

From evaluation of the above events, the systems and associated system functions required to ensure safe shutdown were identified. These system functions or "modes" identified in the SSA were then systematically evaluated, and tests required to verify capability of the functions identified. Testing the modes identified in the SSA under the RTP will verify the capacity

of the systems to support their required safety functions. Where applicable, these tests will be performed under Extended Power Uprate (EPU) conditions.

Development of the BFN Unit 1 RTP program and identification of the associated BFN Unit 1 RTP test requirements are controlled administratively via BFN Procedure 1-TI-452, "Unit 1 Restart Test Program," which specifies the review and approval of the restart test requirements, associated acceptance criteria, and test results. The RTP test requirements are documented in the BFN Unit 1 Baseline Test Requirements Documents (BTRDs) developed, reviewed, and approved in accordance with BFN Procedure 1-TI-469, "Baseline Test Requirements." Consistent with the BFN Unit 3 RTP, a multi-disciplinary review group (per 1-TI-452, designated the Restart Test Program Review Group or "RTPRG") reviews and approves the RTP test requirements identified for each system, as well as the results of the RTP testing for each system.

In addition to the testing planned for BFN Unit 1 under the RTP, TVA is performing system and component post-maintenance, post-modification, calibration, normal surveillance, and power-ascension testing as required to ensure other systems and system functions will operate within their design requirements. This testing, which is not part of the BFN Unit 1 RTP, is identified and controlled as required in accordance with 10 CFR 50 Appendix B.

The BFN Unit 1 restart testing is controlled in accordance with BFN Procedure 1-TI-453, "Unit 1 Startup Test Instruction." Procedure 1-TI-453 provides coordination, tracking, and control of testing performed on each system. Under Procedure 1-TI-453, System Test Specifications (STS) are developed to define the minimum testing requirements, their bases, acceptance criteria, and the test procedures that will be used to satisfy the test requirements for selected BFN systems. The STS are intended to encompass all functional testing beyond the scope of static installation and minor post-maintenance testing, and includes component tests, loop calibrations, post-modification functional tests, Technical Instructions (TIs), Special Tests, and Technical Specifications/Technical Requirements surveillance tests. Consistent with the BFN Unit 3 RTP, TVA is utilizing existing surveillance and testing procedures to the extent possible to perform these tests. Where planned testing is not covered by existing procedures, explicit test instructions are developed to perform the testing.

IV. RESPONSE TO NRC REQUEST FOR INFORMATION

The NRC's June 15, 2005 request for additional information requested that TVA provide the following information:

"In order for the staff to independently verify the adequacy of your restart testing program, please describe in detail the modifications that were made and those still in progress or planned and how they were or will be verified to be within the bounds of the original test data. Also, provide a detailed listing and description of the testing that you referred to in your December 13, 2002 letter."

Table 1 identifies the modifications being implemented as part of the BFN Unit 1 restart. The table lists the Design Change Notices (DCNs), sorted by system, provides a detailed description of the modifications and identifies whether a similar DCN was implemented for BFN Units 2 and 3. Modifications developed primarily to implement EPU have been notated as such and grouped at the end of the table. Portions of other modifications supporting implementation of EPU are notated within their descriptions. A more concise description of the EPU modifications and the associated testing planned for those modifications was provided in TVA's April 25, 2005 letter (Reference 21) providing additional information in support of the BFN Unit 1 Extended Power Uprate application.

Table 1 shows that with the exception of those modifications planned to implement EPU operation, most of the modifications planned for BFN Unit 1 have been implemented previously for BFN Units 2 and 3. Excluding EPU, the design modifications for Unit 1 are the result of like modifications implemented prior to the restart of Units 2 and 3, any changes made on Units 2 and 3 since their restarts, and changes to replace obsolete equipment. A primary consideration throughout the change process in the design, construction, function, and operation of systems being modified, has been unit fidelity. While minor differences exist among Units 1, 2, and 3, largely due to equipment obsolescence, the systems will remain functionally the same.

As discussed in TVA's February 2, 1994 letter concerning the BFN Units 1 and 3 RTP, TVA is not verifying that plant systems and components are within the bounds of the original test data. Rather, the BFN Unit 1 RTP testing requirements and testing acceptance criteria are based on the BFN Safe Shutdown Analysis, and are documented in the BTRDs for each system function credited in the SSA. Therefore, while much of the acceptance criteria remain unchanged since performance of the initial pre-operational testing, the BTRDs establish and document the acceptance criteria based on the revised BFN Unit 1 design bases and design requirements. These acceptance criteria are specified in the applicable test instructions.

As part of the BFN plant modification control process, TVA reviews all Design Change Notices (DCNs) to identify, specify, and document appropriate post-modification testing requirements. The purpose of post-modification testing is to demonstrate conformance with the design requirements of the installed or

modified component(s), confirm expected system response, and verify that no undesirable effects were created.

DCNs are prepared and controlled in accordance with TVA procedure SPP-9.3, "Plant Modifications and Engineering Change Control," which requires that Design engineers identify and document any required verification and/or special testing requirements. Per TVA Procedure SPP-8.3, "Post Modification Testing," System engineers review the DCNs to confirm that all necessary post modification testing has been specified and are responsible for reviewing and concurring with acceptability of test results. These programmatic controls ensure for each design change, that the testing required to ensure system performance requirements are met and expected system response is confirmed. Testing is identified and performed with acceptable results prior to turnover of the system for operation. These controls are typical of industry programs developed to ensure compliance with the requirements of 10 CFR 50 Appendix B.

As discussed in Section III above, for each system within the scope of the program, a set of System Test Specifications (STS) are developed to identify the testing required to return the system to service. These STS identify planned RTP testing as well as planned post-modification, post-maintenance, surveillance testing, etc. Due to the extent of the modifications and replacements being implemented on BFN Unit 1, it is not practical to list each and every planned post-modification and post-maintenance test in this response. However, these tests are documented in the STS for each system.

Examples of typically specified post-modification and/or post-maintenance testing include (as applicable):

- Verification of proper rotation and setting limits on valves
- Motor-operated valve (MOV) setting and baseline diagnostics (for GL 89-10 valves)
- Leak-rate testing for Primary Containment isolation valves
- Pump operability testing (verification of rated flow within specified period)
- Valve operability testing
- System flow balancing
- System and component leak testing
- Instrument channel calibration and functional testing
- Protective relay calibration and functional testing
- Logic system functional testing,
- System run and confirmation that process parameters are within expected ranges

While these tests overlap with testing planned as part of the BFN Unit 1 RTP, they are identified and specified in accordance with the normal design control

process to ensure that plant systems are capable of meeting their design and operational requirements.

Table 2 provides the matrix of tests planned for BFN Unit 1 under the RTP. As discussed in the description of the BFN Unit 1 RTP development in Section III above, the RTP test requirements are identified by system "modes" or functions that have been identified in the BFN SSA as required to ensure the capability for safe shutdown of the plant. Therefore Table 2 is organized according to these system modes, which are described in the table and which correlate to the modes identified in the BFN SSA and the associated system Baseline Technical Requirements Documents (BTRDs). The table also identifies whether the test was performed for BFN Units 2 and 3, whether the test is planned for BFN Unit 1, and includes clarifying information where appropriate.

The BFN Unit 1 Power Ascension Testing (PAT) Program is consistent with the PAT Program described for BFN Unit 3 previously in Reference 12. Table 3 provides a comparison of BFN Unit 1 Power Ascension Testing (PAT) planned to the PAT testing described previously for BFN Unit 3 in Reference 12.

V. REFERENCES

1. NRC letter to TVA "Browns Ferry Nuclear Plant, Unit 1- Request for Additional Information Regarding Restart Testing Program (TAC No. MC7208)," dated June 15, 2005.

2. TVA letter to NRC, regarding the Browns Ferry Nuclear Plant (BFN) Restart Test Program Plan, dated October 7, 1986.

3. NRC letter to TVA, "NRC Comments to Browns Ferry Unit 2 Restart Test Program Plan," dated March 3, 1987.

4. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) - Refinement of the Restart Test Program," dated July 13, 1987.

5. NRC memorandum to docket, "Summary of Meeting with TVA Concerning Restart Test Program at Browns Ferry Nuclear Plant - April 26, 1988 (TAC No. 62264)," dated May 24, 1988.

6. NRC memorandum to docket, "Summary of Meeting with TVA Concerning Browns Ferry Nuclear (BFN) Plant Restart Test Program - June 21, 1988 (TAC No. 62264)," dated July 27, 1988.

7. NRC letter to TVA, "Volume 3, Section II.6.0 (Radiological and Chemistry Improvement) and Section III.8.0 (Restart Test Program) of the Nuclear Performance Plan - Browns Ferry Nuclear Plant, Unit 2 (TACS 62253 and 62264)," dated August 12, 1988.

8. TVA letter to NRC, submittal of the Browns Ferry Nuclear Performance Plan, dated August 28, 1986.

9. TVA letter to NRC, "Browns Terry Nuclear Plant (BFN) - Nuclear Performance Plan, Revision 2," dated October 24, 1988.

10. NRC letter to TVA, "Safety Evaluation Report on the Browns Ferry Nuclear Performance Plan - NUREG-1232, Volume 3," dated April 14, 1989.

11. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Restart Test Program (RTP) for Units 1 and 3," dated September 27, 1991.

12. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Request for Additional Information Regarding the Restart Test Program for Units 1 and 3," dated February 18, 1992.

13. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Update of Restart Test Program (RTP) for Units 1 and 3," dated December 28, 1992.

14. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Restart Test Program (RTP) Update for Units 1 and 3," dated July 19, 1993.

15. NRC memorandum to docket, "Summary of the December 14, 1993 Meeting Regarding the Restart Test Program for the Browns Ferry Nuclear Plant, Units 1 and 3," dated January 13, 1994.

16. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) - Restart Test Program (RTP) Update for Units 1 and 3," dated February 2, 1994.

17. NRC Letter to TVA, "Browns Ferry Nuclear Plant Units 1 and 3 – Restart Test Program," dated August 30, 1994.

18. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Unit 1 Regulatory Framework for the Restart of Unit 1," dated December 13, 2002.

19. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) – Unit 1 Regulatory Framework for the Restart of Unit 1," dated February 28, 2003.

20. NRC Letter to TVA, "Regulatory Framework for the Restart of Browns Ferry Nuclear Plant Unit 1 (TAC MB7679)," dated August 14, 2003.

21. TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) - Unit 1 - Response to NRC's Request for Additional Information Related to Technical Specifications (TS) Change No. TS-431 - Request for Extended Power Uprate Operation (TAC No. MC3812)," dated April 25, 2005.

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Main Steam DCN 51112	Provide a seismically rugged alternative leakage treatment (ALT) path for MSIV leakage during a postulated LOCA.	Y
Main Steam DCN 51136	Add capability to place a standby Steam Jet Air Ejector (SJAE) into service from Unit 1 Control Room. Replace various instruments including Main Steam Line pressure transmitters, High Pressure (HP) Turbine 1st stage pressure transmitters, HP and Low Pressure (LP) Steam Flow Transmitters to Reactor Feedwater Pump Turbines, Steam Pressure Indicators to the Steam Jet air Ejectors (SJAEs), Control Valve Steam Chest Pressure Transmitter, Main Steam (MS) Header Pressure Transmitter, Steam Seal Header Pressure Transmitter, High Pressure Turbine Exhaust Pressure Transmitter, and Steam Pressure to Low Pressure Turbine A Transmitter. Replace Main Steam Line Tunnel Leak Detection Temperature Switches with new switches including EQ quick disconnects to prevent moisture intrusion. Install mounting brackets and supports for linear variable differential transformers (LVDTs) used to monitor steady-state vibration of MS piping outside containment during power ascension up to Extended Power Uprate conditions. Provide addition of Auxiliary Boiler steam supply to (SJAE) pressure switches (1-PS-012-80A & -80B), add root valves for new pressure switches, and add interlocks from Auxiliary Steam to SJAE shutoff valves.	Y
Main Steam DCN 51143	Modify and update the four inboard MSIVs by providing new poppet design, new larger stem, new bonnet, new bolting design, new larger actuator, spring housing modification, adapter plate for solenoid control panel, new limit switches (LS-1 & LS-5), and redesigned switch mounting plate to support EPU. Adjust inboard MSIV position limit switch (LS-5) from the 90% open position to the 85% open position per General Electric Service Information Letter (GE SIL) 568. Replace Main Steam Drain Isolation Valve (MSDIV) FCV-1-55, with an equivalent Flowserve valve due to higher leakage trends in Local Leak Rate Tests (LLRTs). Replace the MSDIV motor actuator with a new environmentally qualified motor (GL 89-10). Replace (4) Main Steam Relief Valve (MSRV) bodies with new bodies and new pilot assemblies. Install nine new pilot assemblies on existing bodies. Replace threaded couplings with socket welded couplings in MSRV tailpipes and install new temperature elements in new welded thermowells. Replace existing Main Steam (MS) System cables with new Class 1E and 10CFR50.49 (EQ) qualified cables between the Electrical Penetration Assemblies (EPA) and the Main Steam System components (inboard MSIV limit switches, MSRV pressure control valves and thermocouples, and MSDIV motor actuator and limit switches). Six (6) of the thirteen (13) Main Steam Relief Valves (MSRVs) are associated with the Automatic Depressurization System (ADS) portion of the Main Steam (MS) System (1-PCV-1-5, -19, -22, -30, -31, and -34). Re-label conduit/cables associated with the ADS MSRVs with the 'IS1' suffix. (Cable/conduit associated with the High Pressure Coolant Injection (HPCI) System will be labeled with the 'IS2' suffix per DCN 51150.) Calculation ED-Q0001-920589, (Division I Cables Requiring Separation to Maintain HPCI-ADS Independence Plus Significant ADS Modifications) has been issued to support this change. Replace the mechanical portion of the Standby Liquid Control (SLC) system inside the drywell consisting of (4) valves (1-SHV-63-12, -538, -539, & 1-CKV-63-526).	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Main Steam DCN 51162	Replace equivalent MSRV acoustic monitors, acoustic monitor charge converters, cables, conduit, and junction boxes. Replace equivalent inboard MSIV control valve manifold assemblies. Addition of cables/conduit for limit switches added per DCN 51143.	Y
Main Steam DCN 51173	Modify and update the four outboard MSIVs by providing new poppet design, new larger stem, new bonnet, new bolting design, new larger actuator, spring housing modification, adapter plate for solenoid control panel, and redesigned switch mounting plate. Replace Main Steam Drain Isolation Valve (MSDIV) FCV-1-56 with an equivalent valve due to higher leakage trends in Local Leak Rate Tests (LLRTs). Replace the MSDIV motor actuator with a new environmentally qualified motor (GL 89-10). Replace Control Air flex hoses for MSIVs 1-FCV-1-15, 27, 38, & 52. Provide live-loaded packing for outboard MSIVs and MSDV. Leak-off taps are deleted from new MSIV bonnet design.	Y
Main Steam DCN 51211	Replace all safety-related limit switches associated with the outboard MSIVs. Replace cable and conduit in the Reactor Building associated with the outboard MSIV solenoid valves with new Class 1E and 10CFR50.49 (EQ) cable and splices. Replace cable and conduit in the Reactor Building associated with the inboard and outboard MSIV open/close limit switches with new Class 1E and 10CFR50.49 (EQ) cable (for inboard MSIV limit switches LS-3 and LS-4, see DCN 51162). Replace cables for the MSIV Drain Interlock circuit and reroute cables from a Div II Electrical Penetration Assembly (EPA) to a Div I EPA. Remove the Unit 1 outboard MSDIV local control station. Replace cable and conduit in the Reactor Building associated with the MSRV solenoid valves with new Class 1E and 10CFR50.49 (EQ) cable. Modify control switch locations to ensure required numbers of ADS SRVs are available in case of fire in any area of the plant. Replace cable and conduit in the Reactor Building associated with the MSRV acoustic monitoring with new Class 1E and 10CFR50.49 (EQ) cable. Delete temperature sensors TS-1-17A, -17B, 17C, & -17D from main steam tunnel vault. Replace cable and conduit in the Reactor Building associated with the Main Steam Line Leak Detectors with new Class 1E and 10CFR50.49 (EQ) cable.	Y
Main Steam DCN 51230	Equivalent replacement of each Main Steam Line Flow transmitter. Procure and qualify like-for-like outboard MSIV open/close control valve manifolds. Equivalent replacement of each Main Steam line high flow transmitter. Like-for-like replacement of Main Steam instruments located in the Reactor Building.	Y
Main Steam DCN 51333	Provide additions and modifications to the small bore instrument piping supports inside Drywell for Main Steam and HPCI systems (from respective flow element to Penetrations X-30A, -B, -C, -D, X-32E & F, X-34-A, -B, -C, & -D).	Y
Main Steam DCN 51408	Provide additions and modifications to the small bore instrument piping supports inside the Reactor Building for the Main Steam System (from Drywell Penetrations X-30A, -B, -C, -D, X-32E & F, X-34-A, -B, -C, & -D to the instrument panels in the Reactor Building)	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Main Steam DCN 51458	Remove Moisture Separator Drain Pumps (MSDPs) and modify the Heater Drain System to operate without MSDPs. Upgrade internals of each moisture separator to increase capacity and increase moisture removal efficiency from 85% to at least 95% at EPU conditions. Clear MSDP room of Heater Drain piping. Tap off of condensate booster pump discharge header to supply injection water to each drain from the moisture separators. Cut and cap Raw Cooling Water supply and return piping to the MSDP room. Remove handswitches and indication for MSDPs from main control board. Remove the closing feature of the flow control valves when the reactor feedwater to the associated high pressure feedwater heaters is manually or automatically isolated.	Y
Main Steam DCN 60534	Implementation of MSRV auto actuation logic (will be safety-related on Unit 1).	Y
Condensate and Demineralized Water DCN 51113	Provide a drainage path from the reactor well to the condensate storage tanks when the condenser is out of service (GE SIL 427). Provide for oxygen injection into the Condensate System from the Hydrogen Water Chemistry System at suction piping of each condensate pump (GE SIL 136). Upgrade condensate demineralizer precoat pump seal equipment to improve pump seal operation. Add precoat inlet and outlet line pressure gauges to improve demineralizer precoat operation. Provide for hydrogen injection into the Condensate System from the Hydrogen Water Chemistry System into each condensate booster pump suction drain piping. Change valves 1-FCV-2-29A and 1-FCV-2-29B from "fail open" to "fail closed". Change system design conditions for temperature and pressure to support new booster pump pressures at EPU conditions. Modify Condensate pump inlet piping with T-section spool piece to accommodate pump suction strainers. Feedwater heaters A3, B3, and C3 and associated piping are re-rated, and the manway opening for Feedwater Heater C3 is reinforced to support new design pressure at EPU conditions.	Y
Condensate and Demineralized Water DCN 51137	Replace the Condensate Demineralizer Control Panel from existing analog to a new Digital Programmable Logic Control (PLC) panel and provide control capability for 10 vessels. Provide primary and alternate 120Vac power to the new panel via separate 480 V feeds, 480/120Vac distribution transformers, and an automatic transfer switch. Replace 27 existing transmitters with "smart" transmitters and replace associated flow elements. (EPU)	Y
Condensate and Demineralized Water DCN 51174	Modify Condensate/Demineralized Water System piping inside Reactor Building as follows: Remove the 20"X24" Y-connection, anchor the 20" return line, install a blind flange on the 20" carbon steel header, and reconstruct the 24" header. The Demineralizer Water supply line to the drywell is cut and capped downstream of SHV-2-1191 and cut and plugged upstream of Penetration X-20.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Condensate and Demineralized Water DCN 51294	Provide for the retubing of the Main Condenser in the Turbine Building. Material substitution only of tubing from brass to stainless steel.	Y
Condensate and Demineralized Water DCN 51335	Modify the support configuration for a portion of the Condensate Storage and Supply System piping outside the drywell in the Reactor Building.	Y
Condensate and Demineralized Water DCN 51344	Provide for modifications and additions to existing supports for a small portion of the Condensate Storage and Supply System piping in the Reactor Building (branch HPCI Pump Test line connecting to Condensate Supply System piping).	Y
Condensate and Demineralized Water DCN 51463	Upgrade the Condensate Demineralizer System air surge backwash system by adding quick-action type valves and upgraded compressors. This will result in higher tank pressures and improved air surge valve operating times. Crosstie capability for Unit 1 to Unit 2 backwash air systems is provided with the addition of manual valve 1-SHV-2-850A.	Y
Reactor Feedwater DCN 51076	Provide equivalent replacement and addition of cables as a result of design/programs. Revise setpoint and scaling calculations applying the effects of EPU, 24-month fuel cycle, and hydrogen water chemistry. Increase setpoint of instrumentation associated with reactor steam dome pressure. Extend channel calibration and logic system functional test frequencies to 24-months. Lower the Reactor Vessel Water Level -Low, Level 3 setpoint.	Y
Reactor Feedwater DCN 51114	Replace valves FCV-3-75, 76, 77, and others due to their stellite content. Replace sample probe and valve SMV-3-549 per GE SIL 257. Install mounting brackets and supports for linear variable differential transformers (LVDTs) used to monitor steady-state vibration of Feedwater (FW) piping outside containment during power ascension up to Extended Power Uprate conditions. Delete stem leak off valves LOV-3-540, 543, & 548 from valves FCV-3-71, 72, & 73 respectively and replace stem packing with Electric Power Research Institute (EPRI)-style packing. Replace 12 obsolete Hancock globe valves. Install a GE zinc injection passivation system to reduce Cobalt-60 build-up in piping systems where condensate water is utilized.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Feedwater DCN 51163	Replace Reactor Vessel Level Indicating System (RVLIS) reference and sensing lines (four each) to provide more reliable measurement (GL 84-23 and NUREG-0737, Item II.F.2). Replace Reactor Head Seal Leakoff reservoir line, level switch, and reservoir isolation and drain valves. Replace Reactor Head Vent sensing line and flow control valves. Replace Reactor Vessel Main Feedwater inboard isolation valve closed limit switches. Install FW piping vibration monitoring equipment permanent mounting hardware. Replace double vent and drain small bore valves associated with Reactor Vessel Main Feedwater inboard isolation valves.	Y
Reactor Feedwater DCN 51231	Relocate sensing lines associated with penetrations 17A, 17B, 26A, & 26B from penetrations 28A, 28D, 29A, & 29D respectively. Rework sensing lines due to slope concerns and separation of functionally redundant lines for various level instrument loops (of 10 sensing lines involved, 5 are being re-routed and 5 are being reworked). Two new 6-inch, core-bore penetrations are required. Penetrations X-28A, X-28D, X-29A, & X-29D are to be capped. Refurbish panels 25-5A, 5B, 5C, 5D, 5-1, 6A, 6B, 6C, 6D, and 6-1, to include replacement of drain valves, isolation valves, equalization valves, quick-connect fittings, and tubing. Add new panel 25-426 to house LT-3-206 & 207.	Y
Reactor Feedwater DCN 63792	Provide separate power supplies to U1 RFP min-flow valve control circuits.	Y
H2 Water Chemistry DCN 51115	Install a Hydrogen Water Chemistry (HWC) system to reduce Intergranular Stress Corrosion Cracking (IGSCC) of stainless steel components in the reactor coolant recirculation piping and lower reactor internals. Relocate Unit 2 valves 2-SHV-66-1135 and 1136 which are currently located in Unit 1. Remove existing Offgas hydrogen analyzer panels, associated Offgas sample tubing, Service Air tubing, Demineralizer water tubing, and sample cooler. Install Offgas monitor panel, sample supply/return piping, supports, and valves. Install four hydrogen area monitor sensors (HAMS) to detect hydrogen leakage. Install Offgas calibration gas supply tubing, valves, and interconnecting wiring, conduit, and pull boxes.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Heater Drains and Vents DCN 51116	Replace six tube side heater relief valves and modify piping such that valve inlets are mounted in the vertical direction. (Note: DCN 51464 replaces the associated shell side heater relief valves.) Replace six heater level control valves including operators, positioners, and pressure regulators to prevent unacceptable modulation of water levels (1-LCV-6-11A, -29A, -47A, -14A, -32A, -50A). Replace Number 3 Feedwater heater level control valves with valves that do not incorporate a fluid-filled stem snubber (1-LCV-6-7, -25, & -43). [EPU: Replace 4-inch moisture separator level control valves with 6-inch valves and new operators and positioners (1-LCV-6-62A, -62B, -73A, -73B, -84A, -84B). Expansion joints (bellows) in the No. 2, 3, 4, and 5 extraction steam piping located inside the condenser are being replaced with stainless steel expansion joints to address flow-accelerated corrosion]. Replace level control valves including actuators and positioners (1-LCV-6-1, -19, -37, -4A, -4B, -22A, -22B, -40A, -40B, -11B, -29B, -47B, -14B, -32B, -50B). Replace 4-inch moisture separator level bypass to condenser level control valves with 6-inch valves and new operators, local positioners, and limit switches (1-LCV-6-61A, -61B, -72A, -72B, -83A, -83B). Replace packing for various valve stems with graphite ring packing as described in EPRI Report NP-5967.	Y
Heater Drains and Vents DCN 51139	Provide for refurbishment of Reactor Feedwater heaters as follows: Addition of electronic level switches, addition of control cables from level switches to the associated heater extraction isolation valve, and addition of associated level transmitters. Existing glass level gauges are replaced with all metal gauges and test valves are added. Root valves and their instrument level piping from their connection points on respective heaters are replaced with stainless steel components. Replace existing condensate chambers with new chambers possessing approximately five times greater volume than presently installed chambers capacities.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Control Bay Panels DCN 51094 DCN 51095 DCN 51096 DCN 51097 DCN 51098 DCN 51099 DCN 51100 DCN 51101 DCN 51103 DCN 51104 DCN 51105 DCN 51106 DCN 51108 DCN 51109 DCN 51077 DCN 51111	Summary of changes to PNLs 1-9-3, -4,:-5, -6, -7, -8, -10, -18, -19, -20, -21, -22, -32, -33, -47, -53, -54, -55, 1-25-32 to resolve Control Room Design Review (CRDR) issues: Multiple component relocations within, to, and from other Control Room panels. Multiple indicator replacements as a result of loop signal changes and indicator obsolescence. Multiple indicating scale modifications to adhere to Human Engineering Standards. Installation of new component labels and switch escutcheon plates. Installation of new system mimics. Panel surface enhancements. Replacement of obsolete recorders with Westronics digital paperless recorders. Replacement of the HPCI and RCIC controllers and power supplies. Relocation of the Acoustic Monitoring System from panel 1-9-47 to panel 1-9-3. Installation of the Containment Isolation Status System (CISS) initiation and success indicators. Replacement of Recirculation Pump speed indicators with grouped pushbuttons and status lamps. Replacement of handswitches associated with the lube oil pumps that control Recirculation Drive Cooling Pumps. Replacement and recalibration of Condensate Pump and Condensate Booster Pump monitoring instrumentation. Delete redundant U2 and U3 electrical distribution controls that do not support Unit 1 operations. Installation of a new fiber optic Local Area Network (LAN) throughout the Main Control Room (MCR), connecting all MCR process recorders to a recorder host PC. Install controls and indication to support the new Hydrogen Water Chemistry system. Relocate all System 02, Condensate and Demineralized Water, (Condensate Storage and Transfer portion) controls, indicators, and meters from panel 1-9-20 to panel 1-9-22. Provide new indication for Fire Protection Header Pressure. Remove Circulating Water Traveling Screen Speed Indications. Provide new Standby Gas Treatment outlet flow indication. Remove Standby Gas Treatment Train operability indication. Deletion of IRM, APRM, RBM, & SRM selector switches. Removal of the annunciation for the Rod Sequence Control System. Removal of Core Spray System testable check valves, indications, and controls. Removal of Residual Heat Removal (RHR) System testable check valves, indications, and controls. Removal of the Primary Containment Isolation System (PCIS) Group 7, HPCI and RCIC valve indication from the PCIS mimic. Installation of equipment associated with the Hardened Wetwell Vent modification. Support activities for the annunciators, Common Accident Signal (CAS), and Unit 2 CAS. Upgrade analog flow controllers to digital loop controllers (1-FIC-84-19 & -20). Remove, replace, relocate, abandon power supplies and flow instrumentation for RHR, Core Spray, and RHR Service Water.	Y
Boiler Drains and Vents DCN 51065	Provide modifications for the Main Steam Relief Valve discharge piping located in the drywell from the (13) MSRVs to the impingement barrier. Replace existing mechanical snubbers with new mechanical snubbers.	Y
Boiler Drains and Vents DCN 51067	Provide additions and modifications to the supports for the Reactor Head Vent and Reactor Bottom Head Drain piping located in the drywell. Provide for the addition of one new snubber to the Reactor Head Vent piping.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Boiler Drains and Vents DCN 51144	Remove RPV low point drain valves (1-10-503, -504) and associated piping. Replace existing RPV drain line isolation globe valve (1-10-505) with a gate valve. Replace existing RPV head vent drain globe valves (1-10-500, -501, -502) due to obsolescence and leak potential. Replace some sections of RPV head vent piping with new piping of upgraded material and schedule to reduce pipe stresses and minimize the number of pipe supports. Upgrade Main Steam Relief Valve (MSRV) discharge pipe 10-inch vacuum breaker valves.	Y
Auxiliary Boiler DCN 51561	Install an additional isolation valve (1-SHV-12-973) in the Auxiliary Boiler feedline to the Steam Jet Air Ejectors (SJAEs). Modify a portion of the associated Aux Boiler System 2½" piping.	N Unit Separation
Central Lube Oil DCN 51117	Install unit isolation valves between Unit 1 and the common header for all three units, including the new crossover line between Unit 1 supply and return headers, and reconnect Unit 1 piping to the common plant purifier header piping. Modify, replace, or add equipment, electrical components, foundations, and piping within the Central Lube Oil System and 480 V Turbine Building Vent Board System to support a new Unit 1 Turbo TOC purifier. Modify High Pressure Fire Protection System to add coverage for the new Turbo TOC.	Y
RHR Service Water DCN 51177	Install replacement equivalent thermocouple assemblies (1-TE-23-32, -35, -38, -41, -44, -47, -50, & -53) in existing thermowells (1-TW-23-32, -35, -38, -41, -44, -47, -50, & -53) respectively. Install new thermowells 1-TW-23-4100 & -4101 and new Resistance Temperature Detectors (RTDs) 1-TE-23-4100 & -4101 to accommodate temperature measurement on the outlet side of the heat exchangers. [EPU: Replace RHRSW Flow Control Valves (1-FCV-23-34, -40, -46, & -52) and their associated Motor Operators (1-MVOP-23-34, -40, -46, & -52)]. Replace relief valves on inlet and outlet of heat exchangers (1-RFV-23-509, -516, -529, -536, -549, -555, -568, & -574). Rework and upgrade Dresser couplings for A and C lines in the Service Water Tunnel. Revise large bore pipe supports for Loops A and C to meet current design requirements including EPU.	Y
Raw Cooling Water DCN 51118	Install two (2-inch) injection lines to allow connection to the U2/U3 skid for chemical injection to the 42-inch Raw Cooling Water (RCW) Supply Header. Replace 1-TCV-24-40 existing 8-inch gate valve with an 8-inch globe valve of stainless steel and reroute control air piping to valve as necessary. Revise setpoints for RFPT bearing lube oil temperature controllers to allow operators to determine setpoint as process dictates. Upgrade 1-TCV-24-75 and install a bypass line for low-flow operation. Replace Stator Cooler outlet valves (1-THV-24-620A, & -620B) with stainless steel valves and replace associated downstream 8-inch piping with stainless steel pipe. Replace Henry Pratt butterfly RCW header isolation valves (1-24-523) 24-inch; and (1-24-534) 10-inch, with Flowserve butterfly valves. Perform underwater repairs on leaking return piping to Wheeler Reservoir. Revise RCW supply and return piping to Condensate Booster Pump area coolers. Refurbish instrument piping in Panels 1-25-178, -179, -182, & -182.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Raw Cooling Water DCN 51178	Eliminate 2-inch RCW supply to H2-O2 Analyzer Panels 1-25-340 & -341. Remove piping, cut and cap just after valve 1-24-882 (2-inch). Install new thermowells 1-TW-24-80, -85, & -90 in Reactor Building Closed Cooling Water (RBCCW) heat exchanger 1A, 1B, & 1C outlets and replace thermocouples. Eliminate RCW supply to RHR Pump Seals and Room Coolers. Eliminate RCW supply to Control Bay Chillers.	Y
Raw Cooling Water DCN 51189	Replace and up size RCW piping, components, and supports to new Drywell Delta P Compressor.	Y
Raw Cooling Water DCN 51219	Installation of RCW supply/return piping to/from each Reactor Recirculation Pump Variable Frequency Drive (VFD) heat exchanger, associated flow and temperature instrumentation, cabling/conduit and supports.	Y
Raw Service Water DCN 51120	Replace existing pairs of CUNO filters with redundant abrasive separators and rough duplex strainers for the Raw Service Water supply to the Condenser Circulating Water (CCW) pump bearings.	Y
High Pressure Fire Protection and Detection DCN 51180	Replace HPCI Turbine room deluge valve 1-FCV-26-37 with a packaged pre-action valve station. Modify Reactor Building existing pre-action sprinkler system on floor elevations 565', 593', 621', and south half of 639' to achieve area wide coverage. Install pre-action water curtain at the equipment hatch openings between Elevation 565' and 639' at column line R5/R6-T/U. Install pre-action sprinkler water curtain at the RHR Heat Exchanger door openings at Elevation 565'. Install pre-action sprinkler water curtain in the openings in east and west RHR Heat Exchanger rooms on the ceiling immediately below floor Elevation 565'. Install pre-action sprinkler water curtain at the stair openings between Elevation 565' and 639' at column line R1-U. Install pre-action sprinklers beneath stair landings in the southwest stairway at Elevation 605 and 630. Remove the existing fixed-water spray systems on Elevation 565' and 593'. Remove and discard all components of the Aqueous Film Forming Foam (AFFF) system.	Y
High Pressure Fire Protection and Detection DCN 51368	Provide an upgraded fire alarm and detection system for Unit 1 Reactor Building, including 4kV Board Rooms A and B and 480V Board Rooms 1A and 1B.	N NFPA Code

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Condenser Circulating Water DCN 51120	Design, procure, and install a debris filter for the inlet piping/water box for the Unit 1, C2 water box. Relocate the existing Nash vacuum priming valves and tie-in to the 4-inch water box vent piping. Replace sponge ball recirculation pumps with new pumps of 316SS wetted parts. Replace the collector inlet ball valves and associated motor operators. Replace collector discharge ball valves. Replace existing motor operators on the upper screen and lower screen of the strainer section in the tube cleaning system. Delete Control Air supply to the differential pressure indicating switches in the Amertap ball collection system. Modify valve operator circuitry for Vacuum Breaker valves (1-FCV-27-118A & -118B). Replace existing cables from each CCW pump to its associated capacitor bank. Revise the alarm circuitry for condenser water box level instrument loops (6). Evaluate operation of CCW system at EPU conditions.	Y
Condenser Circulating Water DCN 62015	Replace Cooling Tower No. 4.	Y (Common)
Ventilation DCN 51748	Facilitate the parallel operation of existing redundant air handling units (AHUs), on an as-needed basis, for the Condensate and Condensate Booster Pumps Area Ventilation System in support of EPU. Provide supplemental cooling to the new Hydrogen Water Chemistry (HWC) panel.	Y
Control Air DCN 51122	Install an automatic actuated Unit isolation pressure control valve station on the Turbine Building between Unit 1 and Unit 2 to allow isolation of a leaking portion of the header in Unit 1 from the remainder of the system. Replace Secondary Containment Isolation Valves (1-FCV-32-28 & -29) and rewire associated solenoid valves (1-FSV-32-28A & -29A). Install manual isolation valves to future use with new Hydrogen Water Chemistry (HWC) panels in Turbine Building.	Y
Control Air DCN 51164	Replace pressure switches monitoring control air pressure to the Automatic Depressurization System (ADS) MSRVs (1-PS-32-31A thru -31F). Relocate ADS MSRV accumulators, re-size inlet and outlet lines, and re-route inlet line to top of the accumulator. Balance Control Air distribution between the two Drywell Control Air (DCA) header segments. Determine acceptable leak rate through check valves at the accumulator assemblies for the ADS MSRVs and MSIVs.	Y
Control Air DCN 51182	Delete Drywell Control Air Compressors A and B, and related aftercoolers, surge tanks, dryers, control instruments, piping, valves, and cables. Replace existing Drywell Control Air Receiver Tank Pressure switch (PS-32-70) with a non-mercury filled switch. Provide a source of nitrogen to the DCA system from a 1-inch Containment Inerting System branch connection at check valve (1-CKV-76-542). Nitrogen is regulated to 100 psig by a new DCA pressure regulator station on panel (925-0700). Remove Drywell Control Air prefilter and associated piping and instrumentation. Replace Primary Containment Isolation Valves (1-SHV-32-2160, & -2520 and 1-CKV-32-336 & -2521). Remove Primary Containment Isolation flow control Valves (1-FCV-32-62 & -63).	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Service Air DCN 51183	Remove all Service Air piping from the drywell. Piping to be cut between Penetration X-21 and check valve (33-785). Install air supervision system for piping downstream of valve (FCV-26-77). Air supervision supply will connect to existing Service Air header on Elev. 565'. Change Control Air Shutoff valve (1-SHV-32-1469) from Normally Open to Normally Closed. Cut associated line, plug, and label connection as "Spare".	Y
CO_2 Storage, Fire Protection and Purging DCN 51368	Delete all Local Fire Alarm Control Panels (LFACPs) from Unit 1 Reactor Building in preparation for installation of new Fire Detection Protection System.	N NFPA Code
Sampling and Water Quality DCN 51126	Install a permanent tee and sample valve (1-SMV-43-852) in the generator breaker (1-PCBC-35-214) cooling water line to allow for sampling of the demineralized water, to verify proper conductivity. Provide seismically rugged anchors for the Main Steam Sample Station constant temperature bath. Replace generator breaker (1-PCBC-35-214) cooling water conductivity instruments with equivalent models, as was done on Units 2 and 3, in the water cooling plant (1-CLR-35-797).	Y
Sampling and Water Quality DCN 51140	Replace existing obsolete Generator Cooling Water Conductivity Cells (1-CE-43-16A, -16B, -16C) and associated transmitters (1-CIT-43-16A, -16B, -16C). Add sample test connections at same locations as conductivity elements to enable calibration. Add new oxygen analyzers (1-O2AN-43-12, & -13) using dp across the inlet and outlet of the Stator Cooling Water System Deionizer to drive flow.	Y
Sampling and Water Quality DCN 51168	Replace (1-FSV-43-13) due to age, time in harsh environment, and degraded components. Replacement valve to have stem seal packing which meets EPRI guidelines. Associated switches (1-ZS-43-13A and -13B) are being replaced. Existing globe valves (1-ISV-43-599, 1-TV-43-1054A and -1054B) with gate valves for enhanced performance and replacement valves to have stem seal packing which meets EPRI guidelines. Delete existing vent line from the Reactor Recirculation discharge piping to sampling and associated valves (1-43-812A, & -812B) which serve no design function. Rework instrument sensing lines for flow elements (1-FE-71-1A & -1B) to correct negative slope and provide accurate steam flow indication and line break detection.	Y
Sampling and Water Quality DCN 51185	Install a scaled-down Post Accident Sampling System for Unit 1. See Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler TSTF-413. The modified system provides a means to sample reactor coolant, suppression pool, and containment atmosphere at a sample station (1-LPNL-925-365). Included are additions of RHR liquid sample line and H2/O2 monitoring gas sample line for the Post Accident Sampling System (PASS). Replace existing solenoid valve (1-FSV-43-14) with a Class 1E and EQ solenoid valve. New valve to be supplied with stem seal packing which meets EPRI guidelines.	N

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Sampling and Water Quality DCN 51235	Provide sampling capability from the drywell sump pumps (1-PMP-77-01A, -01B, and -14A, -14B) discharge lines to facilitate monitoring of identified and unidentified drywell leakage.	N
Sampling and Water Quality DCN 51478	Replace and relocate instrumentation from the Condensate Demineralizer Sampling Panel (25-148) to the Condensate Sample Panel (25-103). Add oxygen and hydrogen analyzers (1-O2AN-43-9 and 1-H2AN-43-9, respectively) to the new Condensate Sample Panel. Add a sample chiller unit (1-CHR-43-2060() to cool influent sample streams in support of new panel (25-103). Add a Feedwater roughing cooler (1-CLR-43-4B). Provide data feed from new panel (25-103) to the Integrated Computer System (ICS) See DCNs 51082 and 51137. Reroute ducts to provide exhaust capability for sample sink in new panel (25-103). Delete existing Feedwater turbidity instruments from panel (25-149).	Y
Feedwater Level Control DCN 51138	Replace existing Reactor Feed Pump Turbines (RFPT) governor control, lubricating and control oil, vibration monitoring, and trip components in conjunction with the addition of a Foxboro Digital Reactor Feedwater Control System (DRFWCS). Install new panel 9-97 in the MCR and add fiber optic cables from Aux Instrument room and Unit 1 Computer room to two local panels (925-562A & 925-562D). Remove existing RFPT controls including the mechanical linkage, Motor Speed Changer (MSC), and Motor Governor Unit (MGU); and replace with a Woodward Digital Governor and Final Drive.	Y
Annunciators DCN 51107	Replace Unit 1 Annunciation System. New system to fit into existing panel spaces and has added capability to provide alarm status and sequences from Integrated Computer System (ICS) displays using Programmable Logic Controllers (PLCs). Remove existing annunciator hardware, circuit cards, lamp holders, and wiring, inside and outside the annunciator window boxes. Install a mounting plate with two PLCs, ladder logic programmed Input/Output (I/O) cards, relay cards, fuses, and terminal blocks with multi pin connectors mounted inside each original Annunciator Window Box facing the rear of each Main Control Room (MCR) panel. Existing field wiring will land on new terminal blocks and be jumpered to allow both PLCs to have identical auctioneered inputs. Modify MCR front panels, above each Annunciator Window box, to accommodate four Light Emitting Diode (LED), long-life bulbs. Existing 48V dc to 120V ac inverters are removed and replaced with two 48V dc to 24V dc power supplies per MCR panel. Replace the current annunciator power supply 48V dc distribution system and Automatic Bus Transfer (ABT) switch in Panel (1-9-9, CAB 1) with two fused distribution panels. Replacement of the Operations Recorder equipment will occur at one time using PLC based equipment Real Time Products (RTP) system and this installation will affect all 3 units. This system consists of two high density I/O racks and processors located in Bay 94 in the Communications Room. Existing light bulbs in the window box on panel (9-8) will be replaced with 24V LED bulbs on all three units. The 120V ac RTP will be powered from Unit 3 ICS distribution panel (25-525).	N
Temperature Monitoring DCN 51165	Provide for equivalent replacement of system 003, (Reactor Feedwater), system 056, (Temperature Monitoring), and system 068 (Reactor Water Recirculation) thermocouples, mounting hardware, and associated cables/conduits to satisfy component reliability due to age, time in harsh environment, and degradation.	N

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Temperature Monitoring DCN 51232	Replace obsolete Control Room temperature recorders (1-TR-56-2, -3, -4, and -37) with digital paperless recorders.	N
Standby Liquid Control DCN 51081	Modify loop (1-P-63-7) power supply from 10-50 mA to 4-20 mA in panel (1-9-19).	Y
Standby Liquid Control DCN 51166	Replace cable and conduit for SLC drywell inboard isolation valve zone switch.	Y
Standby Liquid Control DCN 51233	Modify/replace RTDs (1-TE-63-3 and -4) to upgrade obsolete equipment and ensure monitoring of tank solution instead of area ambient temperature. Replace (1-PI-63-7B and 1-PT-63-7) to remove obsolete equipment and add isolation valve, drain valve (1-ISIV-63-7BA and -7BB) and quick disconnect to facilitate calibration. Remove heat tracing from process lines and components in the SLC system. Replace and rescale temperature switches (1-TS-63-3 and -4) to comply with 10CFR50.62 ATWS equivalency requirements for B10 enriched sodium pentaborate. Revise SLC Storage Tank level alarm setpoints to support implementation of Alternate Source Term and associated Tech Spec change which increases the net injectable volume of sodium pentaborate from 3007 to 4000 gallons.	Y
Reactor Building Ventilation & PCIS DCN 51081	Provide for modification of Primary Containment Isolation System (PCIS) cabling from panel (1-9-15) to panels (1-9-42 and -43) to provide functional redundancy separation. Existing power supply (1-PX-74-51) feeding loops (1-L-64-159A and 1-P-64-160A) and new RTD temperature modifier (1-TM-64-52CA) are rewired to be segregated and powered from panel (1-9-42). In panel (1-9-19) modify loop (1-P-64-67) for conversion from 10-50 mA to 4-20 mA. Modify pressure switches (1-PDS-64-137A, B, C and 1-PDS-64-138A, B, and C) wiring to allow one loop to be removed from service without affecting the redundant loop.	Y
Reactor Building Ventilation & PCIS DCN 51166	Replace obsolete inboard Drywell Personnel Air Lock limit switch (1-ZS-64-53A), associated cable, and conduit. Replace Drywell Air Temperature elements (1-TE-64-52A & -52C) from thermocouples to RTDs and replace associated cable, conduit, and conduit seals. Delete the following Drywell Leak Rate instruments, associated cables and conduit: temperature elements (1-TE-64-82 thru -99) (18 total); humidity sensors (1-ME-64-111 thru -114) (4 total); and pressure sensor (1-PT-64-115) (1 total). Fabricate and install new Unit 1 Drywell Primary Containment Equipment Hatch Cover Lugs.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Building Ventilation & PCIS DCN 51189	Provide for modification of Drywell Vacuum Breakers (1-FCV-64-28A, thru 28M [except 28I]) by replacing hinge arms, hinge pins, bushings, and other parts per (NUREG-0661). Install Unit 1 Torus vent path to the common header portion of the Hardened Wet Well Vent (HWWV), including Primary Containment Isolation Valves (PCIVs) (1-FCV-64-221, & -222) and associated solenoid valves, air operators, 250V dc power, and Control Room handswitches and indications. Replace the following unqualified valves with 10CFR50.49 qualified models: (1-FSV-64-17, -18, -19, -20, -21, -29, -30, -31, -32, -33, & -34). Replace the following valves, including Bettis actuators (1-FCV-64-17 thru -21; -29, -30; 32, & -33) with new valves having closing times of 2.5 seconds or less. Replace cables/conduits, limit switches, terminal blocks, and other electrical components to satisfy EQ, Class 1E, and ampacity issues, and to resolve component reliability issues due to age, time in harsh environment, and degradation. Replace previously removed Drywell Delta P compressor, motor, aftercooler, and associated controls and cables/conduit. Replace two unqualified Drywell Penetrations (PA), containing airlock lighting, telephone, and door status circuitry, with (1) ASME Section III qualified penetration assembly.	Y
Reactor Building Ventilation & PCIS DCN 51190	Provide for fire damper installation in Reactor Building Ventilation ducts through floor penetrations (27 dampers). Provide for new Main Steam Vault Exhaust Booster Fan installation. Provide for replacement of Core Spray and RHR Pump Room Cooler motors, EQ associated cables, and room temperature instruments. Provide for replacement of Secondary Containment Isolation Valve cables, limit switches, and terminal blocks.	Y
Reactor Building Ventilation & PCIS DCN 51243	Modify/add/replace components and wiring internal to Emergency Core Cooling System (ECCS) Panel (1-9-81). Modify/add/replace components and wiring internal to ECCS Panel (1-9-82). Modify/add/replace components and wiring internal to Reactor Protection System (RPS) Panel (1-9-83). Modify/add/replace components and wiring internal to RPS Panel (1-9-84). Modify/add/replace components and wiring internal to RPS Panel (1-9-85). Modify/add/replace components and wiring internal to RPS Panel (1-9-86). Refurbish components and cabling to Panels (1-25-5A, -5B, -5C, -5D, -6A, -6B, -6C) and replace EQ cables. Refurbish components and cabling in Panels (1-25-31, -34, -57B, -57D, -213, -219, -220, -221, -222, -306, -307, and -308) and replace EQ cables.	Y
Reactor Building Ventilation & PCIS DCN 51245	Replace torus wide range level transmitters (1-LT-64-159A & -159B), install quick-disconnect fittings, and splices. Replace torus narrow range level transmitters (1-LT-64-54 & -66) and associated flow controllers (1-FIC-64-54, & -66). Add level sensors (1-LE-64-54, & -66); sight glasses (1-LG-64-54, & -66) demineralized water connections, platforms, communications, lighting, and power.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Building Ventilation & PCIS DCN 51318	Remove removable relief panels in Unit 1 to combine four Secondary Containment zones into one zone. One result of this change is the free flow of each reactor zone atmosphere with the common refuel floor atmosphere. For Elev. 639', 621', & 593', remove all vertical removable relief panels and steel frames surrounding the equipment hatch. Install removable handrails around the hatch. The handrails are Seismic Class II/I (position retention). For Elev. 593' to 580', remove all removable relief panels, however, steel frames are left in place. For Elev. 580' to 565', remove all vertical removable panels and vertical steel frames surrounding the truck bay. Remove horizontal roof panels, however, beams and steel frames are left in place. Add three new diagonal braces to the roof steel platform. Seal two (2) 4-inch Dirty Radwaste (DRW) floor drains with removable closure plates to prevent the flow of water from the SE corner of the Rector Building into the HPCI room. Provide for the installation of an 8-inch concrete curb and ramp in the labyrinth passage of the Main Steam Valve Vault (MSVV) to contain water within the vault. Provide for increasing the concrete curb at the entrance to the HPCI room from 12 inches to 18 inches to prevent water from entering the room.	Y
OffGas DCN 51128	Replace existing obsolete Catalytic Recombiner drain valves (1-FSV-66-73, & -88). Install test connections in suction and discharge piping of Vacuum Pumps (1-PMP-66-43A1, & -43B1) to support Condenser air inleakage tests. Install spring-operated piston check valves (1-CKV-66-922, & -923, respectively) on Service Air System connected to Offgas System Train 'A' and 'B', respectively. Replace SJAE inlet and outlet valves (1-FCV-66-11, -14, -15, & -18) with spark-proof seats. Modify Offgas sample connections to H2 & O2 analyzer containing valves (1-SHV-66-575, & -576). Add Chilled Water sample line at (1-PI-66-63). Replace Chilled Water relief valve (1-RFV-66-541). Replace Glycol Recirculation Pumps (1-PMP-66-104, & -105). Replace Offgas Stack discharge valve (1-FCV-66-28) with spark-proof seat and replace associated solenoid (1-FSV-66-28) and limit switches (1-ZS-66-28A, & -28B).	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
OffGas DCN 51142	Modify/upgrade Offgas flow to 6-hour holdup volume loops (1-F-66-111A & -111B): Relocate flow elements (1-FE-66-111A, & -111B) downstream of dehumidifiers to reduce moisture problems and replace with a Kurz combo FE/FT. Remove existing flow transmitters (1-FE-66-111A, & -111B) from panel 25-95. Add blind flanges where previous flow elements were located. Add two Kurz Instrument flow computers to replace existing (1-FI-66-111A, & -111B; 1-FX-66-111A, & -111B; 1-FM-66-111A, & -111B; 1-FS-66-111A, & -111B). Remove GE indicators (1-FIS-66-111A, & -111B) from panel 25-95. Add time delay relay (1-RLY-66-111) on panel 25-95. Upgrade Offgas flow to 6-hour holdup volume loop (1-F-66-20): Replace Fisher and Porter flow indicating transmitter (1-FIT-66-20) with a Rosemount transmitter connecting to the existing sensing lines from (1-FE-66-20) and providing a linear signal to (1-FR-66-20) on panel 9-8, negating the need for (1-FM-66-20). Remove (1-FM-66-20) from panel 9-29 and re-label (1-FT-66-20 to 1-FIT-66-20). Modify/upgrade Offgas Condensed level control loops (1-L-66-93, & -94): Replace existing 10-50 mA transmitters (1-LT-66-93, & -94) with 4-20 mA transmitters on panel 25-335. Replace existing 10-50 mA controllers (1-LIC-66-93, & -94) with 4-20 mA controllers on panel 25-95 that will also power the loops. Replace existing (two) 10-50 mA level switches (1-LS-66-93, & -94) with (four) 4-20 mA level switches (1-LS-66-93A, -93B, -94A, & -94B) on panel 25-95. Replace existing 10-50 mA I/Ps (1-LM-66-93, & -94) with 4-20 mA I/Ps located in the Recombiner Room. Remove existing power supply (1-PX-66-93). Provide standby level loop (94) with its own independent power by feeding power to (1-LIC-66-94) from non-preferred 120V ac from panel 9-9, BKR 522. Add new panel 25-96A. Modify Glycol Tank temperature loop (1-T-66-102) with programmable logic controller (1-TC-66-102) on new panel 25-96A. Modify Offgas Reheater Outlet Moisture Loop (1-M-66-110) to be an offline system with capability to be isolated from the Offgas system without isolating the Offgas system which it monitors. Modify Offgas Condenser outlet temperature loop (1-T-66-95) for higher temperature range (from 155 to 160 deg. F). Replace Offgas Recombiners A & B temperature controllers (1-TC-66-76, & -90). Revise setpoints: 6-hour holdup volume pressure switches (1-PIS-66-21C, & -21D) to 3.5 psig increasing. CNDR vacuum pump seal water temperature switches (1-TS-66-55, & -56) from 110 deg. F to 120 deg. F CNDR vacuum pumps 1A & 1B suction pressure switches (1-PS-66-37, & -41, respectively, from 27" Hg to 26" Hg.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Emergency Equipment Cooling Water DCN 51192	Replace the following carbon steel valves with stainless steel valves: (1-Ckv-67-541, -542, -554, -584, -585,-597, -648, -649, -656, -657, & -598) (1-TV-67-236, -237, -243, -244, -251, -252, & -259) (1-SHV-67-550, -551, -569, -570, -593, -594, -596, -610, & -611) (1-VTV-67-746, & -751). Reroute 1-inch Emergency Equipment Cooling Water (EECW) line to H2 Analyzers that interferes with a permanent ladder required for access to (1-FCV-23-57) during performance of certain Emergency Operating Instruction appendices. Add EECW 1-inch flush connections with piping, shut off valves, and quick disconnects to the supply and discharge lines for RHR Pump Room Coolers 1A, 1B, 1C, & 1D. Add the following 1-inch valves at the flush connections: (1-SHV-67-817 & -818) at RHR Room Cooler 1A return and inlet connections, respectively; (1-SHV-67-827 & -828) at RHR Room Cooler 1B return and inlet connections, respectively; (1-SHV-67-819 & -820) at RHR Room Cooler 1C return and inlet connections, respectively; and (1-SHV-67-829 & -830) at RHR Room Cooler 1D return and inlet connections, respectively. Change motive fluid for valves (1-FCV-67-50 & 51) from water to air. Cut, remove and cap piping downstream of valves (1-RTV-67-6022A & -6009A) and up to the connection to the valve operators for (1-FCV-67-50 & -51) respectively. Provide new ½-inch connections to install pressure switches (1-PS-67-50 & -51) in the 8-inch header at the downstream side of valves (1-SHV-67-640 & -575) respectively. Add a travel stop to valve (1-FCV-67-50) to limit travel to 25%, +/-1% of maximum opening.	Y
Reactor Water Recirculation DCN 51016	Modify the existing RHR Low Pressure Coolant Injection (LPCI) System signal isolation of the Recirculation Pump discharge valve logic so that the Div I RHR (LPCI) signal will only isolate the 1B Recirculation Pump discharge valve associated with the LPCI loop I injection line, while the Div II RHR (LPCI) signal will only isolate the 1A Recirculation Pump discharge valve associated with the LPCI loop II injection line. Delete the interlock signals from pressure switches (1-PS-68-93, & -94) to block the isolation of the LPCI injection valves (1-FCV-74-53, & -67) on a Group 2 PCIS initiation when reactor pressure is ≥105 psig. Pressure switches (1-PS-68-93, & -94) will continue to provide a (reactor pressure ≥105 psig) signal to relays (10A-K97A & 10A-AK97B) to isolation valve (1-FCV-74-48) which prevents shutdown cooling from being in service when reactor pressure is ≥105 psig. Modify Core Spray initiation & ECCS Preferred Pump logic so that U2 Core Spray (CS) Pumps 2A & 2C and Residual Heat Removal (RHR) Pumps 2A & 2C are load shed on a U1 accident signal initiation and U1 CS Pumps 1B & 1D and RHR Pumps 1B & 1D are load shed on a U2 initiating signal if the pumps were running with normal power available. Thus, CS Pumps 1A & 1C and RHR Pumps 1A & 1C are dedicated to U1 and CS Pumps 2B & 2D and RHR Pumps 2B & 2D are dedicated to U2 with either normal or DG power available. Add new load shed initiating signal from CS Relays (14A-K11A & -K11B) which will be redundant to Relays (10A-K73A & -K73B) to avoid single failure and overloading of (2) 4kV Shutdown Boards.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Water Recirculation DCN 51045	Replace existing Reactor Pressure Vessel (RPV) recirculation outlet safe ends at nozzles N1A and N1B (total of 2) with those made of 316NG stainless steel. Replace existing (RPV) recirculation inlet safe ends at nozzles N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, & N2K (total of 10) with those made of 316NG stainless steel. Remove and replace the existing 28-inch recirculation lines between the RPV recirculation safe end to the RPV recirculation ring headers, including flow elements for loops A & B, with those made of 316NG stainless steel. Remove and replace the existing recirculation risers (total of 10) at RPV nozzles N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, & N2K, with those made of 316NG stainless steel. Remove and replace the existing ring headers in the pump discharge piping for loops A & B, with those made of 316NG stainless steel. Remove valves (1-FCV-68-33 & -35) and associated circuitry and controls inside the Drywell. Remove associated valves (1-68-530, -531, -532, -533, -535, -536, -537, -538, -68-NNN-1, &-68-NNN-2) and the 22-inch piping between loop A & B ring headers. Remove and replace existing Jet Pump Instrumentation (JPI) nozzle safe ends at RPV nozzles N8A & N8B, and proximity piping. Delete valves (1-68-292, -293, -294, & -295). Remove (8) 1-inch sensing lines installed between recirculation discharge risers at RPV nozzles N2A - N2H, and N2J, N2K and their associated containment penetrations. Cut and cap the penetrations. Replace the following thermowell/temperature element sets: (1-TW-68-2 & 1-TE-68-2; 1-TW-68-6 & 1-TE-68-6A & 1-TE-68-6B; 1-TW-68-78 & 1-TE-68-78; 1-TW-68-83 & 1-TE-68-83A & 1-TE-68-83B). Remove and cap the bonnet vent lines for valves (1-FCV-68-1, -77, & -79) and remove associated drain valves (1-68-502, -503, -511, -512, -517, -518, -526, -527). Add (3) new vent valves and piping routed to Clean Radwaste for each Recirculation Pump (valves 1-68-6601, -6602 & -6603 for pump 1A & 1-68-6604, -6605, & -6606 for pump 1B). Provide permanent radiation shielding (lead blankets) for vertical segments of the 12-inch and 28-inch recirculation piping. Replace 2-inch globe valves (1-68-505, -506, -520, & -521) in recirculation pump suction drain lines with valves of non-cobalt trim and EPRI-approved graphite packing. Replace rotating assemblies and seal cartridges for recirculation pumps (1-PMP-68-60A & -60B) including shafts, seals, impellers, and covers. Replace recirculation pump seal injection lines and associated valves.	Y
Reactor Water Recirculation DCN 51167	Replace existing Recirculation Pump/motor 1A & 1B vibration monitoring and speed indicating instrumentation, cabling and conduit. Refurbish and rewind recirculation pump motors.	Y
Reactor Water Recirculation DCN 51178	Provide Raw Cooling Water to Variable Frequency Drives (VFDs) which replace M-G sets (DCN 51219) for Recirculation Pump motors.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Water Recirculation DCN 51193	Replace existing inner and outer RPV head metallic O-ring seals with new spring-energized O-rings and associated retainer clips. Repair Intergranular Stress Corrosion Cracking (IGSCC) on and around the two Access Hole Covers (AHCs) in the RPV shroud support plate, to include installation of new AHCs if necessary. Install retaining clamps on jet pump instrument sensing lines (internal to the RPV) to resolve vibration issue. Replace the (48) shroud head bolts with newly designed bolts. Replace RPV core plate plugs as required. Replace the following Recirculation Pump seal injection line valves: (1-CKV-68-550 & -555; 1-SHV-68-552 & -557; 1-VTV -68-551 & -556; and 1-RFV-68-553 & -558). Relocate flow indicators (1-FI-85-52, & -53) to downstream of the inlet connections of seal injection supply relief valves to provide a more accurate indication of seal injection flow to the Recirculation Pumps.	Y
Reactor Water Recirculation DCN 51218	Replace cables identified for replacement in Total Program Breakage Summary. Splice Reactor Water Recirculation System circuits on outboard (reactor building) side of Penetrations (EB, EC, & EE). Abandon/remove cables for components that are deleted. Determ/splice/reterm cables not replaced but requiring wiring changes. Modify breaker compartments, components, and panel wiring for power and control circuits of MOVs (1-FCV-68-3, -33, -35, & -79).	Y
Reactor Water Recirculation DCN 51219	Abandon M-G sets powering Recirculation Pump motors (in -place) and install new solid state Variable Frequency Drives (VFDs). Remove M-G set lube oil skids, heat exchangers, and foundations. Rerate Recirculation Pump motors from 8000 to 8550 hp.	Y
Reactor Water Recirculation DCN 51234	Install new panel (1-LPNL-925-412), vibration monitoring system, associated cables, and system panel to support EPU. Refurbish existing Reactor Water Recirculation System instrument panels/racks (1-25-7A, -7B, -51B, -52A, -52B, & 1-9-18). Replace existing GE Measurement & Control components with Foxboro Intelligent Automation (I/A) components. Refurbish existing affected panels (1-9-38, -18, & -19). Complete implementation of Recirculation Pump Trip (RPT) and portions of the (ATWS) modifications for Unit 1. Affected panels are (1-925-416, -612, -415, -613, -614, -616, -615, & -419). Perform Foxboro and Bentley-Nevada software verification and validation.	Y
Reactor Water Recirculation DCN 60072	Install control circuit isolation fuses in the positive legs of the 250 V dc trip circuits for Normal; and Emergency feeder breakers for Reactor Recirculation Pumps 1A (Breakers 1122 & 1436) and Pump 1B (Breakers 1124 & 1534). Also, a single fuse is added to the positive leg in the 250 V dc circuits for Reactor Recirculation Pumps 1A & 1B Overcurrent Relay and Transfer Selector Switch circuit (Appendix R).	Y
Reactor Water Cleanup DCN 51046	Remove and replace 6-inch process piping and valves from the 20-inch RHR piping connection to primary containment penetration X-14. Replace Motor Operated Valves (1-FCV-69-1, & -2) per TVA's GL 89-10 program and add valves/capability for Appendix J testing of (1-FCV-69-1). Replace system valves inside the Drywell (1-69-500, -583, -584, -503, & -504). Install a 2-inch decontamination flush connection with 2-inch gate valves (1-69-551, & -552) and a camlock male fitting. Replace cable to (1-FCV-69-1) to correct ampacity/voltage concerns and install (2) T-drains. Install instrument locations to measure piping vibration.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Water Cleanup DCN 51194	Replace/upgrade various 4-inch and 6-inch piping segments to, from, and interconnecting regen and non-regen heat exchangers and from RWCU pump discharge to the tie-in to the RWCU demineralizer influent pipe. Replace regenerative heat exchangers. Replace RWCU recirculation pumps (1-PMP-69-4A, & -4B). Replace small bore vent, drain, and test connections branching off of the RWCU piping, including the associated valves. Replace instrument lines branching from replaced piping, up to the root valves. Replace flow elements on RWCU discharge lines. Replace various thermowells and temperature elements. Replace strainers (1-STN-69-800 & -801). Reroute RWCU flow from outboard isolation valve (1-FCV-69-2) through regenerative heat exchangers A, B, & C, and non-regenerative heat exchangers A & B, the to the RWCU Pump suction resulting in lower temperature water entering pumps and longer lasting pump seals.	Y
Reactor Building Closed Cooling Water DCN 50977	Complete the piping tie-in to the Unit 1 Reactor Building Closed Cooling Water (RBCCW) System from the existing Drywell Outage Chillers.	Y
Reactor Building Closed Cooling Water DCN 51148	Replace RBCCW System carbon steel piping within the drywell with stainless steel piping. Replace the drywell atmosphere cooling coils and blowers (Drywell Cooler) to improve cooling of drywell atmosphere. Replace the inlet and outlet RBCCW valves to each of (10) coils. Upsize Drywell Cooler blower motor power cables (See DCN 51195). Delete (60) cables, associated conduits and junction boxes due to new Drywell Coolers being completely factory wired. Modify RBCCW piping to new Recirculation Pump seal assemblies and reduce connections to one supply and one return per seal assembly cooler. Replace (44) cables inside the drywell with environmentally qualified (EQ) cables.	Y
Reactor Building Closed Cooling Water DCN 51195	Install isolation, drain, and test valves to provide for LLRT of Primary Containment Isolation Valves (1-CKV-70-506 & 1-FCV-70-47). Replace thermowells and temperature elements for loops (1-T-70-3, -50, -51, -52, -53, -54, -56, -58, & -60). Document thrust requirements and switch settings for motor operated containment isolation valve (1-FCV-70-47) to meet GL 89-10 requirements.	Y
Reactor Core Isolation Cooling DCN 51149	Replace solid wedge gate valve (1-FCV-71-2) with a newer design double disc gate valve. Delete the associated leak-off valve and piping. Add a ¾" test line to bottom of new valve body for between-seat leak testing. Install new motor operator to meet EQ and GL 89-10 requirements. Replace existing cable, conduit, and conduit supports for this new MOV and bypass the torque switch in the motor operator control circuit.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Core Isolation Cooling DCN 51196	Perform various mechanical modifications to the Reactor Core Isolation Cooling (RCIC) System valves from among the following: Upgrade valve packing to EPRI-approved graphite (live-load) packing, remove leak-off valves, cut, and cap or plug, leak-off lines. Replace solid wedge gate valve with a newer design double disc gate valve. Delete the associated leak-off valve and piping (excluding 1-SHV-71-14). Add a ¾" test line to bottom of new valve body for between-seat leak testing. Install new motor operator to meet EQ and GL 89-10 requirements, including T-drains and grease relief valve for gear case. Bypass the torque switch in the motor operator control circuit. Install test line with test and shutoff valves for 10CFR50 Appendix J testing. Applicable to (1-FCV-71-3, -6A, -6b, -7a, -7B, -8, -9, -17, -18, -25, -34, -37, -38, -39; 1-SHV-71-14 & 1-PCV-71-22). For check valves (1-CKV-71-597, -598, -599, & -600), install a 2-inch gate valve (1-SHV-71-520) in the RCIC turbine exhaust vacuum relief piping to facilitate Appendix J testing. Replace (1-CKV-71-520) with a new T-pattern globe lift check valve. Replace (1-FCV-71-40) with a new pneumatic testable check valve. Replace valve (1-FCV-71-59) and associated motor operator.	Y
Reactor Core Isolation Cooling DCN 51220	Perform various electrical modifications to RCIC System valves (1-FCV-71-3, -8, -9, -10, -17, -18, -25, -34, -38, -39, & -59). Disconnect existing power and control wiring to the MOVs, remove or abandon cables/conduits and replace existing internal wiring with EQ wiring. Relocate power supplies. Remove local control switches. Remove power from valve (1-FCV-71-59) to maintain valve deenergized and open by opening associated 480V Reactor MOV Board 1A breaker. Replace limit switches for (1-FCV-71-10) for valve mid-position indication. Provide 250V dc power to new solenoid-operated RCIC steam line trap bypass valve (1-LCV-71-5); valve to fail closed on loss of power. Provide for automatic restart of RCIC System upon a reactor vessel low water level signal following a reactor vessel high water level trip per NUREG-0737. Remove the electronic overspeed trip function from the RCIC turbine per GE SIL No. 382. Replace existing GE relays (1-RLY-71-13A-K9 & -K42) with Agastat time delay relays and change setpoint of relay (1-RLY-71-13A-K42) in panel (1-25-31) from 30 seconds to 90 seconds to allow RCIC condensate pump to operate until low level is reached without activating annunciator (LA-71-29), RCIC GLAND SEAL VACUUM TANK LEVEL HIGH (XA-55-3B, Window 20). Replace and/or reroute electrical wiring/cables and replace components and instruments to meet EQ requirements, Appendix R breakage requirements, and to resolve electrical and instrument issues/concerns.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Reactor Core Isolation Cooling DCN 51236	Equivalent instrument replacements: Replace existing (1-PDIS-71-1A & 1B) with (1-PDT-71-1A & 1B). Replace (1-PS-71-1A, 1B, 1C, & 1D) to meet EQ and Class 1E requirements. Replace (1-PS-71-21A) due to failed accuracy evaluation and obsolescence. Replace (1-FS-71-36) with (1-FIS-71-36). Replace RCIC Turbine Exhaust High Pressure switches (1-PS-71-13A & -13B). Replace flow solenoid valves (1-FSV-71-6A & -6B) due to obsolescence. Replace flow transmitters (1-FT-71-1A & -1B) due to obsolescence. Replace pressure transmitters (1-PT-71-4, -12, & -35) due to obsolescence. Replace pressure switches (1-PS-71-11A, -11B, -11C, & -11D) due to obsolescence. Replace temperature switches (1-TS-71-2A, -2B, -2C, -2D, -2E, -2F, -2G, -2H, -2J, -2K, -2L, -2M, -2N, -2P, -2R, & -2S) due to obsolescence. Refurbish instrument panels (1-25-7A & 1-25-58). Add new RCIC Turbine Control Panel (1-LPNL-925-672).	Y
Auxiliary Decay Heat Removal DCN 51197	Auxiliary Decay Heat Removal system was established in 1997 when Unit 1 was not operating. Provide auxiliary decay heat removal capability such that RHR system can be made available for maintenance soon after reactor shutdowns. Route new 12-inch and 14-inch piping and components to and from the fuel pool to provide decay heat removal.	Y
High Pressure Coolant Injection DCN 51083	Remove, abandon, reroute, and replace various cables in the HPCI System to resolve Class 1E, Environmental Qualification (EQ), train separation, and breakage issues.	Y
High Pressure Coolant Injection DCN 51150	Replace solid wedge gate valve (1-FCV-73-2) with newer design double disc gate valve. Delete the associated leak-off valve and piping, as applicable. Add a ¾" test line to bottom of new valve body for between-seat leak testing. Install new motor operator to meet EQ and GL 89-10 requirements. Replace existing cable, conduit, and conduit supports for this new MOV and bypass the torque switch in the motor operator control circuit, as applicable. Upsize power cabling to new MOV operator due to larger motor, as applicable.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
High Pressure Coolant Injection DCN 51198	Replace motor actuator and spring pack for valves (1-FCV-73-36, & -40) and provide live-load packing and smart stem. Cut and cap stem leak-off lines, as applicable. Replace solid wedge gate valve (1-FCV-73-3) with newer design double disc gate valve. Delete the associated leak-off valve and piping, as applicable. Add a ¾" test line to bottom of new valve body for between-seat leak testing, as applicable. Install new motor operator to meet EQ and GL 89-10 requirements, including T-drains, as applicable. Replace motor actuator and spring pack for valve (1-FCV-73-18) and provide live-load packing and smart stem. Cut and cap stem leak-off lines, as applicable. This valve is changed from globe to a gate valve. Replace motor actuator and spring pack for valve (1-FCV-73-16) and provide live-load packing and smart stem. Cut and cap stem leak-off lines, as applicable. Opening time is increased from 20 seconds to 30 seconds. The new valve has body drain which is plugged. Replace existing EG-R hydraulic actuator (1-SM-73-190) for HPCI Turbine control valve (1-FCV-73-19) with a device qualified by GE. Replace HPCI booster pump suction relief valve (1-RFV-73-506) and lower set pressure from 150 psig to 55 psig per GE SIL No. 129. Replace previously removed HPCI pump test flow control valve 1-FCV-73-35 with a new valve and provide live-load packing and smart stem. Replace the motor operators and valve stem packing on valves (1-FCV-73-26, -34, & -44) and plug stem leak-off lines. Replace testable check valve and pneumatic operator on (1-FCV-73-45). Replace check valve (1-73-603) with a new 'T' pattern globe lift check valve. Add new 2-inch gate isolation valve downstream of check valve (1-73-24) and upstream of penetration X-222. Replace motor actuator and spring pack for valve (1-FCV-73-30) and provide live-load packing and smart stem. Cut and cap stem leak-off line. Add a 4-inch isolation gate valve (1-SHV-73-652) between (1-FCV-73-30) and the connection to the 18-inch RHR test line. Refurbish/ upgrade GE supplied HPCI turbine/pump skid to included impeller replacement and seismic qualifications.	Y
High Pressure Coolant Injection DCN 51221	Replace existing cables for new level switches (1-LS-73-56A, -56B, -57A, & -57B) (Ref. DCN 51237). Replace existing relay (23A-K17) with time delay relay (1-RLY-73-29-1) to retard the low suction pressure trip function of (1-PS-73-29-1) for 7 seconds. Replace HPCI booster pump suction pressure switch (1-PS-73-29-1) with a Class 1E, EQ device. Replace time delay relays (23A-K43 & -K51) for HPCI discharge pump and suppression chamber High Pressure, with (1-RLY-73-23AK43, & -51) in panel (1-9-39). Replace (LCV-73-5) HPCI condensate drain pot drain valve, with a manual valve. Replace various obsolete handswitches and temperature and level instruments, and upgrade wiring, splices, and connectors to Class 1E, EQ.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
High Pressure Coolant Injection DCN 51237	Equivalent instrument replacements: Replace existing (1-LS-73-56A, -56B, 57A, & -57B) Replace the following as a result of design/programs such as EQ & Class 1E requirements. Replace (1-LS-73-5). Replace (1-LS-73-8 with 1-LS-73-8A, & -8B) to allow separate alarm and control functions. Replace HPCI Steam Flow switches (1-PDIS-73-1A & -1B). Replace HPCI Steam Supply pressure switches (1-PS-73-1A, -1B, -1C, & -1D). Replace HPCI System minimum flow switch (1-FS-73-33) with a non-indicating switch and add indicator (1-FI-73-33B). Replace HPCI System flow transmitter (1-FT-73-33). Replace HPCI Turbine Exhaust disc ruptured pressure switches (1-PS-73-20A, -20B, -20C, & -20D). Replace HPCI Turbine Exhaust pressure switches (1-PS-73-22A, & -22B). Replace HPCI Booster Pump suction pressure switch (1-PS-73-29-1). Replace HPCI Turbine instruments (1-SE-73-51) turbine speed pick-up; and (1-TE-73-54B, -54H, & -54J), turbine bearing thermocouples. Replace Gland Seal Condensate Hotwell level switch high (1-LS-73-15A), and low (1-LS-73-15B). Replace HPCI Turbine Steam Line pressure transmitter (1-PT-73-4), Exhaust pressure transmitter (1-PT-73-21), Booster Pump suction pressure transmitter (1-PT-73-28), and Main Pump Discharge pressure transmitter (1-PT-73-31). Replace HPCI Steam Line Leakage temperature switches (1-TS-73-2A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, & S). Refurbish instrument panels/racks (1-25-7B, -25-50, & -25-63).	Y
Residual Heat Removal DCN 51151	Refurbish valve (1-FCV-74-48) and install new motor operator. Replace existing cables and conduits with new cables. Replace and upgrade materials for the 20-inch suction line and (2) -24-inch shutdown cooling/RHR return lines from first weld inside the drywell to their respective connections to the Reactor Water Recirculation System loops A & B piping. Replace check valves (1-CKV-74-661 & -662) currently installed in vertical piping and unsuitable for this application. Replace large bore valves (1-FCV-74-54, -68, & 1-HCV-74-49, -55, -69). Install new 2-inch Decon connections on the 20-inch suction line and (2) -24-inch shutdown cooling/RHR return lines to allow for future cleaning/decon activities. Eliminate air-actuator and testable feature from check valves (1-FCV-74-54 & -68) and change unit identification numbers (UNIDs) from 'FCV' to 'CKV'. Remove associated solenoid valves, limit switches, cables, handswitches, and indicating lights. Delete piping, valves (1-FCV-74-78, -690, -691, -694, -695 & -697) and associated wiring from reactor vessel head (nozzle N6A) to the drywell penetration to eliminate the head spray function and support RVLIS modifications. Eliminate bonnet vents from valves (1-HCV-74-49, -55, &-69) and delete bonnet vent and body drain from (1-FCV-74-48).	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Residual Heat Removal DCN 51199	Replace pressure indicators (1-PI-74-117 & -133) on drain pump "A" suction and pressure indicators (1-PI-74-118 & -134) on drain pump "B" suction. Replace temperature elements (1-TE-74-81, & -82) and (1-TE-74-9, -21, -32, & -43) on the discharge and inlet of RHR heat exchangers. Modify instrument panels (25-2, -62, & -224A): Replace thermowells (1-TW-74-111, -112, -115, & -116). Cut and cap vent lines to valves (1-FCV-74-102, -103, -119, & -120). Install block valves, test connections, and vent lines to allow leak testing of the Core Spray isolation check valves. Replace obsolete system relief valves including (1-RFV-74-509A, -509C, -528A, -528B, -578C, -578D, -587A, -587B, -659, -677, -578A, -578B, -701, -709). Remove cross-tie flow control valve (1-FCV-74-46) actuator and gate valve. Install smart stems on the following GL 89-10 valves (1-FCV-74-7, -30, -47, -53, -57, -58, -59, -60, -61, -67, -71, -72, -73, -74, & -75). Install bypass around the RHR Pump Seal Injection Water Heat Exchangers "A" & "C'" and shutoff valves between RHR pumps and the heat exchangers to allow servicing the heat exchangers without removing the associated RHR pump form service.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Residual Heat Removal DCN 51222	Replace cables with EQ cables, replace internal wiring, replace EQ components, and reroute cables, as applicable, on the following: RHR Pump 1A suction valve(1-FCV_74-1) RHR Shutdown Cooling valve (1-FCV-74-2) RHR Pumps A&C Min Flow bypass valve (1-FCV-74-7) RHR Pump 1C suction valve (1-FCV-74-12) RHR Shutdown Cooling suction valve (1-FCV-74-13) RHR Shutdown Cooling suction isolation valve (1-FCV-74-48) RHR Outboard valve (1-FCV-74-52) RHR Inboard valve (1-FCV-74-53) RHR Pressure Suppression Chamber isolation valve (1-FCV-74-57) RHR Pressure Suppression Chamber spray valve (1-FCV-74-58) RHR Test valve (1-FCV-74-59) RHR Containment Spray valve (1-FCV-74-60) RHR Containment Spray valve (1-FCV-74-61) RHR System I flush valve (1-FCV-74-104) RHR System I testable check valve (1-FCV-74-54) RHR Pump 1C (1-PMP-74-16) (1-FCV-74-102); (1-FCV-74-1119); Panel (1-9-32) RHR Pump 1B suction valve(1-FCV_74-24) RHR Shutdown Cooling valve (1-FCV-74-25) RHR Pumps B&D Min Flow bypass valve (1-FCV-74-30) RHR Pump 1D suction valve (1-FCV-74-35) RHR Shutdown Cooling suction valve (1-FCV-74-36) RHR Discharge crosstie (1-FCV-74-46) RHR Shutdown Cooling suction isolation valve (1-FCV-74-47) RHR Outboard valve (1-FCV-74-66) RHR Inboard valve (1-FCV-74-67) RHR Pressure Suppression Chamber isolation valve (1-FCV-74-71) RHR Pressure Suppression Chamber spray valve (1-FCV-74-72) RHR Test valve (1-FCV-74-73) RHR Containment Spray valve (1-FCV-74-74) RHR Containment Spray valve (1-FCV-74-75) RHR System I flush valve (1-FCV-74-106) RHR System II testable check valve (1-FCV-74-68) RHR Pump 1B (1-PMP-74-28) & RHR Pump 1D (1-PMP-74-39) (1-FCV-74-103); (1-FCV-74-1120); Panel (1-9-33)	Y
Core Spray DCN 51152	Replace 10-inch and 12-inch Core Spray piping in Drywell from the RPV to containment penetrations X-16a & b. Remove 1-inch bonnet vent lines including (1-SHV-75-27 & -55) and (1-VTV-75-27 & -55) from (1-HCV-75-27 & -55). Plug or cap bonnet vents. Rename (1-HCV-75-27 & -55) to (1-SHV-75-27 & -55). Install improved valve packing and remove leak-off lines for (1-FCV-75-26, & -54). Install live-load packing and hardware for (1-FCV-75-27 & -55) and remove leak-off lines. Replace existing cables and associated conduits inside Drywell with new cables and route in new conduits between penetrations and end devices. Recertify valves (1-SHV-75-27, & -55) to design conditions of 1250 psig at 575 Deg F.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Core Spray DCN 51200	Replace ECCS suction strainers to provide acceptable head loss under all plant design conditions. Replace relief valves (1-RFV-75-507A, -507B, -507C, -507D, -543A, -543B, & -583). Add block valves and test connections to provide for local leak rate testing of check valves (1-CKV-75-606, & -607). Replace check valves (1-CKV-75-606, -607, -609, & -610). Add block valve and test connection upstream of (1-FCV-75-57) to eliminate need for freeze-plugging of associated piping for maintenance. For (1-FCV-75-9 & -37), install new valve and EQ motor operator, including T-drains for the limit switch compartment and motor. New valve to be furnished with smart stem, upgraded gland packing and leak-off connection plugged. For (1-FCV-75-22, & -50) install new EQ motor operator, including T-drains for the limit switch compartment and motor and a new threaded stem nut. Upgrade gland packing and remove leak-off valve. For (1-FCV-75-25, & -53) install new EQ motor operator, including T-drains for the limit switch compartment and motor and a new threaded stem nut. Additionally, modify the valve by drilling a 0.25" hole in the high-pressure side disc face to eliminate pressure binding. Upgrade gland packing and remove leak-off valve. For (1-FCV-75-2, & -30) install new EQ motor operator, including T-drains for the limit switch compartment and motor and a new threaded stem nut. Upgrade gland packing and remove leak-off valve. For (1-FCV-75-11, & -39) install new EQ motor operator, including T-drains for the limit switch compartment and motor and a new threaded stem nut. Upgrade gland packing and remove leak-off valve. For (1-FCV-75-23, & -51) install new EQ motor operator, including T-drains for the limit switch compartment and motor and a new threaded stem nut. Upgrade gland packing and remove leak-off valve. Add sediment traps for PSC head tanks "keep fill" function. Remove Core Spray drain pumps.	Y
Core Spray DCN 51223	Provide new cables/conduit and abandon existing cables in place for SOVs/MOVs/controls and other Core Spray system components:(1-SHV-75-27, -55, 1-FCV-75-2, -9, -11, -22, -23, -25, -30, -37, -39, -50, -51, -53, 1-FSV-75-57 & -58).	Y
Core Spray DCN 51238	Replace pressure indicators (1-PI-75-4, -13, -32, & -41). Replace pressure switches (1-PS-75-7, -16, -24, -35, -44, & -52). Replace pressure transmitters (1-PT-75-20, & -48). Replace flow transmitters (1-FT-75-21 & -49). Replace flow switches (1-FS-75-21, & -49). Replace temperature transmitters (1-TTS-75-69A, & -69B) Refurbish panels (1-25-1, -57A, -60, & -256) Revise calculations and setpoints for EPU.	Y
Containment Inerting DCN 51169	Remove existing H2 & O2 elements, sample lines, cables, valves, and associated hangers from the drywell. Add (2) new lines for sampling both H2 & O2 with valves (1-SHV-76-74, & -84 and 1-TV-76-75, & -85) at penetrations X-27F & X-52D.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Containment Inerting DCN 51201	Install shutoff valve (1-SHV-76-538) , check valves (1-CKV-76-551, & -552) and pipe branching off existing 1-inch Traversing Incore Probe (TIP) nitrogen supply line to Drywell Control Air to provide a diverse nitrogen source. Install new pressure regulator/indicator (1-PREG-76-50) on TIP nitrogen supply line to provide stable nitrogen supply to TIP purge system. Replace devices, components, and cables due to obsolescence and to meet Class 1E & EQ standards (1-FSV-76-17, -18, -19, -24, & -503); 1-ZS-76-17A, -17B, -18A, -18B, -19A, & -19B). Replace relief valves (1-RFV-76-543, & -656). Replace flow transmitter/totalizer (1-FT-76-25) and pressure transmitter (1-PT-76-14). Route/reroute associated electrical cables/conduit.	Y
Containment Inerting DCN 51369	Remove existing Drywell O2 and Torus sample lines and associated supports. Cap and spare associated penetrations. Replace existing valves (1-FSV-76-49, -50, -55, -56, -57, -58, -59, -60, -65, -66, -67, & -68). Replace existing H2/O2 Analyzers 1A & 1B with one new analyzer. Relocate PASS source connections for Torus and Drywell gas sample points. Install new valve (1-FSV-43-87) in the Division I Torus sample return line, to divert H2/O2 Analyzer discharge flow to PASS sample panel. Included with this new valve are limit switches to provide indication at Control Room Panel 1-9-54.	Y
Radwaste DCN 51154	Remove valves (1-FCV-77-14A, & 14B; 1-DRV-77-666, & -667; 1-VTV-77-632) and associated cables/conduit. Replace and upsize Clean RadWaste (CRW) heat exchangers in drywell equipment drain sump and provide seismic supports. Replace check valves (1-CKV-77-600, -603, -625, & -628) with valves having a 1/16" diameter hole in the disc to prevent possible over-pressurization among Drywell Equipment Drain, floor drain sump pumps, and Primary Containment Isolation Valves (PCIVs). Replace drain sump bypass valves (1-77-602, -605, -627, & -630) and associated piping and shutoff valves (1-77-601, -604, -624, -629). Replace the following instruments: (1-LT-77-1A, -1B, -14A, -14B; 1-TE-77-14; 1-FS-77-51) and associated cables/conduit. With these changes, the temperature control signal is deleted and pumps will operate on level controls.	Y
Radwaste DCN 51202	Replace flow control valves (1-FCV-77-15A, -15B, -2A, & -2B) with air operated ball valves, solenoid controllers, limit switches, and switch mounting brackets. Replace the following small bore valves: (1-DRV-77-, 636, & -1355; 1-TV-77-619, -620, -643, & -644) including piping and fittings. Add relays in panel (1-9-4) and revise wiring such that flow totalizers for Drywell Equipment Drain sump pumps (1A & 1B) will only count when pumps are running. Replace flow transmitters (1-FT-77-6, & -16) and delete converters (1-FM-77-6, & -16). Replace the following instruments, associated cables/conduit: (1-FSV-77-2A, -2B, -3, -15A, & -15B); (1-ZS-77-2AA, -2AB, -2BA, -2BB, -15AA, -15AB, -15BA, & -15BB). Replace (1-FSV-77-17 & 1-TIS-77-17). Add lead shielding blankets to the 6-inch CRW unlimited access area drain header at Reactor building floor Elev. 565', Col. P/R-3, S/R-6, & S/R-2; and to the 4-inch drain header on Elev. 565', 593' & 621', Col S/R-2.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Radwaste DCN 51597	Modify/upgrade RadWaste sump/pump controls to achieve the following: monitor and control sump level, replace elapsed time meters, replace alternating action relay logic, replace manual leakage detection methodology, detect level signal wiring problems, control sump pump operation per existing level setpoints, provide a manual mode of monitoring and controlling sump levels, transmit sump level information to plant computer, provide quantitative inleakage information, and provide future monitoring and control capabilities.	Y
Spent Fuel Pool Cooling and Cleanup DCN 51203	Replace the following (1-LS-78-1A, -1B, -1C, 1D, -1E, -1F, & -1G; 1-PS-78-9, & -14), including associated cables/conduits. Replace thermowells (1-TW-78-8, -13, & -18) and associated fittings. Cut and cap existing crosstie between (1-PIS-78-11 & -16) and rewire annunciator (1-XA-78-51) to differentiate when Pump 1A, or 1B, or both 1A & 1B are running. Remove power from valve (1-FCV-78-62) to preclude spurious opening.	Y
Spent Fuel Pool Cooling and Cleanup DCN 62160	Replace flow switch (1-FS-78-51), and associated cables/conduit.	Y
Spent Fuel Pool Cooling and Cleanup DCN 63631	Install a 2-inch ball valve, a welded 2-inch nipple, a 2-inch threaded cap, and a 6-inch X 2-inch weldolet at various locations of Spent Fuel Pool Cooling piping (primarily at heat exchangers outlet to Radwaste) to facilitate hydrolazing and reduce dose rates.	Y
Fuel Handling and Storage DCN 51204	Add grating and handrails to improve safety on Refueling platform. Replace entire fuel handling control; system utilizing variable speed motor drivers, a programmable Logic Controller (PLC), a solid-state electronic load weighing system for main hoist, software defined boundary zone. protection, new position indication system, updated controllers, an operators cab mounted display, new main trolley motor, new main trolley and mono-rail hoist power tracks, new main hoist assembly, new fuel grapple, updated video equipment, upgraded air system (per GE SIL 272), and an isolation transformer	Y
Primary Containment Temperature Monitoring DCN 51148	Replace (32) thermocouples and relocate (1-TE-70-7, -8, & -9). Upgrade cables for replaced thermocouples to environmentally qualified cables.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Primary Containment Temperature Monitoring DCN 51170	Remove/delete existing Humidity Sensors (1-ME-80-36A & -36B) and associated cables and conduits. These loops were originally intended to assist in determining drywell liquid leakage which is now monitored by drywell sump level/flow.	Y
Primary Containment Temperature Monitoring DCN 51232	Remove/delete existing Humidity instruments (1-MIT-80-36A & -36B) and associated cables and conduits. Revise setpoint for (1-T-56-4, 2-T-56-4, & 3-T-56-4). Issue initial setpoint and scaling documents for temperature recorder loops (1-T-68-37; 1-T-56-2, -3, & -4) for Reactor Water Recirculation and Reactor Temperature Monitoring.	Y
Standby Diesel Generators DCN 51016	Complete the Unit 1 connections to the Unit 1/2 Diesel Generator Unit priority Re-Trip logic by wiring connections from the Unit 1 Re-Trip relay contacts in series with the Unit 2 Re-Trip relay contacts, Relays (10A-K132A, & B and 10A-K134A, & B). Complete the Unit 1 connections to the Unit 1/2 Diesel Generator for ECCS preferred pump logic.	Y
Containment Atmosphere Dilution DCN 51205	Replace the following valves: (1-FSV-84-8A, -8B, -8C, & -8D). Replace control and power cables associated with these valves, with EQ cables. New valves meet ASME Section III, Class 2, Seismic Category I, Class 1E, and 10CFR50.49 (EQ) requirements. Add test connections, block valves, and test valves to facilitate Appendix J leak testing. Provide a backup source of nitrogen from the Containment Atmosphere Dilution (CAD) System to Drywell Control Air system. Provide a backup source of nitrogen from CAD to the Suppression Chamber/Reactor Building Vacuum breaker valves (1-FCV-64-20, & -21). Provide a backup source of nitrogen from CAD to the Hardened Wetwell Vent PCIVs (1-FCV-64-221, & -222). Modify the CAD Vent Pipe Control loop that includes (1-FCCV-84-19), to add an expansion loop to reduce pipe stresses and pipe support loads. Replace various instruments, components, cables/conduit that are obsolete or to address EQ issues. Reconnect Trains A & B CAD nitrogen supply lines from their respective Nitrogen Storage Tank (A & B) to the U1 Drywell and Suppression Chamber. Replace Train A, CAD Vaporizer Power cable splice ($ES-153A).	Y
Control Rod Drive DCN 50985	Provide Control Rod Drive Housing (CRDH) lateral seismic restraints in lower pedestal cavity.	Y
Control Rod Drive DCN 51078	Remove Rod Sequence Control System (RSCS). Remove components of instrument loops (1-P-85-61A, -61B, & -61C) from panels (1-25-110 & -111), and abandon or remove associated cables. Remove group notch logic module for the Rod Sequence Control logic from panel (1-9-28). Remove Logic Card and Aux. Buffer Boards for the Rod Sequence Control Logic and handswitch (1-HS-85-3A/S12) from panel (1-9-27). Replace existing Reactor Manual Control System (RMCS) Automatic Sequence Timer (1-TMR-85-3A/S4) with two Programmable Logic Controllers (PLCs) (1-PLC-85-3A/S4A, & -3A/S4B) with one PLC being an installed spare.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Control Rod Drive DCN 51206	Replace obsolete CRD pump suction relief valve (1-RFV-85-505A). Replace valve (1-ISV-85-586) and relabel as (1-SHV-85-586). Replace packing for the following valves with packing to meet EPRI guidelines: (1-FCV-85-56; 0-SHV-85-500; 1-SHV-85-504A, -516A, -517, -552, -555, -556, -559, -561, -562, -563, -564, -565, -566, -568, -569, -572, -577; 1-BYV-85-519A, & -551; 1-THV-85-527). Replace seal injection flow control valves (1-FCV-85-54, & -55) based on GE recommendations. Replace CRD system flow control valves (1-FCV-85-11A, & -11B). Revise the N2 charging cart relief valves (1-RFV-85-604 & -609) setpoint from 1150 psig to 1200 psig. The system design temperature for a portion of the CRD hydraulics return to RWCU system is revised to 545° F. Install a second door to each Unit 1 Scram Discharge Instrument Volume (SDIV) cage. Modify SDIV level instrumentation to improve response time for inputs to the RPS scram logic by increasing diameter of piping, fittings, and valves for (1-LS-85-45C, -45D, -45E, & -45F) to 2-inches. Disable and abandon Unit 1 low scram pilot air header pressure switches and associated pressure indicators (1-PS-85-35A1, -35A2, -35B1, -35B2: 1-PI-85-35A, & -35B). Remove Scram Discharge Header ultrasonic level detectors (1-LE-85-85A, -85B, -85C, & -85D).	Y
Control Rod Drive DCN 51240 '	Replace obsolete pressure and level instrumentation of the Hydraulic Control Units with equivalent instrumentation. Replace scram pilot solenoid valves with qualified valves. Install a continuous backfill to the Reactor Vessel Level Instrumentation System reference legs. Install Alternate Rod Insertion system scram and vent valves to meet Anticipated Transient Without Scram (ATWS) requirements. Refurbish CRD local panels. Install a differential pressure indicator across the CRD Pump 1A strainer. Install a new permanent sample station to sample condensate flowing from the condensate storage tanks to the CRD drive water pumps.	Y
Radiation Monitoring DCN 50583	Replace obsolete flow (current) switches (1-FS-90-134B, & -134C) in panel (1-9-93)	Y
Radiation Monitoring DCN 51171	Remove existing Containment High Range Radiation Monitor (CHRRM) Detectors (1-RE-90-272C, & -273C) and associated cable and conduit from the drywell. Modify penetrations (X-46, & X-105A) by extending the penetrations 15-inches further into the drywell to house CHRRM detectors (1-RE-90-272A, & -273A).	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Radiation Monitoring DCN 51241	Replace Air Particulate Radiation monitors (1-RM-90-50, -55, -57, & -58). Replace Main Steam Line Radiation monitors (1-RM-90-136, -137, -138, & -139). Replace flow control valves with flow solenoid valves, rework sample lines, and add Appendix J test connections for:(1-FSV-90-254A, -254B, -255, -257A, & -257B). Replace Primary Coolant Leak Detection (PCLD) Continuous Air Monitor, (1-RM-90-256), replace heat tracing and controls: (1-TS-90-256, 1-RM-90-256, 1-RE-90-256-A, 1-RE-90-256-B, 1-FE-90-256, 1-HTR-90-256, 1-PMP-90-256, 1-PREG-90-256, 1-XI-90-256, 1-XX-90-256A, 1-XX-90-256B, 1-HS-90-256B, -256C, -256D, & -256E). Remove (1-RE-90-133, -133A, -134, -134A) and associated pre-amps, cabling and raceway. Rework sample lines for loops (1-R-90-133, -134, -131, & -132. Replace drywell Radiation Detectors (1-RE-90-272A, & -273A) and install new cables, as needed. Remove cables and raceways associated with (1-RE-90-272C, & -273C) in U1 Reactor Building.	Y
Radiation Monitoring DCN 61999	Delete Off Gas monitor (1-RM-90-160) and both Torus Area Monitors (1-RM-90-272B, & -273B). Replace Off Gas monitor (1-RM-90-157) with a suitable drawer detector to detect early onset of fuel failure.	N
Radiation Monitoring DCN 62861	Turbine Building Radcon Continuous Air Monitors (CAMs) (1-RM-90-51, -53, -54, -56, & -59) will not communicate with the upgraded Control Room module.	N
Neutron Monitoring DCN 51079	Replace existing Power Range Monitor electronics with new Nuclear Measurement Analysis and Control (NUMAC) digital Power Range Neutron Monitoring (PRNM) hardware to address GL 94-02. Install new Traversing Incore Probe (TIP) system devices (NUMACs) to replace existing Drive Control Channels A thru E. Install TIP isolation reset Hand Switch and a new relay for PCIS logic seal-in. Perform minor modifications to the Intermediate Range Monitors (IRMs) and Source Range Monitors (SRMs) chassis and SRM Test Switch.	Y
Neutron Monitoring DCN 51158	Replace Source Range Monitor (SRM), Intermediate Range Monitor (IRM), and Local Power Range Monitor (LPRM) cables, detectors, and associated equipment within the drywell and specific portions of the reactor building and reactor vessel.	Y
Neutron Monitoring DCN 61728	Replace existing obsolete Unit 1 Neutron Monitoring 24V dc battery chargers (4). The new chargers have current limit setting of 110%.	Y
Traversing Incore Probe DCN 51172	Provide mounting, installation, and connection of Index Mechanisms (1-MCHR-94-101A thru -101E), to include replacement of Indexer incoming TIP tube from Penetration (1-MPEN-100-35A thru -35E) flange to indexer and Indexer outgoing TIP tubes from indexer to associated LPRM detector assembly connection. Replace blind flange on each indexer tubing penetration listed above and connect it to the Drywell TIP tube to each indexer. Rework N2 purge tubing at indexers and change connection from outboard to inboard side of each indexer.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Traversing Incore Probe DCN 51242	Replace TIP Integrated Drive Mechanisms (1-MCHD-94-101A thru -101E) with upgraded units. Upgraded units to include: DC Drive Motor, allow use of existing field cables, allow use of Gamma TIP style detector, and externally mounted motor starter. Replace TIP Chamber Shields (1-SHDP-94-101A/A, -101B/B, -101C/C, -101D/D, & -101E/E). Replace Shear Valves (1-XCV-94-506, -507, -508, 509, & -510) due to age and valves can not be non-destructively tested. Perform cycle and leak tests on TIP Guide Tube ball isolation valves (1-FCV-94-501, -502, -503, -504, & -505).	Y
Reactor Water Recirculation Flow Control DCN 51219	Remove relays, indications, ammeters, resistors, fuses, instrument and power transformers, diodes, and handswitches from local control panels (1-LPNL-925-23, & -24). Install (3) Motor Management Relays (MMRs) per panel to provide Recirculation motor ground fault, overcurrent, phase reversal, and differential protective functions and trip the associated Variable Frequency Drive (VFD) and VFD feeder breakers. Install (3) Digital Frequency Relays (DFRs) per panel for redundant overfrequency protection. Replace Recirculation Pump Differential Pressure Transmitters (1-PDT-68-65, & -82) with transmitters that have a 4-20 mA output signal for compatibility with control system software.	Y
Reactor Protection DCN 51080	Remove condenser low vacuum trip logic. This was an anticipatory trip and no FSAR transient and accident analysis credit was taken for this feature. Delete CRD air header low pressure trip function. Replace obsolete time delay relays (1-RLY-99-1AK4, & -1AK4B in RPS MG Set Control Panels. Install test switches (1-HS-85-37AA & -37BA) for testing the Scram Discharge Volume Vent and Drain Pilot Valves (1-FSV-85-37A, & -37B).	Y
Penetrations DCN 51159	Replace primary containment electrical penetration assemblies (EPAs) (1-EPEN-100-110A, 100A, & -104F) with environmentally qualified EPAs.	Y
Penetrations DCN 51208	Inspect, document, and install as necessary, fire barrier seals for penetrations between fire zones (1-1, 1-2, 1-3, 1-4, 1-5, & 1-6) in Unit 1 Reactor Building. Replace Doors (490, 635, & 670), including frames and hardware, in Unit 1 Reactor Building, with fire rated doors and designations.	Y
Cranes and Hoists DCN 51740	Install a jib crane above each of three (3) sets of Combined Intercept Valves (CIVs) and relief valves (1-FCV-1-96 & 1-1-553; 1-FCV-1-99 & 1-1-561; & 1-FCV-1-102 & 1-1-567).	Y
Cranes and Hoists DCN 61028	Install a 10-ton jib crane in Unit 1/2 Turbine Building to provide a means to lift equipment hatches and equipment which are not accessible with existing area overhead crane.	N Common

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Main Generator DCN 51133	Provide back-up power source to the Main Generator Breaker Air Compressor System (MGBACS) to provide redundant capability for operation of the Replenishing Valve Control circuits. Add parallel diodes across Diodes R7D & R8D for Main Generator Exciter Firing Control Circuit to eliminate a potential single point of failure. Add a resistor onto the Maximum Excitation Limit Panel Component board and add a resistor onto the Transfer Panel Component board (43A & J2KX relays). The additional resistors increase the conditioning effect for the boards and eliminate noise in the ground circuit. Remove existing field isolators and install a programmable Field Temperature Module (1-TM-242-45) in generator exciter cabinet to recorder (1-TR-242-59).	Y
Communi-cations DCN 51735	Install an antenna on Turbine Building roof to extend coverage of the existing VHF radio system to include the outside plant area. Install a pair of cross-band couplers to allow multi-band operation of an existing coaxial cable connecting the existing antenna to the base unit.	N Common
Security DCN 60075	Replace hinges on watertight personnel access door 235.	N
Security DCN 62234	Provide alternate door latch equipment for doors 230 & 232.	N
Process Computer DCN 51082	Provide for the installation of a new Unit 1 Integrated Computer System (ICS). This modification adds a new redundant process computer, operator work stations, printers, I/O cabinets, I/O wiring, and interface to package systems via data-link. Package systems include Foxboro IA System (includes Reactor Water Recirculation, Reactor Feedwater, Feedwater Heater Drains, Moisture Separator, and Generator Temperature Monitoring) Reactor Recirculation Pump VFDs, Condensate Demineralizers, Containment Isolation System, Neutron Monitoring, Generator Hydrogen, Radwaste Sump Level Control, Turbine EHC, MCR Annunciators, And MCR Recorders.	Y
Civil Structures DCN 50627	Provide a clean-island and Operations work area as a permanent structure to replace temporary structures in Unit 1 Reactor Building Elev. 639'. Total weight of the new structure is approx. 6000 pounds, with a footprint of approximately 390 square feet.	N
Civil Structures DCN 51019	Provide modifications to the Drywell Platform structural steel at Elev. 584'. The modifications include horizontal rigidity bracing for the platform due to revised seismic analysis, revised piping loads, NRC IE Bulletin 79-14, added cable trays and conduit.	Y
Civil Structures DCN 51020	Provide modifications to the Drywell Platform structural steel at Elev. 563'. The modifications include horizontal rigidity bracing for the platform due to revised seismic analysis, revised piping loads, NRC IE Bulletin 79-14, added cable trays and conduit.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Civil Structures DCN 51088	Provide for the installation of new cable trays and raceway components in the Cable Spreading Room, Auxiliary Instrument Room, and Control Room in Unit 1. Also, provide transition raceway components to interface with Reactor Building and Turbine Building cable trays.	Y
Civil Structures DCN 51160	Provide design details for cables requiring coating or beta shielding, for junction boxes and terminal boxes requiring sealing against moisture, for junction boxes and terminal boxes requiring ventilation and drainage, and for sealing of conduits terminating at cable trays, all within the Unit 1 Drywell. Additionally, provide details for replacing various Drywell junction boxes with boxes made of stainless steel.	Y
Civil Structures DCN 51286	Provide modifications to the Drywell Platforms structural steel at Elev. 604', 616', & 628'. The modifications are due to revised seismic analysis, revised piping loads, NRC IE Bulletin 79-14, added cable trays and conduit.	Y
Civil Structures DCN 51374	Modify the Unit 1 Reactor Building Elev. 551' Torus Access Platform structural members and associated connections. Modifications are to resolve identified platform deficient items such as insufficient welds, structural members, and anchorage. Structural components are added, modified, or replaced and field cut-outs and unaccounted attachments are evaluated and resolved.	Y
Civil Structures DCN 51375	Provide modifications to various structural steel platforms within the Unit 1 Reactor Building based on evaluation of the steel members, connections, surface mounted baseplates, anchorages, and/or evaluation of embedded plates.	Y
Civil Structures DCN 51377	Provide modifications to the piping penetration anchor frames in the Reactor Building.	Y
Civil Structures DCN 51519	Implement structural modifications necessary to qualify Miscellaneous Steel Support Frames (MSSFs) in the Unit 1 Reactor Building zone, outside of the Drywell, to the requirements of GDC 50-C-7100 and Seismic Design 50-C-7102. The MSSFs serve as structural attachment points for pipe supports and for secondary loads such as cable tray supports and HVAC duct supports. No new frames are added.	Y
Civil Structures DCN 51520	Provide for the modification of various steel platforms for the Core Spray Valve Access platform and Control Rod Drive Relief Valve Access platform, and addition/modification of HVAC duct supports in the Core Spray and RHR pump rooms.	Y
Civil Structures DCN 51521	Provide for modifications to the Unit 1 Reactor Building structural components required for A-46 qualification of cable tray and conduit supports.	Y
Civil Structures DCN 51560	Provide modifications to the Reactor Pressure Vessel (RPV) insulation support frame (base ring supported at Elev. 640') to ensure that frame displacements are within acceptable limits for support of Seismic Class I piping.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Civil Structures DCN 51669	Modify Seismic Class II items located in the Reactor Building, outside the drywell which, if not modified, would degrade the integrity of Class I items as identified by Seismic II/I Spray Evaluation Program. A total of eighteen outliers will require modification. One outlier identified by MSIV Seismic Ruggedness Verification Program, and located in the Reactor Building, is added to the scope of this modification.	Y
Civil Structures DCN 60268	Provide steel frames for permanent shielding at CRD suction/discharge lines, strainers/filters on Elev. 565' & 541' in NE quadrant of Unit 1 Reactor Building to reduce dose rates.	Y
120/208 VAC Electrical Distribution DCN 51085	Replace the existing 1KVA ECCS Analog Trip Unit (ATU) Inverters with 5KVA inverters. Replace the Unit Preferred Motor-Motor-Generator (MMG) Sets with a rectifier/inverter Uninterruptible Power Supply (UPS). Replace the Unit Preferred Transformer with a regulating type transformer. Install/Replace various 120V Distribution system fuses and breakers for proper coordination, protection and/or support of downstream load changes. Modify breaker settings for proper coordination and protection. Structural support modifications are made associated with USI-A46 and Seismic IPEEE Programs for the Control Building.	Y
120/208 VAC Electrical Distribution DCN 51214	Various cables in the 120V Distribution System are added, replaced, rerouted, retagged or abandoned as required to support 10CFR50.49, App R, voltage drop/ampacity/short circuit, Design Criteria Requirements and cable separations analysis.	Y
250 VDC Electrical Distribution DCN 51110	Various cables in the 250V Distribution System are added, replaced, rerouted, retagged or abandoned as required to support 10CFR50.49, App R, voltage drop/ampacity/short circuit, Design Criteria Requirements and cable separations analysis. Modify the internal components in the 250V Motor Control Center (MCC) cubicles to support changes to the loads and cables. Modify breaker settings for proper coordination and protection.	Y
250 VDC Electrical Distribution DCN 51215	Various cables in the 250V Distribution System are added, replaced, rerouted, retagged or abandoned as required to support 10CFR50.49, App R, voltage drop/ampacity/short circuit, Design Criteria Requirements and cable separations analysis. Modify the internal components in the 250V MCC cubicles to support changes to the loads and cables. Modify breaker settings for proper coordination and protection.	Y
480 VAC Electrical Distribution DCN 51131	Various cables in the 480V Distribution System are replaced as required to support voltage drop/ampacity/short circuit and Design Criteria Requirements. Modify breaker settings for proper coordination and protection. Modify the internal components in the 480V MCC cubicles to support changes to the loads and cables.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
480 VAC Electrical Distribution DCN 51090	Various cables in the 480V Distribution System are added, replaced, rerouted, retagged or abandoned as required to support 10CFR50.49, Appendix R, voltage drop/ampacity/short circuit, Design Criteria Requirements and cable separations analysis. A new isolation switch is installed for the Electric Board Room Air Handling Units 1A and 1B to satisfy Appendix R requirements. Modify the internal components in the 480V MCC cubicles to support changes to the loads and cables. Modify breaker settings for proper coordination and protection. Modify the 480V Load Shed Logic for the Drywell Blowers for both Units 1 and 2 and the Control Bay Chilled Water Pumps A and B to satisfy Diesel Generator Loading requirements.	Y
480 VAC Electrical Distribution DCN 51216	Various cables in the 480V Distribution System are added, replaced, rerouted, retagged or abandoned as required to support 10CFR50.49, App R, voltage drop/ampacity/short circuit, Design Criteria Requirements and cable separations analysis. Modify the internal components in the 480V MCC cubicles to support changes to the loads and cables. The 480V Shutdown Boards 1A and 1B oil filled 750KVA transformers are replaced with dry type 1000KVA transformers to meet system load requirements. Isolation fuses are installed in 4160V Shutdown Board BD power feed to 480V Shutdown Boards 1E transformer to eliminate an associated circuit concern for Appendix R requirements. Remove LPCI Motor-Generator (M-G) Sets and abandon in place the Reactor MOV Boards 1D & 1E (LPCI M-G set removal has not yet been performed on Units 2 and 3).	Y
4kV AC Electrical Distribution DCN 51087	Unit 1 4KV breakers are replaced with new vacuum style breakers. Fuses are installed in 4KV Shutdown Boards to provide isolation of control circuit cables to satisfy Appendix R requirements.	Y
4kV AC Electrical Distribution DCN 51217	Various cables in the 4KV Distribution System are added, replaced, rerouted, retagged or abandoned as required to support 10CFR50.49, Appendix R Ampacity/Voltage Drop and Cable Separations analyses. Replace the Terminal Blocks for the U1 Shutdown Board Cooling Units to complete documentation for the requirements of 10CFR50.49	Y
500/161kV Off Site Power DCN 51084	Add a provision to trip the Generator exciter field breaker when the turbine is tripped to prevent reverse power relay operation. Add a redundant Generator Backup Relay for tripping of the Generator to eliminate a single point failure of the Generator. Remove the Unit 1 Main Generator and Turbine trip initiations which are generated by the operation of the 64GF Generator Field Ground relay and add an additional alarm in the control room for operator action upon actuation of the relay to prevent unnecessary Generator trips. Install a blocking contact from Loss of Potential (Voltage Balance) Relay 160 into the Generator overcurrent trip circuit to prevent false tripping.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Miscellaneous DCN 50995 DCN 51012 DCN 51065 DCN 51066 DCN 51067 DCN 51068 DCN 51069 DCN 51254 DCN 51261 DCN 51263 DCN 51335 DCN 51336 DCN 51338 DCN 51339 DCN 51340 DCN 51341 DCN 51342 DCN 51343 DCN 51344 DCN 51345 DCN 51346 DCN 51347 DCN 51349 DCN 51351 DCN 51352 DCN 51353 DCN 51419 DCN 51420 DCN 51441	Evaluate piping supports and their configurations against applicable requirements from General Design Criteria, UFSAR Seismic Class I requirements, existing calculations, walkdown data, and NRC Bulletins IE 79-02 and 79-14. Perform piping support modifications as necessary to ensure piping and branch connections are qualified for deadweight, seismic, and thermal loads.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Miscellaneous DCN 51255 DCN 51256 DCN 51257 DCN 51258 DCN 51260 DCN 51262 DCN 51264 DCN 51334 DCN 51348 DCN 51408 DCN 51409 DCN 51410 DCN 51411 DCN 51412 DCN 51413 DCN 51414 DCN 51415 DCN 51416 DCN 51417 DCN 51418 DCN 51448 DCN 51449 DCN 51450 DCN 51452 DCN 51453	Evaluate piping, piping supports and their configurations against applicable requirements from General Design Criteria, UFSAR Seismic Class I requirements, existing calculations, and walkdown data, for all Seismic Class I piping/tubing less than 2.5-inch diameter. Perform piping and support modifications (including addition and deletion) as necessary to ensure piping and branch connections are qualified for deadweight, seismic, and thermal loads at EPU conditions.	Y
Miscellaneous DCN 51091 DCN 51642 DCN 60073 DCN 60074	Replace safety related, quality related, and non-safety related fuses in the Unit 1 Control Bay, Reactor Building, and Turbine Building with like-for-like equivalent fuses. There are no changes to circuitry, no addition or deletion of any fuses, and no fuse-holder replacement, within the scope of this DCN. Unit 1 fuses, which are within the Operating Boundary of Units 2 or 3, are excluded from the scope of these DCNs. Fuses with common, Unit 2, or Unit 3 UNIDs, are excluded from the scope of these DCNs.	Y

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Generator Cooling DCN 51140 (EPU)	Addition of flow and temperature switches (1-FS-35-65A, -B, -C and 1-TS/TW-35-71A, -B, & -C) to provide two out of three logic based turbine trip instrumentation. The new flow switches provide for a turbine trip on loss of cooling water flow to the generator. Provide for an increase in generator hydrogen pressure from 65 to 75 psig to support EPU conditions. Replace pressure switches (1-PS-35-18A, 18B, and -19) and revise setpoint (EPU). Recalibrate (1-PCV-35-5A, -5B, and -9) in support of EPU conditions. Eliminate Flow Integrator (1-FQ-35-8) to preclude potential hydrogen leakage. Add an excess flow check valve at the location where (1-FQ-35-8) was removed, to comply with fire protection code requirements. Replace obsolete Generator Seal Oil Vacuum Pump motor and gear box. Replace under-sized Generator Emergency Seal Oil Pump motor power cable to ensure minimum acceptable voltage. Replace Generator Exciter Flexible coupling per GE recommendation. Install Litten Veam Connectors/penetrations and Generator flux probe on generator housing. Add Foxboro I/A monitoring capability for generator stator and other related thermocouples.	N (EPU)
Condensate DCN 51401 (EPU)	Replace Condensate pump motors and impellers to accommodate increased flows required for EPU. Add an orifice plate downstream of FCV-2-29A to minimize pressure drop through the valve. Upsize associated motor power feed cables, replace switchgear ammeters with appropriately sized meters, and revise protective relay settings.	N (EPU)
Condensate DCN 51402 (EPU)	Replace Condensate Booster pumps and motors to accommodate increased flows required for EPU. New pump motors are water to air cooled and Raw Cooling Water heat exchangers are added. Upsized current transformers and power feed cables for the associated pump motors are provided. HVAC air flows are increased to the Condensate pumps/motors as due to the increased heat loads of larger motors being installed. HVAC air flows are reduced to the Condensate Booster pumps/motors due to the reduced heat load from the new water-cooled motors.	N (EPU)
Feedwater DCN 51403 (EPU)	Replace Unit 1 Reactor Feedwater (FW) Pumps (3), the FW pump/turbine couplings, and associated bearing temperature and vibration monitoring instrumentation to accommodate increased design flows required for EPU.	N (EPU)
Main Steam DCN 51456 (EPU)	Retrofit the high pressure turbine with Advanced Design Steam Path (ADSP) to include a new rotor with new custom-designed diaphragms and buckets for EPU. Modify the size of the steam seal unloader valves and associated piping to accommodate the larger steam flow requirements.	N (EPU)
Main Steam DCN 51481 (EPU)	Provide GE designed and supplied turbine replacement components, including monoblock rotors and diaphragms for 3 LP turbines, in support of EPU.	N (EPU)

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Condensate and Demineralized Water DCN 51457 (EPU)	Install a tenth Condensate Filter-Demineralizer and associated components such as, resin filter, holding pump, instrument panel/instruments, access platform, and demineralizer vessel shielding. Replace nine existing holding pumps with new, lower rpm pumps. These changes will maintain condensate flow below the 4000 gpm max flow rate for each Filter-Demin vessel at EPU conditions with one vessel out of service.	N (EPU)
Condensate and Demineralized Water DCN 51459 (EPU)	Replace the existing 16" line and 16" air-operated butterfly valve that provide for condensate to bypass the steam packing exhauster (SPE), with a 24" line and a 20" motor-operated butterfly valve. Permanently block the orifice contained within the SPE in the partition plate that separates the inlet and outlet of the waterbox.	N (EPU)
Condensate and Demineralized Water DCN 51462 (EPU)	Replace 71 Condensate demineralizer System valves and their associated pneumatic actuators with upgraded valve/actuator assemblies. Requires minor piping modifications to adjust face to face distances between flanges to accommodate the new valve bodies. Install new tube rack supports.	N (EPU)
Heater Drains and Vents DCN 51464 (EPU)	Modify the shells, nozzles, and relief valves for Feedwater Heaters 1, 2, and 3 to be ASME Code compliant under EPU conditions. Provide the Feedwater Heaters 1, 2, 3, 4, and 5 pass partition plate modifications required for higher EPU pressures. Relocate the Extraction Steam nozzles on #3 Feedwater Heater and add a steam duct/impingement plate internal to the heater to protect the shell and to provide improved steam distribution within the heater. Modify the Extraction Steam piping to match the new nozzle locations.	N (EPU)
Main Steam DCN 51466 (EPU)	Make changes to the instruments identified in the BOP Instrument Study in support of EPU. Replace various local pressure gauges with new gauges and pulsation dampening snubbers. Re-calibrate various flow and pressure transmitters such that their ranges encompass new EPU operating conditions. Re-calibrate various pressure switches with new setpoints to account for new EPU operating conditions. Revise setpoint for pressure switches monitoring steam supply to Steam Jet Air Ejectors (SJAEs) from 180 to 187 psig.	N (EPU)

Table 1
Description of Modifications Planned for BFN Unit 1 Restart

System and Design Change	Description of Change	U2/U3 Related DCN(Y/N)
Main Generator DCN 51470 (EPU)	Upgrade Main Transformer system for plant operation at EPU conditions. The rating for each Main Transformer is increased from 400 to 500 MVA. Revise circuit for actuation of Lock-Out Relays (LORs) 186 & 186C to actuate on a signal from Qualitrol Multi Function Pressure Monitor (2 out of 3 logic) instead of from the sudden pressure relays. Add an interlock in the transformers cooling control circuit from LOR 186 & 186C. Delete interlocks from undervoltage relay 127T, to meet single failure criteria for loss of Relay 127T. Replace fire protection ring header for Unit 1 Main Transformer due to new transformers configuration and to comply with present code requirements. Relocation of existing heat detectors and addition of (3) detectors.	N (EPU)
Condensate and Demineralized Water DCN 51477 (EPU)	Modify the Unit 1 condenser instrumentation to provide for improved performance monitoring under EPU conditions. Improve the accuracy of condenser pressure inputs to the Integrated Computer System (ICS). Provide additional Condenser Cooling Water (CCW) supply and return temperature data to the ICS and provide CCW flow input to ICS.	N (EPU)
Feedwater DCN 51482 (EPU)	Replace rotors for each Unit 1 Feedwater Pump Turbine (FWPT) to include new stages 1 & 2 buckets per current design and newly designed stages 3-6 buckets to support EPU conditions. Included will be newly designed stage 6 diaphragms and (3) new mechanical overspeed trip governors, all furnished by GE.	N (EPU)
Feedwater DCN 62024	Revise thermal ratings of the Feedwater System for EPU.	N (EPU)
Feedwater PIC 63881 (EPU)	Upgrade seal injection for new Feedwater pumps.	N (EPU)
Gen Bus Duct Cooling DCN 60598 (EPU)	Replace Isolated Phase Bus (IPB) duct cooling coil (1-CLR-262-1) with the new coil sized for 200 gpm flow and 2.5 million BTU/hr cooling to support EPU. Replace existing IPB duct cooling air supply fan (1-FAN-262-1) and motor (1-MTR-262-1) with two new fan/motor assemblies (1-FAN-262-1A, & -1B; 1-MTR-262-1A, & -1B). Delete existing wiring, cables, and control switches and replace with new wiring, cables, and control switches to power the new fans/motors. Raw Cooling Water piping is modified to make the existing dual inlet and outlet piping to cooling coil, a single inlet and outlet configuration. Add Raw Cooling Water hydraulic calculations.	N (EPU)

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Main Steam	001-01	Provide Main Turbine Stop Valves < 90% open trip signal to Reactor Protection System (99).	YES	YES	See also Mode 068-02.
Main Steam	001-02	Provide Main Steam Isolation Valve (MSIV) <90% open trip signal to Reactor Protection System (99).	YES	YES	
Main Steam	001-03	Close MSIVs on Primary Containment System (64D) Group 1 isolation signal.	YES	YES	See also Mode 64D-01.
Main Steam	001-04	Close Main Steam Drain Line Valves on Primary Containment System (64D) Group 1 isolation signal.	YES	YES	See also Mode 64D-01.
Main Steam	001-05	Open Main Turbine Steam Bypass valves on Turbine Control System (47) turbine trip signal.	YES	YES	See also Mode 047-05.
Main Steam	001-06	Controlled manual depressurization of Reactor Pressure Vessel (RPV) by opening Automatic Depressurization System (ADS) Main Steam Relief Valves (MSRVs).	YES	YES	
Main Steam	001-07	Open Main Steam Relief Valves (MSRVs) on high reactor pressure to provide RPV pressure relief.	YES	YES	
Main Steam	001-08	Auto opening of ADS MSRVs upon coincident signals of 2 Core Spray pumps (75) or one RHR pump (74) running and either low water level (L1&L3 from Sys 03), high Drywell pressure (Sys 64A), and time delay, or low water level (L1&L3 from Sys 03) and high Drywell pressure bypass time delay.	YES	YES	See also Modes: 003-04, 003-21, 64A-25, 074-12, and 075-10
Main Steam	001-09	Close Main Turbine Stop Valves upon Turbine Control System (47) diversion of hydraulic pressure due to low condenser vacuum signal (System 47).	YES	YES	See also Mode 047-03.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Main Steam	001-10	Main steam flow restrictors passively limit the mass flow rate of coolant being ejected following a steamline break until MSIV closure occurs.	NO	NO	Main Steam System Mode 001-10, is directed at restricting flow of coolant in the main steam lines. The name plate data will be gathered and evaluated for these four restrictions. There is no functional test required for these passive components.
Main Steam	001-11	Manually deactivate non-ADS MSRVs and MSIV test circuits to prevent inadvertent RPV depressurization and loss of coolant.	YES	YES	
Main Steam	001-12	Provide low pressure signal (in Main Steam Line at turbine) to Primary Containment System (64D) Group 1 isolation logic (RUN Mode).	YES	YES	
Main Steam	001-13	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) Systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be hydrostatically tested under ASME Section XI program.
Main Steam	001-14	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Main Steam	001-15	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Main Steam	001-16	Close Feedwater (FW) Pump Turbine Stop Valves (to trip FW turbine) on loss of hydraulic pressure due to energization of Feedwater System solenoid.	YES	YES	See also Modes 003-07 and 003-18.
Main Steam	001-17	Provide Main Steam Line high flow and high steam tunnel temperature signals to Primary Containment System (64D) Group 1 isolation logic.	YES	YES	
Main Steam	001-18	Provide steam for High Pressure Coolant Injection (HPCI) (73) Turbine.	NO	NO	Mode 001-18 requires the Main Steam System to provide steam and piping for the High Pressure Coolant Injection System. No functional test is required for these passive components.
Main Steam	001-19	Provide steam for Reactor Core Isolation Cooling (RCIC) (71) Turbine.	NO	NO	Mode 001-19 requires the Main Steam System to provide steam and piping for the Reactor Core Isolation Cooling System. No functional test is required for these passive components.
Main Steam	001-21	Provide Main Turbine Stop Valve closure position signals to Turbine Control System (47) which initiates opening of Main Turbine Bypass Valves.	YES	YES	
Main Steam	001-22	Close Main Turbine Bypass Valves upon Turbine Control System (47) diversion of hydraulic pressure due to low condenser vacuum signal (System 47).	YES	YES	See also Mode 047-04.
Main Steam	001-23	Provide > 26% turbine first stage pressure interlock signal to Reactor Protection System (RPS) (99) fail-safe logic.	YES	YES	See also Mode 068-02.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Main Steam	001-24	Provide Main Steam Line pressure signal to Turbine Control System (47) for operation of Main Turbine Bypass Valves.	YES	YES	
Main Steam	001-25	Manually close MSIVs and Main Steam Drain Line Valves.	YES	YES	
Main Steam	001-26	Provide Main Turbine Bypass Valve position indication in the main control room.	See Note 2.	YES	
Main Steam	001-27	Automatically open MSRVs on high reactor pressure to provide RPV pressure relief.	See Note 2.	YES	
Main Steam	001-28	Establish MSIV leakage pathway to condenser.	See Note 2.	YES	
Condensate and Demineralized Water	002-02	Provide normally open water supply to RCIC System (71) Pump.	NO	NO	The requirement to verify free flow of water from condensate storage tank to RCIC System (071) will be fulfilled during flow testing of the RCIC System, Modes 071-01 or 071-02. This mode is a passive function since this is the normal flow path of normally open valves; no in-line component is changing state to satisfy this Mode Condition. There is no individual component test required for this mode.
Condensate and Demineralized Water	002-05	Provide normally open water supply to Residual Heat Removal (RHR) System (74) piping flow path which continues to HPCI System piping upstream of HPCI System pump.	NO	NO	The requirement to verify free flow of water from condensate storage tank to HPCI System (073) will be fulfilled during flow testing of the HPCI System, Mode 073-01. This mode is a passive function since this is the normal flow path of normally open valves; no in-line component is changing state to satisfy this Mode Condition. There is no individual component test required for this mode.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Condensate and Demineralized Water	002-06	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Condensate and Demineralized Water	002-08	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Condensate and Demineralized Water	002-09	Maintain the as-built design to meet 100 degree F assumption for maximum feedwater temperature drop that can occur for any single action or failure of feedwater heater(s). See also Extraction Steam And Feedwater systems (Modes 005-01 and 003-24).	See Note 2.	NO	No component testing is required for CDW and ES systems. The PEPSE Thermal Cycle Model for Extended Power Uprate was reviewed to assure that no single action or failure of feedwater heater could cause feedwater temperature to drop by more than 100 deg F. The greatest loss of recoverable heat (worst case condition) would be the loss of the last feedwater heater in line since there is no chance of additional heat recovery by the upstream feedwater heaters prior to the feedwater return to the reactor. Interpretation of the calculation results for the high pressure feedwater heater (the last feedwater in-line heater) indicates feedwater temperature will not drop by more than 100 deg F due to loss in recovery heat.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Condensate and Demineralized Water	002-10	Establish MSIV leakage pathway to condenser.	See Note 2.	NO	There is no individual component test required within the Condensate and Demineralized Water System for this mode. The Mode requirement is to establish a leakage path from MSIVs to Condenser A and is covered under main steam system Mode 001-028. This mode is a passive function since this is the normal flow path of normally open valves; no in-line component is changing state to satisfy this Mode Condition.
Reactor Feedwater	003-01	Provide high reactor vessel pressure trip signal to RPS (99) fail-safe logic.	YES	YES	
Reactor Feedwater	003-02	Provide RPV low water level (L3) trip signal to RPS (99).	YES	YES	
Reactor Feedwater	003-03	Provide RPV low water level (L2) signal to HPCI System (73).	YES	YES	See also Mode 073-01.
Reactor Feedwater	003-04	Provide RPV low water level (L3) permissive signal to Main Steam System (01) for ADS.	YES	YES	See also Mode 001-08.
Reactor Feedwater	003-05	Provide RPV high water level (L8) signal to HPCI System (73) for automatic system shutoff.	YES	YES	See also Mode 073-01.
Reactor Feedwater	003-06	Provide high reactor vessel pressure signal to Recirculation System (68) to open recirculation pump motor breakers for trip of recirculation pumps and to Control Rod Drive (CRD) System (85) to initiate alternate rod insertion, and provide reactor pressure signals, as measured from selected feedwater sensing lines and transmitters to the Main Turbine Control System (47) for operation of Main Turbine Bypass Valves.	YES	YES	See also Modes 068-06 and 085-14.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Feedwater	003-07	Provide low condenser vacuum signal to energize Reactor Feedwater System (03) solenoid to close Main Steam System (01) Feedwater Turbine Supply Stop Valves.	YES	YES	See also Modes 001-16 and 003-18.
Reactor Feedwater	003-08	Provide RPV water level indication at backup control center.	YES	YES	
Reactor Feedwater	003-09	Provide low reactor pressure permissive signals to core spray system (75) for opening of low pressure ECCS injection valves and to RHR System (74) for closing of Recirculation Pump Discharge Valves.	YES	YES	See also Modes 075-12 and 075-17.
Reactor Feedwater	003-10	Provide RPV low water level (L1) signal to Primary Containment Isolation System (64D) Group 1 isolation logic.	YES	YES	
Reactor Feedwater	003-11	Provide RPV high water level (L8) signal to feedwater control system (46) for main and FW turbine trip.	YES	YES	See also Mode 046-01.
Reactor Feedwater	003-12	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Feedwater	003-13	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing). See also Mode 64C-06.
Reactor Feedwater	003-14	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Reactor Feedwater	003-15	Provide RPV low water level (L2) signal to Recirculation System (68) to open recirculation pump motor breakers for trip of recirculation pumps and to CRD System (85) to initiate alternate rod insertion.	YES	YES	See also Modes 068-06 and 085-14.
Reactor Feedwater	003-16	Provide RPV pressure indication in Main Control Room.	YES	YES	
Reactor Feedwater	003-17	Provide path for HPCI System (73) flow to the RPV through the Feedwater spargers.	NO	NO	Mode 003-17 provides a flow path for the HPCI System (073) to the reactor vessel through the feedwater spargers. This is a passive function. No baseline test is required.
Reactor Feedwater	003-18	Energize solenoid to close Main Steam System (01) Feedwater Turbine Steam Supply Stop Valves on low condenser vacuum or high RPV level (L8) signal.	YES	YES	See also Modes 001-16 and 003-07.
Reactor Feedwater	003-19	Indicate RPV water level in the Main Control Room for operator information in support of manual actions.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Feedwater	003-20	Provide RPV low water level (L2) signal via RHR System (74) for automatic RCIC System (71) initiation.	YES	YES	See also Modes 071-01 and 074-21.
Reactor Feedwater	003-21	Provide RPV low water level (L1) signal to Main Steam System (01) for ADS.	YES	YES	See also Mode 001-08.
Reactor Feedwater	003-22	Provide RPV low water level (L1) signal to Core Spray System (75) for Core Spray, Low Pressure Coolant Injection System (LPCI) (74), and Diesel Generator (82) start.	YES	YES	See also Modes 074-01, 075-07, 075-11, and 075-17.
Reactor Feedwater	003-23	Provide RPV pressure indication at backup control center.	YES	YES	
Reactor Feedwater	003-24	Maintain the as-built design to meet 100 degree F assumption for maximum feedwater temperature drop that can occur for any single action or failure of feedwater heater(s). See also Condensate And Extraction Steam Systems (Modes 002-09 and 005-01).	NO	NO	Mode 003-24 is demonstrated by calculation and no component testing is required. The PEPSE Thermal Cycle Model for Extended Power Uprate was reviewed to assure that no single action or failure of feedwater heater could cause feedwater temperature to drop by more than 100 deg F. The greatest loss of recoverable heat (worst case condition) would be the loss of the last feedwater heater in line since there is no chance of additional heat recovery by the upstream feedwater heaters prior to the feedwater return to the reactor. Interpretation of the calculation results for the high pressure feedwater heater (the last feedwater in-line heater) indicates feedwater temperature will not drop by more than 100 deg F due to loss in recovery heat.
Reactor Feedwater	003-25	The upper limit on feedwater flow at maximum run-out must restrict flow to a value consistent with the reload analysis.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Feedwater	003-26	Provide 2/3 core coverage permissive signal to RHR System (74) for containment cooling (Drywell Spray, Torus Spray, or Suppression Pool Cooling) modes.	YES	YES	
Reactor Feedwater	003-27	Provide RPV high water level (L8) to RCIC System (73) for automatic system shutoff.	YES	YES	See also Modes 071-01 and 073-01.
Reactor Feedwater	003-28	Provide path for RCIC System (71) flow to the RPV through the feedwater spargers.	NO	NO	Mode 003-17 provides a flow path for the RCIC System (071) to the reactor vessel through the feedwater spargers. This is a passive function. No baseline test is required.
Reactor Feedwater	003-29	Provide high reactor vessel pressure signal to MSRV auto actuation logic.	NO	YES	This is a new mode. The BFN Unit 1 MSRV pressure switch actuation function is a new mode. The BFN Unit 1 function will be safety related; currently the BFN Units 2 and 3 functions are non-safety related.
Extraction Steam	005-01	Maintain the as-built design to meet 100 degree F assumption for maximum feedwater temperature drop that can occur for any single action or failure of Feedwater Heater(s). See also Condensate And Feedwater Systems (Modes 002-09 and 003 -24).	NO	NO	Supported by engineering analysis. See also Modes 002-09 and 003-24.
Heater Drains and Vents	006-01	Establish MSIV leakage pathway to condenser.	NO	NO	
Boiler Drains and Vents	010-01	Provide path for Main Steam System (01) MSRV steam blowdown to Primary Containment System (64A) Suppression Pool.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Boiler Drains and Vents	010-02	Provide Reactor Coolant Pressure Boundary.	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing.
Auxiliary Boiler	012-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Auxiliary Boiler	012-02	Provide Primary Containment Boundary.	YES	NO	DCN 51200 deletes interface from System 012 to Primary Containment.
Auxiliary Boiler	012-03	Establish MSIV leakage pathway to condenser.	NO	NO	Passive function. This mode does not require testing.
Fuel Oil	018-01	Provide diesel fuel oil to Diesel Generator System (82).	YES	NO	Unit 2 testing fulfilled Unit 1 requirements.
Fuel Oil	018-02	Maintain 7 day (long term) supply of fuel oil in storage tanks in support of Diesel Generator System (82).	YES	NO	Unit 2 testing fulfilled Unit 1 requirements.
RHR Service Water	023-01	Provide cooling water to RHR System (74) heat exchangers.	YES	YES	See also Mode 074-20.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
RHR Service Water	023-03	Provide cooling water to EECW system (67) upon start of the RHR Service Water (RHRSW) pumps given Emergency Equipment Cooling Water (EECW) valve position interlock signals.	YES	YES	See Note 5. See also Modes 067-01 and 067-03.
RHR Service Water	023-04	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
RHR Service Water	023-06	Provide Wheeler Lake level alarm at elevation 564 feet and rising.	YES	NO	This is a shared function among all three units. Test results from 2-BFN-RTP-023 are applicable to Unit 1. No further testing is required to support Unit 1 restart.
RHR Service Water	023-08	Manual RHRSW System operation to provide cooling water to RHR System (74) heat exchangers from outside of Main Control Room.	YES	YES	
RHR Service Water	023-09	Provide sump pump capability for RHRSW Pump compartments.	YES	NO	This is a shared function among all three units. Test results from 2-BFN-RTP-023 are applicable to Unit 1. No further testing is required to support Unit 1 restart.
RHR Service Water	023-10	Provide operation of RHRSW pumps from outside the main control room to supply water to the EECW System (67) given EECW position interlock signals.	YES	NO	See Mode 067-03.
Raw Cooling Water	024-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Raw Cooling Water	024-02	Provide pressure boundary integrity to EECW System (67).	NO	NO	To be deleted per DCN 51178.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Raw Cooling Water	024-04	Provide flow path through control room chillers A & B for Units 1 & 2.	NO	NO	Chillers have been replaced by air cooled chillers and abandoned in place under DCN 51178.
Raw Cooling Water	024-06	Provide manual control from outside the main control room for Raw Cooling Water (RCW) Pumps 1D and 3D to prevent overloading of diesel generators (82).	NO	NO	This mode supports the 4kV AC Auxiliary Power System. RCW pumps 1D and 3D are provided power from 4kV Shutdown Boards A and 3EC respectively. This power source assures raw cooling water can be made available for equipment protection and to facilitate restarting the units. However, since these pumps are not required for safe shutdown, they have no auto-start capabilities during loss of offsite power or a design basis accident to assure they will not adversely impact the safety-related electrical system bus voltage. Manual start capabilities are available outside the Main Control Room for these pumps. This capability makes Raw Cooling Water available at the operator's discretion, when adequate power is available from the diesel backed 4kV shutdown boards during loss of offsite power or a design basis accident. These pumps (1D & 3D) and the associated Diesel Generators are operable for Units 2 & 3 and this mode is common to all three units. Therefore, this mode does not require a test under the scope of the associated BTRD.
Raw Service Water	025-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
High Pressure Fire Protection and Detection	026-01	Support Secondary Containment function.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
High Pressure Fire Protection and Detection	026-02	Prevent automatic start of High Pressure Fire Protection System (26) Pumps (lock out) to prevent overloading the Diesel Generator System (82).	See Note 2.	YES	See MODE 575-07.
Condenser Circulating Water	027-04	Provide manual vacuum breaking capability to prevent backflow from cooling tower warm water channel into the forebay upon trip of the Condenser Circulating Water Pumps.	YES	YES	
Potable Water	029-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Ventilation	030-01	Provide ventilation to Units 1 and 2 Diesel Generator Building.	See Note 2.	NO	
Ventilation	030-02	Provide ventilation to Unit 3 Diesel Generator Building.	See Note 2.	NO	
Ventilation	030-03	Provide ventilation to 250V Battery Room 3EB in the Unit 3 Diesel Generator Building to prevent a buildup of hydrogen gas during battery charging.	See Note 2.	NO	
Ventilation	030-04	Provide Secondary Containment Integrity.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-01	Isolate supply ducts and supply pressurized filtered outdoor air to Main Control Room on Primary Containment Isolation System (64D) Group 6 signal or Radiation Monitoring System (90) initiation signal.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-02	Provide ventilation to Cable Spreading Rooms and Control Bay Mechanical Equipment Rooms.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-03	Recirculate cool air to Reactor Building Board Rooms.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-04	Provide ventilation and air conditioning to Unit 3 Diesel Generator Building Board Rooms.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-05	Provide recirculation air conditioning to Control Rooms and Auxiliary Instrument Rooms.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-06	Provide ventilation to Battery Rooms.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-08	Provide manual lineup of HVAC equipment with total loss of control air.	YES	NO	The testing performed by the Unit 2 BTRD included all testing necessary for Unit 1 (and Unit 3). The Unit 2/3 BTRD provides this justification. Also the summary in the Unit 2/3 BTRD states: "…unit 2 restart testing was sufficient to functionally verify the shutdown requirements for system 031 (Units 1, 2, 3)…"
Air Conditioning (Includes Shutdown Board Room Cooling and Control Room Emergency Ventilation System)	031-09	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Control Air	032-01	Perform isolation action(s) upon receiving Primary Containment System (64D) Group 6 isolation signals.	YES	NO	DCN 51182 deletes suction valves. See also Mode 64D-04.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Control Air	032-02	Provide compressed air to Main Steam System (01) ADS MSRVs.	YES	YES	
Control Air	032-03	Provide compressed air for closure of Main Steam Isolation Valves (System 01).	YES	YES	This function is tested in 1-BFN-BTRD-001 under Mode 001-03 and 001-25.
Control Air	032-04	Provide compressed air to equipment access air lock seals to provide Secondary Containment Pressure Boundary.	YES	NO	This is a shared configuration, and Unit 2 results (listed in 2-BFN-BTRD-032) are acceptable for Unit 1. Unit 1 operation does not impact the capability of the doors to meet safe shutdown mode requirements. No additional testing is required to support Unit 1 Restart.
Control Air	032-05	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Control Air	032-06	Provide/support Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Control Air	032-09	Provide flow path integrity for supply of CAD nitrogen to the Torus Vacuum Breaker Valves.	See Note 2.	YES	Testing for this mode also fulfills the requirements of Mode 084-07, "Provide nitrogen as the actuating medium for the reactor building to torus vacuum breaker butterfly valves when control air is not available".
Service Air	033-01	Provide Primary Containment Boundary.	YES	NO	Service air inside the Drywell will be cut and capped by DCN 51183.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Service Air	033-02	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Gland Seal Water	037-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
CO_2 Storage, Fire Protection and Purging	039-01	Inhibit spurious CO2 initiation/release during a seismic event when ventilation (sys 30) is required in diesel generator buildings. Provide ability locally to inhibit CO2 release in operating areas required for shutdown from outside the Main Control Room.	YES	NO	Unit 2 testing performed satisfies Unit 1 test requirements. No further testing is required.
Station Drainage	040-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Station Drainage	040-02	Provide valve closure or piping geometry to prevent back-flooding of the Diesel Generator (82) Building.	NO	NO	This mode was identified as Phase II (Unit 2 post-restart) mode and was verified by calculation MD-Q0999-920112. There are no requirements for Unit 1 above and beyond the verified Unit 2 requirements. Therefore, no additional testing is required for Unit 1.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Sampling and Water Quality (SWQ)	043-01	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Sampling and Water Quality	043-02	Close Sampling & Water Quality System (43) isolation valves on RPV low water level (L1).	YES	YES	
Sampling and Water Quality	043-03	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Sampling and Water Quality	043-04	Maintain RHRSW System (23) pressure boundary integrity.	YES	YES	See also Mode 023-01.
Sampling and Water Quality	043-05	Provide capability of manual backup control isolation (valve closure) to prevent loss of reactor water inventory.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Sampling and Water Quality	043-06	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Sampling and Water Quality	043-07	Close Post Accident Sampling System Isolation Valves upon receiving Primary Containment System (64D) Group 6 isolation signal.	YES	YES	See also Mode 64D-04.
Sampling and Water Quality	043-08	Establish MSIV leakage pathway to condenser.	NO	NO	There is no individual component test required within the SWQ system for this mode. The Mode Requirement to establish a leakage path from MSIVs to Condenser A is covered under Main Steam system Mode 001-028. This mode is a passive function since this is the normal flow path with each sampling branch containing normally open manual valves up to the last isolation closed manual valve. No in-line component is changing state to satisfy this Mode Condition.
Building Heating	044-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Feedwater Level Control	046-01	Provide RPV high water level (L8) signal to energize Reactor Feedwater System (03) solenoid to close Main Steam System (01) Feedwater Turbine Steam Supply Stop Valves.	YES	YES	L8 signal is covered by Modes 003-05 and 003-11. Closure of valve solenoid is covered by Mode 003-18.
Turbine Control (EHC)	047-01	Provide Main Turbine Control Valve fast closure signal to RPS (99).	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Turbine Control (EHC)	047-03	Provide hydraulic closure of Main Steam System (01) Turbine Stop Valves upon low condenser vacuum (approximately 20" HG) signal.	YES	YES	See also Mode 001-09.
Turbine Control (EHC)	047-04	Provide hydraulic closure of Main Steam System (01) Main Turbine Bypass Valves upon low condenser vacuum (approximately 7" HG) signal.	YES	YES	See also Mode 001-22.
Turbine Control (EHC)	047-05	Provide hydraulic control to open Main Steam System (01) Main Turbine Bypass Valves on turbine trip (main turbine stop valve closure) signal.	YES	YES	See also Mode 001-05.
Demineralizer Backwash Air	053-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Standby Liquid Control	063-01	Manual injection of boron solution into reactor given indication of incomplete insertion of control rods (CRD, system 85) and reactor not being in subcritical condition (Neutron Monitoring System, system 92).	YES	YES	
Standby Liquid Control	063-02	Provide Standby Liquid Control System (SLCS) initiation signal to Reactor Water Cleanup (RWCU) System (69) for isolation of RWCU System from the reactor to prevent loss or dilution of Boron solution.	YES	YES	See also Mode 069-04.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Standby Liquid Control	063-03	Provide Reactor Coolant Pressure Boundary.	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Standby Liquid Control	063-04	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Primary Containment	64A-06	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing). See Mode 64B-27.
Primary Containment	64A-08	Provide high drywell pressure trip signal to RPS (99).	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Primary Containment	64A-09	Provide high drywell pressure signal to RHR System (74) for LPCI initiation logic and to Core Spray System (75) for system initiation logic, 480V load shed logic, Diesel Generator start logic, and HPCI System (73) initiation logic.	YES	YES	See also Modes 073-01, 074-01, 075-07, 075-08, and 075-17.
Primary Containment	64A-10	Provide vacuum relief system (vacuum breaker valves) to prevent drywell or suppression chamber (torus) negative pressure from damaging containment structure. Provide air-operated reclosure of the inboard reactor building to torus vacuum breakers.	YES	YES	
Primary Containment	64A-11	Provide drywell temperature indication in Main Control Room in support of Reactor Building Closed Cooling Water System (system 70) and RHR System (74) Drywell Spray (containment cooling) Mode.	YES	YES	
Primary Containment	64A-12	Provide suppression pool temperature indication in Main Control Room in support of RHR System (74) Containment Cooling (torus cooling and drywell/torus spray), Main Steam System manual RPV depressurization, and RPS System (99) manual scram.	YES	YES	
Primary Containment	64A-13	Provide suppression pool level indication in main control room in support of RHR System (74) Containment Cooling and Main Steam System (01) manual depressurization. Provide pressure boundary integrity to HPCI System (73).	YES	YES	
Primary Containment	64A-14	Provide drywell pressure indication in Main Control Room in support of RHR System (74) Containment Cooling (drywell/torus spray) and Containment Atmosphere Dilution System (84) containment venting after a LOCA.	YES	YES	See also Modes 073-12, 074-03, and 084-01.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Primary Containment	64A-15	Provide drywell temperature indication outside the Main Control Room in support of Reactor Building Closed Cooling Water System (system 70) and RHR System (74) operation from outside the Main Control Room.	YES	YES	
Primary Containment	64A-16	Provide suppression pool temperature indication outside the Main Control Room in support of Main Steam System (01) manual RPV depressurization, and RHR System (74) operation.	YES	YES	
Primary Containment	64A-17	Provide suppression pool level indication outside the main control room in support of Main Steam System (01) manual RPV depressurization, RCIC System (71) operation, and RHR system (74) operation from outside the Main Control Room.	YES	YES	
Primary Containment	64A-18	Provide drywell pressure indication outside the Main Control Room in support of RHR System (74) operation from outside the Main Control Room.	YES	YES	
Primary Containment	64A-25	Provide high drywell pressure signal to Main Steam System (01) for Automatic Depressurization System (ADS) logic.	YES	YES	See also Mode 001-08.
Reactor Building Ventilation	64B-23	Provide forced air cooling for RHR System (74) and Core Spray System (75) pump motors.	YES	YES	
Reactor Building Ventilation	64B-27	Close primary Containment Ventilation System Isolation Valves on Primary Containment Isolation System (64D) Group 6 isolation signal. (Fail-safe with respect to power supply.)	YES	YES	See also Mode 64D-04.
Reactor Building Ventilation	64B-28	Perform isolation actions [trip fans, close dampers, open dampers to Standby Gas Treatment System (SGTS) (65) on Primary Containment Isolation System (64D) Group 6 isolation signals. (Fail-safe with respect to power supply.)	YES	YES	See also Mode 64D-04.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Secondary Containment	64C-21	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Primary Containment Isolation	64D-01	Provide signal to close Group 1 Primary Containment Isolation Valves [Main Steam System (01) and Sampling and Water Quality System (43)].	YES	YES	See also Modes 001-03 and 001-04.
Primary Containment Isolation	64D-02	Provide signal to close Group 2 Primary Containment Isolation Valves [RHR System (74), Core Spray System (75), and Radwaste (77)].	YES	YES	See also Mode 077-01.
Primary Containment Isolation	64D-03	Provide signal to close Group 3 Primary Containment Isolation Valves [RWCU System (69)].	YES	YES	See also Mode 069-03.
Primary Containment Isolation	64D-04	Provide signal to close Group 6 Primary Containment Isolation Valves (Systems 43, 64, 76, 84, and 90), & isolate AC system (31) supply ducts to Main Control Room, initiate Control Room Emergency Ventilation System (31), trip fans & position dampers (64B), & initiate SGTS (65).	YES	YES	See also Modes 031-01, 032-01, 043-07, 64B-27, 64B-28, 065-01, 065-03, 076-01, 084-06, 090-03, and 090-05.
Primary Containment Isolation	64D-05	Provide signal to close Group 8 isolation valves.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Standby Gas Treatment	065-01	Maintain negative pressure in Secondary Containment on Primary Containment System (64D) Group 6 isolation signal. Filter airborne particulates & gases [including those from HPCI system (73) & CAD system (84)] prior to discharge to off-gas system (66).	YES	NO	Complete testing for these modes (Mode 065-01, Mode 065-03, and Mode 066-02) was included in the Test Requirements for Unit 2 startup. The SGTS and Off Gas System (OGS) are operational as common systems to Units 2/3 and are under Tech Spec surveillance. Thus the system capability to establish negative pressure and provide gaseous release control was demonstrated for Unit 2 Restart and does not require further testing for Unit 1. The SGTS initiation logic for Modes 065-01 and 065-03 on a Unit 1 Primary Containment Isolation System (PCIS) Group 6 signal is tested during Mode 064D-04 while no testing is required for Mode 066-02.
Standby Gas Treatment	065-02	Provide valves or piping geometry to support Radwaste System (77) to prevent Radwaste Building flooding.	NO	NO	These modes contain only piping geometry and manually actuated valves to perform the mode function, therefore, no testing is required. Verification of piping geometry is performed under 1-BFN-BTRD-077, Modes 077-06 and 077-07.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Standby Gas Treatment	065-03	Maintain negative pressure in Secondary Containment on Primary Containment System (64D) signal due to Radiation Monitoring System refueling zone high radiation signal. Filter airborne particulates & gases prior to discharge to Off-Gas System (66).	YES	NO	Complete testing for these modes (Mode 065-01, Mode 065-03, and Mode 066-02) was included in the Test Requirements for Unit 2 startup. The SGTS and OGS are operational as common systems to Units 2/3 and are under Tech Spec surveillance. Thus the system capability to establish negative pressure and provide gaseous release control was demonstrated for Unit 2 Restart and does not require further testing for Unit 1. The SGTS initiation logic for Modes 065-01 and 065-03 on a Unit 1 PCIS Group 6 signal is tested during Mode 064D-04 while no testing is required for Mode 066-02.
OffGas	066-02	Provide flow path integrity for the release of the filtered SGTS (65) gases to the stacks.	YES	NO	Complete testing for these modes (Mode 065-01, Mode 065-03, and Mode 066-02) was included in the Test Requirements for Unit 2 startup. The SGTS and OGS are operational as common systems to Units 2/3 and are under Tech Spec surveillance. Thus the system capability to establish negative pressure and provide gaseous release control was demonstrated for Unit 2 Restart and does not require further testing for Unit 1. The SGTS initiation logic for Modes 065-01 and 065-03 on a Unit 1 PCIS Group 6 signal is tested during Mode 064D-04 while no testing is required for Mode 066-02.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
OffGas	066-03	Provide valves or piping geometry to support Radwaste System (77) to prevent Radwaste Building flooding.	YES	YES	These modes contain only piping geometry and manually actuated valves to perform the mode function, therefore, no testing is required. Verification of piping geometry is performed under 1-BFN-BTRD-077, Modes 077-06 and 077-07.
OffGas	066-04	Provide automatic closure of back-draft prevention dampers to prevent back flow and potential ground level release of radiation.	See Note 2.	NO	Testing for Mode 066-04 was included in post modification testing for DCN W17999A. Additional testing for Unit 1 is not required. See also DCN 51128.
Emergency Equipment Cooling Water	067-01	Provide cooling water to AC System (31) chillers, RHR System (74) Pump Seal Coolers, Containment Inerting System (76) H2 & O2 Gas Analyzers, Diesel Generator (82), RHR & Core Spray Equipment Room Coolers (64B), and Fuel Pool (78). B. Provide EECW valve position interlock signal for auto-start RHRSW (23) pumps.	YES	YES	This is a shared system. In addition to the verification of adequate cooling water flow to essential Unit EECW components, the testing must include simultaneous verification of adequate flow to Units 2/3 essential components. However, verification of adequate flow to Unit 1 H2O2 analyzer is not required.
Emergency Equipment Cooling Water	067-02	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Emergency Equipment Cooling Water	067-03	A. For outside Main Control Room shutdown, provide cooling water to AC System (31) chillers, RHR & Core Spray Equipment Room Coolers (64B), RHR (74) pump seal coolers, DG (82), & fuel pool (78); B. Provide EECW valve position interlock signal for RHRSW (23) pump start.	YES	YES	A. This is a shared system. In addition to the verification of adequate cooling water flow to essential Unit EECW components, the testing must include simultaneous verification of adequate flow to Units 2/3 essential components. Verification of adequate flow to Unit 1 H2O2 analyzer is not required. B. This is a shared system. Test results for 2-BFN-BTRD-067 are applicable to Unit 1. No further testing is required to support Unit 1 Restart.
Emergency Equipment Cooling Water	067-05	Attach a fire hose to EECW to maintain water level in the Fuel Pool.	YES	YES	Calculation MDQ0067-870654 correlates EECW header pressure with flow rate to the fuel pools. Taking pressure readings to verify a minimum flow of 150 gpm (based on the calculation header pressure/flow graphs) while testing for Modes 067-01/067-03 accomplishes testing for Mode 067-05.
Reactor Water Recirculation	068-01	Close Recirculation Pump Discharge Valves on RHR System (74) automatic LPCI mode initiation signal.	YES	YES	See also Mode 074-17.
Reactor Water Recirculation	068-02	Open Recirculation Pump Motor Breakers on RPS (99) signal due to > 30% turbine 1st stage pressure and either Main Turbine Control Valve fast closure or Main Turbine Stop Valve < 90% open (end-of-cycle RPT function). Provide adequate coastdown inertia.	YES	YES	See also Modes 001-01, 001-23, and 099-05.
Reactor Water Recirculation	068-03	Close Recirculation Pump Discharge Valves manually in support of manually initiated RHR System (74) shutdown cooling mode and LPCI mode (from Main Control Room and from outside Main Control Room).	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Water Recirculation	068-04	Provide reactor Coolant Pressure Boundary (RCPB).	YES	YES	
Reactor Water Recirculation	068-05	Provide low reactor pressure permissive signals to Core Spray System (75) and RHR System (74).	YES	YES	
Reactor Water Recirculation	068-06	Trip recirculation pump motor-breakers on high reactor pressure or low water level (L2).	YES	YES	See also Modes 003-06 and 003-15.
Reactor Water Recirculation	068-08	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Reactor Water Recirculation	068-09	Assure that motor-generator (M-G) set speed changes stay within analyzed limits (Acceleration at maximum rate of 25% of full speed per second; Maximum flow of 105% of rated flow at 100% rated power).	YES	YES	M-G sets are being replaced with Variable Frequency Drives (VFDs) per DCN 51219. Functional testing of the VFDs will be conducted during Post Modification Tests (PMTs) for DCN 51219.
Reactor Water Recirculation	068-10	Plant technical specification and procedures require warm-up of the loop before pump start.	NO	NO	Plant Technical Specifications and procedures require the loop to be warmed before the Reactor Recirculation pump is started. No baseline operational testing is required to support this statement of fact. (Tech Spec 3.4.9 prescribes the recirculation pump starting temperatures.)
Reactor Water Cleanup	069-01	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Water Cleanup	069-02	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Reactor Water Cleanup	069-03	Close RWCU System isolation valves on Primary Containment System (64D) Group 3 isolation signal.	YES	YES	See also Mode 64D-03.
Reactor Water Cleanup	069-04	Close RWCU System suction line isolation valves on Standby Liquid Control System (63) initiation signal to prevent loss or dilution of the boron solution.	YES	YES	See also Mode 063-02.
Reactor Water Cleanup	069-05	Provide high RWCU equipment area & pipe trench atmosphere & drain temperature signals to PCIS (64D) Group 3 isolation logic. (Drain temperature N/A for Unit 2.)	YES	YES	
Reactor Water Cleanup	069-06	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) Systems addresses the functionality of the RCPB and its overall testing.
Reactor Water Cleanup	069-07	Provide System Pressure Boundary support (check valve) to HPCI System (73) to prevent diversion of HPCI System core cooling water from reactor vessel (Unit 3 only).	YES	NO	Mode 069-07 does not apply to Unit 1. The Unit 1 RWCU discharge piping does not connect to Feedwater Line 'A' piping and does not interface with the HPCI discharge piping.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Water Cleanup	069-08	Provide system pressure boundary in support of RCIC System (71) operation.	YES	YES	
Reactor Water Cleanup	069-09	Provide capability of manual backup control isolation (valve closure) to prevent loss of reactor water inventory.	YES	YES	
Reactor Building Closed Cooling Water	070-01	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing). Piping and components which supply a Primary Containment Pressure Boundary shall be system pressure tested under ASME Section XI program.
Reactor Building Closed Cooling Water	070-02	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Reactor Building Closed Cooling Water	070-03	Provide drywell cooling when power and cooling water are available.	NO	NO	Testing to demonstrate the functional capability of the shutdown/cool down mode (070-03) for the unaffected units using offsite or onsite resources is not required. This mode supports the normal operation of the unaffected units as well as the shutdown/cooldown operation.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Core Isolation Cooling (RCIC)	071-01	Auto RCIC System initiation on Reactor Feedwater System (03) RPV low level (L2) signal transmitted via RHR System (74). Auto RCIC System shutoff (if operating) on Reactor Feedwater System (03) RPV high level (L8) signal. Manual transfer of suction from Condensate Storage Tank (CST) to Suppression Pool if CST is low or Suppression Pool is high.	YES	YES	See also Modes 003-20, 003-27, and 074-21.
Reactor Core Isolation Cooling (RCIC)	071-02	Manual RCIC System initiation and trip to control level. (Non-LOCA unit.) Manual transfer of suction source from condensate to suppression pool if condensate is low or the suppression pool level is high.	YES	YES	
Reactor Core Isolation Cooling (RCIC)	071-03	Close RCIC System steam supply line isolation valves on RCIC System Group 5 isolation signals (high steam line differential pressure, high steam line space temperature, low steam line pressure, or high turbine exhaust diaphragm pressure).	YES	YES	
Reactor Core Isolation Cooling (RCIC)	071-04	Manually close RCIC System steam supply line isolation valves on reactor feedwater system (03) indication of low RPV pressure.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Core Isolation Cooling (RCIC)	071-05	Provide Reactor Coolant Pressure Boundary.	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Reactor Core Isolation Cooling (RCIC)	071-07	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Reactor Core Isolation Cooling (RCIC)	071-08	Provide system pressure boundary in support of RHR System (74) containment (Torus) cooling function.	YES	YES	
Reactor Core Isolation Cooling (RCIC)	071-09	Manual RCIC System operation from outside the Main Control Room to maintain normal RPV water inventory while RPV pressure is above 100 psig. Manually transfer suction source to Suppression Pool if Suppression Pool level is high.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Core Isolation Cooling (RCIC)	071-10	Provide power to ECCS Division I and II analog trip units [Reactor Feedwater System (03), primary containment system (64A), reactor water recirculation system (68), RCIC system (71), and HPCI system (73)].	YES	YES	
Reactor Core Isolation Cooling (RCIC)	071-11	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Reactor Core Isolation Cooling (RCIC)	071-12	Establish MSIV leakage pathway to condenser.	NO	NO	Testing is not required for Mode 071-12. This mode of operation is a passive function and no physical action is required of the RCIC System to establish MSIV leakage pathway to the condenser.
Alternate Decay Heat Removal	072-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
High Pressure Coolant Injection	073-01	Auto HPCI initiation on Reactor Feedwater (03) RPV low level (L2) or high Drywell pressure (75) signal. Auto HPCI shutoff (if operating) on Reactor Feedwater (03) RPV high level (L8) signal. Includes auto transfer, if needed, from CST to supp pool on low CST or high Suppression Pool level l.	YES	YES	See also Modes 003-03, 003-05, 003-27, 064A-09, and 075-08.
High Pressure Coolant Injection	073-02	Provide indication (in Main Control Room) of HPCI suction transfer on low condensate level (for manual RCIC suction transfer to Suppression Pool).	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
High Pressure Coolant Injection	073-03	Close HPCI System Steam Supply Line Isolation Valves on HPCI System Group 4 isolation signals (high steam line differential pressure, high steam line space temperature, low steam line pressure, or high turbine exhaust diaphragm pressure).	YES	YES	
High Pressure Coolant Injection	073-04	Manually close HPCI System Steam Supply Line Isolation Valves on Reactor Feedwater System (03) indication of low reactor pressure.	YES	YES	
High Pressure Coolant Injection	073-05	Provide Reactor Coolant Pressure Boundary during HPCI System standby.	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) Systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
High Pressure Coolant Injection	073-06	Provide Reactor Coolant Pressure Boundary during HPCI System operation.	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be hydrostatically tested under ASME Section XI program.
High Pressure Coolant Injection	073-07	Provide Primary Containment Boundary during HPCI System standby.	YES	YES	
High Pressure Coolant Injection	073-08	Provide Primary Containment Boundary during HPCI System operation.	YES	YES	
High Pressure Coolant Injection	073-09	Manually trip HPCI System from outside the Main Control Room to prevent RPV overfill.	YES	YES	
High Pressure Coolant Injection	073-10	Limit the loss of coolant through HPCI System steam supply line break (flow restrictor built into steam line).	NO	NO	Testing will not be required for Mode 073-10. A flow element has been installed on the steam supply line to operate as a flow limiter. The flow limiter will maintain steam flow within required limits in the event of a downstream steam line break. This component does not physically change state to perform the intended safe shutdown requirement.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
High Pressure Coolant Injection	073-11	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
High Pressure Coolant Injection	073-12	Provide power to Primary Containment System (64A) drywell pressure indicators in support of RHR System Drywell/Torus spray mode and Containment Atmosphere Dilution System post-LOCA containment venting mode.	YES	YES	
High Pressure Coolant Injection	073-13	Establish MSIV leakage pathway to condenser.	NO	NO	Testing is not required for Mode 073-13. This mode of operation is a passive function and no physical action is required of the HPCI System to establish MSIV leakage pathway to the condenser.
Residual Heat Removal	074-01	Automatic LPCI mode initiation on RPV low water level (L1) signal or high Drywell pressure signal, with concurrent low RPV pressure permissive. Manual LPCI mode initiation from the Main Control Room.	YES	YES	See also Modes 003-22 and 64A-09.
Residual Heat Removal	074-02	Provide Suppression Pool water cooling to maintain Suppression Pool water temperature below limits to assure that pump NPSH requirements are met and that complete condensation of blowdown steam from a design basis LOCA can be expected.	YES	YES	
Residual Heat Removal	074-03	Provide spray to Drywell and Torus for containment cooling and lowering of containment pressure under post-accident conditions.	YES	YES	See also Mode 64A-14.
Residual Heat Removal	074-04	Provide Shutdown Cooling Mode (manual) to restore reactor temperature to normal.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Residual Heat Removal	074-09	Provide Secondary Containment Boundary and pressure boundary interface with condensate (system 02) ring header.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Residual Heat Removal	074-10	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) Systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Residual Heat Removal	074-11	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Residual Heat Removal	074-12	Provide signal (that a RHR pump is running) to main steam system (01) Automatic Depressurization System (ADS) initiation logic.	YES	YES	See also Mode 001-08.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Residual Heat Removal	074-14	Provide RHR System piping flow path for transmission of Condensate and Demineralized Water System (02) water supply to HPCI System (73) piping upstream of HPCI System pump.	NO	NO	Modes 074-14 and 074-15 provide for a flow path for the HPCI system via RHR piping. However, the RHR system Is not required nor does it have the capabilities to control or measure the flow in the flow path provided to the HPCI system. These modes are addressed in the HPCI system (073) BTRD.
Residual Heat Removal	074-15	Provide RHR System piping flow path from HPCI System (73) pump minimum flow bypass line to Primary Containment System (64A) Suppression Pool.	NO	NO	Modes 074-14 and 074-15 provide for a flow path for the HPCI System via RHR piping. However, the RHR System Is not required nor does it have the capabilities to control or measure the flow in the flow path provided to the HPCI System. These modes are addressed in the HPCI System (073) BTRD.
Residual Heat Removal	074-16	Provide RHR System piping flow path from RCIC System (71) pump minimum flow bypass line to Primary Containment System (64A) Suppression Pool.	NO	NO	Mode 074-16 provides for a flow path for the RCIC System via RHR piping. However, the RHR System Is not required nor does it have the capabilities to control or measure the flow in the flow path provided to the RCIC System. These modes are addressed in the RCIC System (071) BTRD.
Residual Heat Removal	074-17	Provide automatic LPCI mode initiation signal for closure of Reactor Water Recirculation System (68) Pump Discharge Valves.	YES	YES	See also Mode 068-01.
Residual Heat Removal	074-19	Manual RHR System operation (LPCI, Torus Cooling, and Shutdown Cooling modes) from outside the Main Control Room.	YES	YES	
Residual Heat Removal	074-20	Provide flow path and pressure boundary integrity for RHR Service Water System (23) coolant to the main RHR System heat exchangers.	YES	YES	See also Mode 023-01.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Residual Heat Removal	074-21	Provide Reactor Feedwater System (03) RPV low water level (L2) signal for automatic RCIC System (71) initiation.	YES	YES	See also Modes 003-20 and 071-01.
Residual Heat Removal	074-23	RHR Shutdown Cooling suction valves close on signal from Primary Containment Isolation System (64D).	YES	YES	
Residual Heat Removal	074-24	Inhibit automatic initiation of RHR in Unit 2 (1) given a LOCA signal from the RHR System of Unit 1 (2).	YES	YES	
Residual Heat Removal	074-25	Provide a LOCA signal from Unit 2 (1) to divisionally inhibit automatic initiation of two Unit 1 (2) RHR pumps (74). (A total of two Unit 1 (2) RHR pumps is inhibited, one RHR pump per division.)	YES	YES	
Residual Heat Removal	074-26	Provide Unit Priority Re-Trip signal to 4kV Electrical Distribution (4kV) System (575) for Diesel breaker retrip, load shed, and load sequencing on RPV low water level (L1) signal or high Drywell pressure signal, with concurrent low RPV pressure.	See Note 2.	YES	
Residual Heat Removal	074-27	Provide a LOCA signal from Unit 1(2) RHR (74) to 4kV system (575) to inhibit a Unit-Priority Re-Trip signal from Unit 2(1) RHR (74) from re-tripping Unit 1(2) Division I (II) diesel generator breakers.	See Note 2.	YES	
Core Spray	075-01	Supply cooling water to reactor - auto initiation.	YES	YES	
Core Spray	075-03	Provide Core Spray Pump power disconnect from outside Main Control Room.	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Core Spray	075-04	Provide Reactor Coolant Pressure Boundary.	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Core Spray	075-05	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Core Spray	075-07	Provide a start signal to Standby Diesel Generator (D/G) System (82) on Drywell high pressure or RPV low level (L1); and provide an accident signal to 4kV system (575) logic on either reactor low level (L1) or Drywell high pressure coincident with reactor low pressure.	YES	YES	See also Modes 003-22 and 64A-09.
Core Spray	075-08	Provide Primary Containment System (64A) high Drywell pressure signal for automatic HPCI System (73) operation.	YES	YES	See also Modes 064A-09 and 073-01.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Core Spray	075-09	Provide Core Spray piping flow path from Primary Containment System (64A) Suppression Pool to RCIC System (71) piping upstream of RCIC System pump for manual RCIC System operation.	YES	YES	Testing to demonstrate the functionality of the flow path from Suppression Pool Ring Header for RCIC manual operation (Mode 075-09) will not be performed using the RCIC pump. The integrity of the suction line up to the system 071 interface is demonstrated by operation of Division I of Core Spray System.
Core Spray	075-10	Provide signals (that Core Spray Pumps are running) to Main Steam System (01) Automatic Depressurization System (ADS) initiation logic.	YES	YES	See also Mode 001-08.
Core Spray	075-11	Provide Feedwater System (03) RPV low water level (L1) signal to RHR System (74) LPCI Mode initiation logic.	YES	YES	See also Modes 003-22 and 074-01.
Core Spray	075-12	Provide Reactor Feedwater System (03) and Reactor Water Recirculation System (68) low reactor pressure signals to RHR System (74) LPCI Mode isolation initiation logic.	YES	YES	See also Mode 003-09.
Core Spray	075-13	Provide Secondary Containment Boundary and pressure boundary interface with Condensate and Demineralized Water System (02) ring header.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Core Spray	075-14	Close PSC Head Tank Pump Suction Valves upon receiving isolation signal [low water level (L3) or high Drywell pressure] from the Primary Containment System (64D).	YES	YES	
Core Spray	075-15	Provide a LOCA signal from Unit 2 (1) to inhibit automatic initiation of one loop of Core Spray (75) of Unit 1 (2).	NO	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Core Spray	075-16	Inhibit automatic initiation of one loop of CS in Unit 2 (1) given a LOCA signal from the CS system (75) of Unit 1 (2).	NO	YES	
Core Spray	075-17	Provide load shed signal to 480-VAC System (574) on reactor low water level (L1) from Feedwater System (03) or coincident high Drywell pressure (from system 64A) and low reactor pressure from Feedwater System (03) or Reactor Recirculation System (68).	YES	YES	
Containment Inerting	076-01	Close Containment Inerting System Isolation Valves on Primary Containment System (64D) Group 6 isolation valves.	YES	YES	See also Mode 64D-04.
Containment Inerting	076-02	Provide oxygen and hydrogen gas analyzers and indicators to monitor gas concentrations inside the Primary Containment in support of Containment Atmosphere Dilution System (84) operation.	YES	YES	DCN 51369 removes the Protective Safety Function of the Containment Atmospheric Monitoring sub-system of the CAD system. This mode to be removed from the SSA.
Containment Inerting	076-03	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Containment Inerting	076-04	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Radwaste	077-01	Close Radwaste System Isolation Valves on Primary Containment System (64D) Group 2 isolation signals.	YES	YES	See also Mode 64D-02.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Radwaste	077-02	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Radwaste	077-03	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Radwaste	077-06	Provide valve closure or pipe geometry to prevent backflooding of Radwaste Building through the SGTS Building, Off-Gas Building, Service Building, and Off-Gas Stack drains.	NO	NO	This mode was identified as Phase II (Unit 2 post-restart) and was verified by calculation MD-Q0999-920112. There are no requirements above and beyond the verified Unit 2 requirements.
Radwaste	077-07	Provide piping interface integrity with the SGTS system (65) and the off gas system (66) in support of release of the filtered SGTS gases through the stack.	YES	YES	Same as Mode 066-02.
Spent Fuel Pool Cooling and Cleanup	078-01	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Spent Fuel Pool Cooling and Cleanup	078-02	Provide pressure boundary integrity at RHR/Fuel Pool Cooling (FPC) interface.	NO	NO	DCN 51203 removed the motive power to 1-FCV-078-0062. This mode of operation is now a passive function and no physical action is necessary to maintain the pressure boundary integrity.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Spent Fuel Pool Cooling and Cleanup	078-03	Prevent inadvertent siphoning of the Spent Fuel Pool.	YES	NO	ECN P7200 added anti-siphon vents to check valves 78-256 & 78-527 to prevent siphoning of Spent Fuel Pool water. Tested per 1-PMT-BF-78.003.
Spent Fuel Pool Cooling and Cleanup	078-04	Perform manual actions required to restore Fuel Pool Cooling to service following a loss of off-site power.	NO	NO	Unit 1 FPC system has been in continuous service. There are no limitations, with the exception of administrative controls, on manual loading of the FPC pumps onto the diesel generators if capacity is available.
Fuel Handling and Storage	079-01	Provide safe fuel handling using refuel bridge and equipment.	YES	YES	
Fuel Handling and Storage	079-02	Provide interlocks to CRD System during fuel movement.	YES	YES	
Fuel Handling and Storage	079-03	Provide safe storage for new and spent fuel.	NO	NO	The safe storage is accomplished by passive structures (new fuel vault and spent fuel storage racks) to maintain fuel sub-critical at all times. (All are seismic Class I structures)
Fuel Handling and Storage	079-06	Maintain Spent Fuel Pool water level.	NO	NO	Level is maintained by the design of the pool structure and gates. The construction of the fuel pool together with retraction limits on refuel bridge hoist minimum nine (9) feet of required water level above irradiated fuel. Tests to ensure makeup water availability is contained in Modes 067-01, 067-03, and 067-05 and testing for the prevention of inadvertent siphoning of the Spent Fuel Pool is prescribed in Mode 078-03.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Fuel Handling and Storage	079-07	Refueling platforms are to be deenergized and appropriately parked under tornado conditions. With this provision, the refueling platforms must withstand tornado design loads.	NO	NO	Safe storage is accomplished by securing (tying down) the crane during tornado conditions and deenergizing and positioning the refueling platform during a tornado warning.
Standby Diesel Generators	082-01	Start standby AC power source for 4kV System (575).	YES	YES	
Standby Diesel Generators	082-02	Provide power to 4kV system (575) upon D/G availability and loss of off-site power.	YES	YES	
Standby Diesel Generators	082-03	Provide D/G power to diesel fuel transfer pumps (System 18).	YES	NO	Unit 3 testing performed satisfies Unit 1 test requirements. No further testing is required.
Containment Atmosphere Dilution	084-01	Provide dilution of the primary containment atmosphere with nitrogen after a LOCA to maintain gas concentrations (oxygen and hydrogen) below level (5% oxygen by volume) which could produce a combustible gas mixture.	YES	YES	See also Mode 64A-14.
Containment Atmosphere Dilution	084-03	Provide Primary Containment Pressure Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Containment Atmosphere Dilution	084-04	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Containment Atmosphere Dilution	084-06	Close CAD System vent valves on Primary Containment Isolation System (64D) Group 6 isolation signal.	YES	YES	
Containment Atmosphere Dilution	084-07	Provide nitrogen as the actuating medium for the Reactor Building To Torus Vacuum Breaker butterfly valves when Control Air is not available.	See Note 2.	YES	Will be tested under Mode 032-09. DCN 51205 adds the CAD tie-ins to the Torus vacuum breakers.
Control Rod Drive	085-01	Provide scram (99) and close Scram Discharge Volume (SDV) vent and drain valves.	YES	NO	See also Mode 099-01.
Control Rod Drive	085-02	Provide Primary Containment Boundary.	YES	NO	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Control Rod Drive	085-03	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Control Rod Drive	085-04	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	NO	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Control Rod Drive	085-05	Prevent rod withdrawal.	YES	YES	See also Mode 092-04.
Control Rod Drive	085-06	Provide housing support to keep rods in place.	YES	NO	This mode of operation is a passive function. The housing support structure will be inspected after reassembly. Ref. 0-SI-4.3.B.2.
Control Rod Drive	085-07	Limit rod drop rate to less than 3.11 ft/sec.	NO	NO	This mode requires no testing. The original design, as verified by developmental testing, is acceptable to ensure the function.
Control Rod Drive	085-08	Provide Main Control Room rod position indication.	YES	YES	
Control Rod Drive	085-09	Provide SDV high water level signal.	YES	YES	
Control Rod Drive	085-10	Provide scram discharge volume low air header pressure signal.	YES	NO	This function and the corresponding SSA mode are removed per DCN 51206. No test required.
Control Rod Drive	085-12	Provide system pressure boundary support to Main Steam System (01) > 30% turbine first stage pressure instrumentation.	NO	NO	This function and the corresponding SSA mode are removed per DCN 51078. No test required.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Control Rod Drive	085-13	Provide system pressure boundary in support of RCIC System (71) automatic initiation mode and manual operation.	NO	YES	See also Mode 71-05.
Control Rod Drive	085-14	Provide Alternate Rod Insertion (ARI) by opening backup scram valves on Feedwater System (03) RPV low water level (L2) signal or high reactor vessel pressure signal.	YES	YES	See also Modes 003-06 and 003-15.
Control Rod Drive	085-15	Provide Condensate and Demineralized Water System (02) pressure boundary for HPCI System (73) normal open water supply.	YES	NO	The requirement to verify pressure boundary integrity while drawing water from the Condensate Storage Tank to the HPCI System (73) will be fulfilled during flow testing of the HPCI System, Mode 073-01. No system 085 in-line component needs to change state to satisfy this mode condition.
Control Rod Drive	085-16	Provide selected rod identification.	See Note 2.	YES	
Radiation Monitoring	090-02	Provide Primary Containment Boundary.	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Radiation Monitoring	090-03	Provide Reactor Building ventilation exhaust line and refueling zone area (adjacent to the fuel pools) high radiation signals to primary Containment Isolation System (64D) Group 6 isolation logic.	YES	YES	See also Mode 64D-04.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Radiation Monitoring	090-04	Provide Main Control Room intake air ducts excessive radiation signal to Air Conditioning System (31) for initiation of Main Control Room Emergency Ventilation (isolation of intake ducts and supply of pressurized filtered outdoor air).	YES	NO	Functional testing of the isolation logic for both the Radiation Monitoring System and Control Room Emergency Ventilation System were tested for conformance to the SSA for each system during BFN Unit 2 restart. No additional testing is required for this mode.
Radiation Monitoring	090-05	Close valves on suction and return lines to the drywell radioactive particulate iodine and gaseous monitor on primary Containment Isolation System (64D) Group 6 isolation signal.	YES	YES	See also Mode 64D-04.
Radiation Monitoring	090-07	Provide system pressure boundary integrity (with all mechanical joints and components associated with the off-line liquid monitors) to RHR Service Water System (23) cooling water for RHR System (74) heat exchangers.	NO	NO	Pressure boundary integrity with the RHRSW System (023) is by design codes of piping and structures. In the event of a leak in the off-line radiation monitors with the RHRSW, the appropriate radiation monitor isolation valves could be manually closed. No additional testing required for this mode.
Radiation Monitoring	090-08	Provide Secondary Containment Boundary.	YES	NO	BFN units operate as a single zone Secondary Containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
Neutron Monitoring	092-01	Provide Intermediate Range Monitor (IRM) high neutron flux trip signal to Reactor Protection System (99).	YES	YES	
Neutron Monitoring	092-02	Provide Average Power Range Monitor (APRM) high neutron flux trip signal to Reactor Protection System (99).	YES	YES	

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Neutron Monitoring	092-04	Provide Rod Block Monitor trip signal to the Reactor Manual Control subsystem of the Control Rod Drive System (85) to inhibit control rod withdrawal.	YES	YES	See also Mode 085-05.
Neutron Monitoring	092-05	Provide indication in the Main Control Room of power/neutron flux level as monitored on the Source Range Monitors (SRMs), IRMs, or APRMs (as applicable) as the event is identified and the Standby Liquid Control System (63) injects the boron solution into the reactor.	YES	NO	During plant startup the Neutron Monitoring System is functioning in a normal mode. That is, the SRMs and IRMs provide indication in the Main Control Room of the power/flux level. Since these indications are monitored as the plant is brought up to power, it is not necessary to provide any baseline test for the SRM/IRM indications.
Neutron Monitoring	092-07	Provide Reactor Coolant Pressure Boundary (RCPB).	YES	YES	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) Systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Neutron Monitoring	092-08	Provide Oscillation Power Range Monitor (OPRM) trip signal to Reactor Protection System (99).	See Note 2.	YES	The Detect & Suppress Solution Confirmation Density [DSSCD] methodology is planned.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Traversing Incore Probe	094-01	Provide Primary Containment Boundary isolation and integrity. (Active isolation function is not required.)	YES	YES	Various systems perform a passive function of providing a pressure boundary for the Primary Containment. Components which form the Primary Containment Pressure Boundary must be Local Leak Rate Tested (LLRT) in accordance with 10CFR50 Appendix J (i.e., Type A, B, & C testing).
Traversing Incore Probe	094-03	Provide Reactor Coolant Pressure Boundary (RCPB). Passive function only.	NO	NO	Testing to demonstrate functional capability of Reactor Coolant Pressure Boundary is not required. This mode of operation is a passive function and no physical action is required by the system to maintain the integrity of the Reactor Coolant Pressure Boundary. Baseline Test Requirements Document 1-BFN-BTRD-068, Mode 068-04, for the Reactor Recirculation (68) and Recirculation Flow Control (96) Systems addresses the functionality of the RCPB and its overall testing. Piping and components which supply a RCPB shall be system pressure tested under ASME Section XI program.
Reactor Protection	099-01	Provide auto scram signal and SDV vent/drain valve isolation signal to CRD System (85).	YES	YES	See also Mode 085-01.
Reactor Protection	099-02	Provide manual scram signal and SDV vent/drain valve isolation signal to CRD System (85).	YES	YES	
Reactor Protection	099-03	Provide "RUN" mode signal to PCIS (64D) for low steamline pressure isolation permissive.	YES	YES	
Reactor Protection	099-04	Provide refuel interlock to Reactor Manual Control subsystem of CRD (85).	YES	YES	
Reactor Protection	099-05	Provide trip signal to recirculation pump motor breakers (System 68).	YES	YES	See also Mode 068-02.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Reactor Protection	099-06	Provide signals to Primary Containment Isolation System (64D) logic.	YES	YES	
Cranes and Hoists	111-01	Reactor Building crane is to be tied down under tornado conditions. With this provision, the crane must withstand full design loads (passive).	NO	NO	Safe storage is accomplished by securing (tying down) the crane during tornado conditions and deenergizing and positioning the crane during a tornado warning.
Communications	244-01	Provide communication from local panels for shutdown from outside the Main Control Room.	NO	YES	
Buildings and Structures	303-01	Maintain configuration integrity of structures during earthquake.	NO	NO	All safety related structures were designed and constructed in accordance with seismic criteria. This mode of operation is a passive function and no physical action is required by the system to maintain integrity of the structures.
Buildings and Structures	303-02	Provide protection against the effects of flooding.	NO	NO	All safety related structures were designed and constructed to meet the criteria related to external flooding prevention/mitigation. This mode of operation is a passive function and no physical action is required by the system to protect against the effects of flooding.
Buildings and Structures	303-03	Maintain configuration integrity of structures during tornado.	NO	NO	All safety related structures were designed and constructed to meet the criteria related to wind, tornado wind, tornado depressurization, and tornado generated missiles. This mode of operation is a passive function and no physical action is required by the system to maintain integrity of the structures.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
Buildings and Structures	303-04	Secondary Containment leakage rate criteria must be maintained by the Reactor Building.	YES	NO	BFN units operate as a single zone secondary containment. Secondary Containment was tested as a whole during Unit 2 testing. Secondary Containment boundary and pressure boundary interface is being maintained.
125 VDC Electrical Distribution	571-01	Provide 125VDC control power to D/G circuitry (System 82).	YES	NO	Adequate tests performed under Unit 2 Restart Test Program. This test fulfills Unit 1 mode required testing.
120 VAC Electrical Distribution	572-01	Provide 208/120V I&C Bus power distribution.	YES	YES	
120 VAC Electrical Distribution	572-02	Provide unit preferred power distribution.	NO	YES	Unit 1 MMG Set has been replaced with rectifier/inverter per DCN 51085. Testing to be performed as Post Modification Testing for this DCN.
120 VAC Electrical Distribution	572-03	Provide 120 VAC power for RPS System (99) and ability to deenergize RPS from outside the Main Control Room.	NO	YES	
120 VAC Electrical Distribution	572-04	Provide control of the 120 VAC power for the RPS System (99) due to overvoltage, undervoltage and underfrequency.	YES	NO	Associated 120 VAC system is in service and testing performed for Unit 2 restart encompassed Unit 1 scope and requirements. No additional testing required.
250 VDC Electrical Distribution	573-01	Provide control and logic power to 4kV and 480V switchgear.	YES	NO	Tested for U-2 periodic SI performed.
250 VDC Electrical Distribution	573-02	Provide switchyard (500kV - 161kV) relaying and tripping power.	YES	NO	Tested for U-2 periodic SI performed.
250 VDC Electrical Distribution	573-03	Provide motive power and logic power to equipment.	YES	NO	Tested for U-2 periodic SI performed.
250 VDC Electrical Distribution	573-04	Provide distribution point for numerous electrical systems.	YES	NO	Tested for U-2 periodic SI performed.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
250 VDC Electrical Distribution	573-05	Provide logic power to 480 VAC load shed logic.	YES	NO	System is in service and testing performed for Unit 2 restart encompassed Unit 1 scope and requirements. No additional testing required.
480 VAC Electrical Distribution	574-01	Provide 480 VAC switchgear distribution. [Manual action for battery charging]	YES	NO	System is in service and testing performed for Unit 2 restart encompassed Unit 1 scope and requirements. No additional testing required.
480 VAC Electrical Distribution	574-02	Provide 480 VAC Motor Control Center distribution.	YES	NO	System is in service and testing performed for Unit 2 restart encompassed Unit 1 scope and requirements. No additional testing required.
480 VAC Electrical Distribution	574-03	Provide logic and perform 480 VAC load shed based on accident signal from Core Spray System (75) and Diesel Generator voltage available signal from the 4kV System (575).	YES	YES	
480 VAC Electrical Distribution	574-04	Provide 480V AC distribution backup control.	YES	YES	
480 VAC Electrical Distribution	574-05	Provide 480-V load shed on degraded voltage conditions.	YES	YES	
4kV Electrical Distribution	575-01	Provide Class 1E 4kV power distribution.	YES	NO	No additional testing required.
4kV Electrical Distribution	575-03	Provide instrumentation for DG paralleling (System 82).	YES	NO	No additional testing required.
4kV Electrical Distribution	575-04	Provide initiation signal to diesels (System 82).	YES	YES	New CAS Logic.
4kV Electrical Distribution	575-06	Backup control for 4kV feeder breakers outside the control bay.	YES	NO	No additional testing required.

Table 2
Comparison of BFN Unit 1 RTP Testing Scope to BFN Units 2 and 3 RTP Testing Scope

System	System Mode No.[1]	Mode Description	U2/3 Test	U1 Test	Comments
4kV Electrical Distribution	575-07	Provide 4kV load shed and load sequencing logic.	YES	YES	DCN 51016 Changes Common Accident Signal logic and these changes will be tested in applicable Post Modification Tests.
4kV Electrical Distribution	575-08	Provide diesel generator voltage available signal to accident signal initiated 480V load shed logic (574).	YES	NO	See also Mode 574-03. Adequately tested for Unit 3 Restart. No additional testing required.
4kV Electrical Distribution	575-09	Provide 4kV power distribution from off-site power.	YES	NO	Adequately tested for Unit 3 Restart. No additional testing required.
500 kV/161 kV Off Site Power	576-01	Provide offsite power to 4kV distribution (575).	YES	YES	1-ETU-RMI 1-GEN-1 required.
500 kV/161 kV Off Site Power	576-02	Provide 24 VDC power to the Neutron Monitoring System.	NO	NO	No testing required for Unit 1. System is non-safety related and loss of 24V DC system does not have unacceptable results nor does it prevent safe shutdown of the unit.
500 kV/161 kV Off Site Power	576-03	Provide 48 VDC power to Annunciator System.	NO	NO	No testing required for Unit 1. The 48V DC system is non-safety related as are its loads. In addition, this system has batteries/chargers as backup.

Notes:

1. Refer to Calculation NDQ0999910033, "Safe Shutdown Analysis".

2. Some of the System Modes identified herein for Unit 1 were not applicable to safe shutdown for transients, accidents, and special events during the startup of Units 2 and/or 3. This analysis assumes operation of Units 1, 2 and 3 in any combination of reactor operating states.

Table 3
Comparison of BFN Unit 1 Power Ascension Testing Programs to BFN Unit 3 Power Ascension Testing Programs

BFN TEST	TEST NAME	UNIT 3 TEST	TEST FOR UNIT 1	OPEN VESSEL	0-55%	55-100%
SI-4.6.B.1-4	Reactor Coolant Chemical/Radiochemical	YES	YES	X	X	X
RCDP-1	Radiological Control Program	YES	YES		X	X
SR-3.1.1.1	Reactivity Margin Test	YES	YES		X	
TI-20	Control Rod Drive System	YES	YES	X	X	
GOI-100-1A	Unit Startup & Power Operation [Source Range Monitor]	YES	YES		X	X
TI-149	Reactor Water Level Measurements [RVLIS]	YES	YES		X	X
SR-3.3.1.1.9 [IRMs A-H]	Intermediate Range Monitor	YES	YES		X	
SR-3.3.1.1.7	RPS Local Power Range Monitor Calibration	YES	YES		X	X
TI-136	Average Power Range Monitor [Constant Heatup]	YES	YES		X	
SR-3.3.1.1.13 [APRMs 1-4]	Average Power Range Monitor Calibration	YES	YES		X	X
TI-135	Process Computer And Core Performance	YES	YES		X	X
TBD	Reactor Core Isolation Cooling System	YES	YES		X	
TBD	High Pressure Coolant Injection System	YES	YES		X	
TBD	System Expansion	YES	YES		X	
TI-137	Core Power Distribution	YES	YES		X	X
TBD	Core Performance	YES	YES		X	X
SR-2	Instrument Checks & Observations [Core Performance]	YES	YES		X	X
TI-130	Main Steam Pressure Control Pressure Regulator	YES	YES		X	X
TI-131	Feedwater Level Control System	YES	YES		X	X
SR-3.3.1.1.8(8)	Turbine Stop Valve Closure [RPS] Surveillance	YES	YES		X	X
SI-4.7.D	Primary Containment Isolation Valve Tests	YES	YES		X	
SI-4.6.D	Safety Relief Valve	YES	YES		X	
TBD	Shutdown From Outside Control Room [Back Up Control Panel Test]	YES	YES	X		
TBD	Turbine Surveillance	YES	YES		X	X
TI-132	Recirculation Flow Control System	YES	YES	X	X	X
TBD	Drywell Piping Vibration	YES	YES	X	X	
TI-174	Recirculation Flow Control Calibration	YES	YES			X
TI-82	Drywell Atmosphere Cooling System Temperatures	YES	YES		X	X
SI-4.8.B.1.A.1	Airborne Effluent Release Rate [Offgas System]	YES	YES		X	X
TBD	Reactor Water Cleanup System	YES	YES		X	
TBD	Recirculation Flow Calibration	YES	YES			X

Notes:

N/A Not Applicable
TBD To Be Determined