Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-15-168

August 12, 2015

10 CFR 50.56
10 CFR 50.57

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
Construction Permit No. CPPR-92
NRC Docket No. 50-391

Subject: **Watts Bar Nuclear Plant Unit 2 - Notification of Construction Substantially Complete and Request for Operating License**

References:

1. TVA letter dated April 3, 2007, “Watts Bar Nuclear Plant (WBN) - Unit 2 - Key Assumptions for the Possible Completion of Construction Activities”
2. NRC SECY-07-0096 dated June 7, 2007, “Possible Reactivation Of Construction And Licensing Activities For The Watts Bar Nuclear Plant Unit 2”
3. NRC Staff Requirements Memorandum dated July 25, 2007, Staff Requirements - SECY-07-0096 - Possible Reactivation Of Construction and Licensing Activities For The Watts Bar Nuclear Plant Unit 2
4. TVA Letter dated January 29, 2008, “Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2”
5. TVA Letter dated March 13, 2008, “Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 - Restructured Tables”
6. TVA Letter dated June 16, 2008, “Watts Bar Nuclear Plant (WBN) – Unit 2 – Regulatory Framework for the Completion of Construction and Licensing for Unit 2 – Revision 1”
7. Watts Bar Nuclear Plant (WBN) – Unit 2 – Final Safety Analysis Report, Amendment 113, dated February 23, 2015
8. NUREG-0847, Initial Report and Supplements applicable to Unit 2, published June 1982 through January 2015, “Safety Evaluation Report Related to Operation of Watts Bar Nuclear Plant, Unit 2, Docket No. 50 391”
9. TVA Letter dated September 6, 1991, “Watts Bar Nuclear Plant (WBN) – Nuclear Performance Plan, Volume 4, Revision 1”

The purpose of this letter is to inform the Nuclear Regulatory Commission (NRC) that construction of Watts Bar Nuclear Plant (WBN) Unit 2 is substantially complete and to request that the NRC issue an operating license to Tennessee Valley Authority (TVA) pursuant to 10 *Code of Federal Regulations* (10 CFR) 50.56 and 50.57.

Background

The regulatory framework for completion of construction activities at WBN Unit 2 is described in References 1 through 6. The regulatory framework was developed based on key assumptions provided in TVA's letter of April 3, 2007 (Reference 1) and the NRC Staff Requirements Memorandum for SECY-07-0096 (Reference 3). TVA has followed this framework to ensure that WBN Unit 2 is completed in the same manner as WBN Unit 1. Within this framework, TVA has implemented the quality processes necessary to safely complete construction of WBN Unit 2 in accordance with the Final Safety Analysis Report (FSAR) (Reference 7) and supporting documents, as reflected in the NRC's Safety Evaluation Report and Supplements (Reference 8).

In addition, TVA has developed and is implementing a pre-operational and start-up test plan as reflected in Chapter 14 of the FSAR. The test plan is designed to provide reasonable assurance that WBN Unit 2 will operate in conformity with the application as amended, the provisions of the Atomic Energy Act of 1954, as amended (the Act), and the rules and regulations of the Commission. Testing of WBN Unit 2 is ongoing. Hot functional testing has been completed and the containment integrated leak rate test and integrated safeguards tests are scheduled for completion. The transition plans that were implemented to confirm that the WBN staff is prepared to safely operate WBN Unit 2 are complete. These plans provide reasonable assurance that dual unit operation of WBN Units 1 and 2 can be conducted in compliance with the Commission's rules and regulations without endangering the health and safety of the public.

Construction of WBN Unit 2 Is Substantially Complete

TVA concludes that construction of WBN Unit 2 has been substantially completed in conformity with applicable requirements. As explained below, TVA considers substantial completion to be the point in the construction project at which WBN Unit 2 Construction turns over a substantial number of plant structures, systems, and components (SSCs) to Preoperational Startup Engineering (PSE) for testing. TVA also has determined that WBN Unit 2 will operate in accordance with applicable requirements and that dual unit operation with WBN Unit 1 can be conducted safely. Information supporting these conclusions and determinations is provided in Enclosure 1, "Watts Bar Unit 2 Readiness Assessment Report." Enclosure 1 consists of 11 attachments divided into three sections as described below. In addition to providing the basis for TVA's conclusions and determinations, the information in Enclosure 1 is presented to address the standards in 10 CFR 50.57, "Issuance of operating license," Paragraphs (a)(1) through (a)(3).

a) Section A - The six attachments in this section provide the basis for TVA's conclusion that construction of WBN Unit 2 is substantially complete and is in conformity with the construction permit and the application as amended, the provisions of the Act, and the rules and regulations of the Commission. This information supports an affirmative finding relative to 10 CFR 50.57(a)(1) and includes the following.

Attachment A1 discusses the programs and processes implemented by TVA to assure construction completion at WBN Unit 2 in accordance with the plant's design and licensing bases, as well as to accomplish system turnover. It also describes the status of construction at WBN Unit 2, which is substantially complete.

Attachment A2 discusses the programs and processes implemented by TVA to verify that WBN Unit 2 structures, systems and components (SSCs) have been constructed in accordance with the design and licensing bases.

Attachment A3 discusses the equipment refurbishment and qualification programs that have been implemented to ensure that safety- and quality-related SSCs are able to meet their design specifications.

Attachment A4 discusses the Watts Bar Nuclear Performance Plan (Reference 9) Corrective Action Programs (CAPs) and Special Programs (SPs) for WBN Unit 2.

Attachment A5 discusses the status of generic safety issues/unresolved safety issues (USIs) and generic communications for WBN Unit 2. TVA plans to complete work related to all generic safety issues/USIs and generic communications prior to fuel load or on a schedule that is appropriate for the issue as reflected in this attachment.

Attachment A6 discusses the Quality Assurance Program, quality control reviews, assessments, inspections and audits that provide reasonable assurance that construction activities at WBN Unit 2 have been and will continue to be accomplished in accordance with a Quality Assurance Program that meets the requirements of 10 CFR Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.

Section B - Attachment B provides a list of the completed and outstanding preoperational test program activities. TVA's comprehensive pre-operational test program is described in Chapter 14, Initial Test Program, of the Final Safety Analysis Report (Reference 7). The program is designed to provide confidence that the facility will operate in conformity with the application as amended, the provisions of the Act, and the rules and regulations of the Commission. The information in Section B supports an affirmative finding relative to 10 CFR 50.57(a)(2).

b) Section C - The four attachments in this section provide the basis for TVA's conclusion that there is reasonable assurance that the activities authorized by an operating license can be conducted without endangering the health and safety of the public, and that those activities will be conducted in compliance with applicable Commission regulations. The information in Section C supports an affirmative finding relative to 10 CFR 50.57(a)(3) and includes the following:

   Attachment C1 discusses TVA's implementation of the Transition and Change Management Plans that were developed to manage the transition of the Watts Bar site from single unit operation to dual unit operation.

   Attachment C2 discusses TVA's implementation of processes to manage the differences between the design of WBN Unit 1 and Unit 2.

   Attachment C3 discusses the impact of unit differences on operator licensing and qualifications.

   Attachment C4 discusses the Employee Concerns Program and Safety Culture at WBN Unit 2.

In addition to the standards set forth in 10 CFR 50.57, TVA has reviewed NRC guidance related to substantial completion letters. This included NRC Inspection Procedure (IP) 94302, "Status of Watts Bar Unit 2 Readiness for an Operating License." The IP 94302 states that TVA will provide written notification that construction of WBN Unit 2 is substantially complete. In addition, IP 94302 states that TVA will provide a list of remaining construction and preoperational test activities that must be addressed prior to loading fuel. This letter provides that information.

In particular, Enclosure 2 to this letter provides a listing of key construction and testing activities that remain open and which TVA will complete prior to operations. These activities are managed under existing quality processes which govern the appropriate completion of those activities. These processes have been used throughout the WBN Unit 2 project and, in many instances, will be used after fuel load and up to the declaration that WBN Unit 2 is ready for commercial operation. These processes govern activities such as system turnover to the WBN Operations organization, system surveillance testing and corrective action. The WBN Unit 2 Technical Specifications establish the necessary conditions for mode changes through fuel load and startup testing. Forecast schedule information, as defined by applicable modes, for future activities is based on the best available information at the time of submittal. The schedule may change due to unforeseen or emergent circumstances. The NRC will be kept informed as TVA makes progress towards fuel load and the completion of major activities.

Plant conditions necessary to support safe fuel load will be established soon after successful completion of the integrated safeguards tests (ISTs). The WBN Unit 2 ISTs are currently forecasted to be completed in September 2015. At this stage of the WBN Unit 2 project, TVA is confident that conditions necessary to support safe fuel load will occur as stated in our forecast schedule.

Given the substantially complete determination set forth in this letter and enclosures, TVA is requesting that the NRC issue an operating license to TVA for WBN Unit 2 pursuant to 10 CFR 50.56 and 50.57.

There are no new commitments associated with this submittal. Please address any questions to Gordon Arent at 423-365-2004 or Joe Calle at 423-452-4525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12th day of August 2015.

Respectfully,

J. W. Shea

Digitally signed by J. W. Shea
DN: cn=J. W. Shea, o=Tennessee Valley Authority, ou=Nuclear Licensing, email=jwshea@tva.gov, c=US
Date: 2015.08.12 12:46:10 -04'00'

J. W. Shea
Vice President, Nuclear Licensing

Enclosures: 1. Watts Bar Unit 2 Readiness Assessment Report
2. Watts Bar Unit 2 Key Activities Remaining Open

cc (Enclosures):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant, Unit 1
NRC Senior Resident Inspector – Watts Bar Nuclear Plant, Unit 2
NRC Director, Office of Nuclear Reactor Regulation
NRC Director, Division of Operating Reactor Licensing, NRR
NRC Project Manager – Watts Bar Nuclear Plant, Unit 1
NRC Project Manager – Watts Bar Nuclear Plant, Unit 2

ENCLOSURE 1

Watts Bar Unit 2 Readiness Assessment Report

Enclosure 1

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 2

READINESS ASSESSMENT REPORT

The Watts Bar Unit 2 Construction Completion Project is substantially complete. TVA considers substantial completion to be the point in a construction project at which WBN Unit 2 Construction turns over a substantial number of plant structures, systems, and components to Preoperational Startup Engineering for testing. The three attachments to this enclosure correspond, and are submitted in response, to the requirements of 10 CFR 50.57(a)(1), 10 CFR 50.57(a)(2) and 10 CFR 50.57(a)(3), respectively. These attachments include an overview of the activities that have been accomplished at WBN Unit 2, which support each requirement, as well as the forecast for remaining activities based on the best available information at the time of this submittal.

Kevin T. Walsh, Site Vice President
Watts Bar Nuclear Plant

Attachment A1

Construction and Completion Status

This attachment discusses the programs and processes implemented by Tennessee Valley Authority (TVA) to assure construction completion at WBN Unit 2 in accordance with the plant's design and licensing bases, as well as to accomplish system turnover. It also describes the status of construction at WBN Unit 2, which is substantially complete.

References:

[A1-1] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Reactivation of Construction Activities," dated August 3, 2007

[A1-2] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Key Assumptions for the Possible Completion of Construction Activities," dated April 3, 2007

[A1-3] NRC Staff Requirements Memorandum SECY-07-0096, dated July 25, 2007, Possible Reactivation of Construction and Licensing Activities for the Watts Bar Nuclear Plant Unit 2

1. BACKGROUND

By way of background, the WBN facility is located in Rhea County, which is in southeastern Tennessee, approximately 50 miles northeast of Chattanooga. The facility is owned and operated by TVA. The plant has two Westinghouse-designed pressurized-water reactors. WBN Unit 2 was in deferred status, but by letter dated August 3, 2007, TVA informed the U.S. Nuclear Regulatory Commission (NRC) of its plan to reactivate and complete construction activities at WBN Unit 2 under the existing construction permit issued pursuant to Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," of the *Code of Federal Regulations* (10 CFR Part 50) (Reference [A1-1]).

As set forth in TVA's April 3, 2007 letter, two key regulatory assumptions have governed the completion of construction activities at WBN Unit 2 (Reference [A1-2]). First, the project would proceed under the existing 10 CFR Part 50 construction permit and the largely completed and well-documented operating license review framework. Second, TVA also would rely on the docket record that supports WBN Unit 2, as well as the Unit 1 licensing basis, to close out any remaining construction issues for WBN Unit 2. In a 2007 Staff Requirements Memorandum, the Commission endorsed this approach and a licensing review that employs the current licensing basis for WBN Unit 1 as the reference basis for the review and licensing of WBN Unit 2 (Reference [A1-3]).

After the TVA Board approved the WBN Unit 2 completion project in August 2007, completion activities began in October 2007. TVA entered into an Engineering, Procurement and Construction (EPC) contract with Bechtel Power Company (Bechtel). With this contract, Bechtel was tasked with the overall project under its own Quality Assurance Program and TVA would be in an oversight role.

2. PROGRAM AND PROCESS OVERVIEW

TVA considers substantial completion to be the point in the construction project at which WBN Unit 2 Construction turns over a substantial number of plant structures, systems, and components to Preoperational Startup Engineering (PSE) for testing. TVA has implemented several programs and processes at WBN Unit 2 governing completion of construction and turnover to PSE. Chief among them is the Turnover Process, governed by Startup Manual Procedure 4.0 (SMP-4.0).

In summary, the Turnover Process:

- Verifies an acceptable level of construction completion to support flushing and testing activities;
- Identifies and documents any outstanding items required for satisfactory completion of the system, subsystem, or component turnover;
- Documents the turnover and acceptance of systems, subsystems, or components from WBN Unit 2 Construction to PSE; and
- Transfers ownership, care, custody and jurisdictional control to PSE. It is at this point that TVA takes ownership of the system, subsystem, or component, and at which its construction is substantially complete.

In addition, Procedure NC-PP-37 (System Turnover to Operations) defines the process for turning over systems from PSE to WBN Operations. This process turns over functionally complete systems and components from PSE to WBN Operations.

Finally, WBN Operations prepares for operational readiness in accordance with the process in 0-TI-441 (Operational Readiness Process for Unit 2 Systems) and brings the systems to Technical Specification Operability with the process in ODM-39, Operations Process of Ensuring U-2 Systems Are Operable For Fuel Load.

3. STATUS OF WBN UNIT 2 CONSTRUCTION AND SYSTEM TURNOVER

As of August 12, 2015, construction has been substantially completed at WBN Unit 2 as the vast majority (78 systems) of the 87 Unit 2 systems have been turned over per the SMP-4 process from WBN Unit 2 Construction to PSE. Of these 78 systems, 28 have been turned over from PSE to WBN Operations per the NC-PP-37 process. Thus, 9 systems remain to be turned over from WBN Unit 2 Construction to PSE.

As a final note, applicable WBN Unit 2 systems required for safe operation will undergo verification for Technical Specification operability in accordance with ODM-39 on a schedule consistent with entry into applicable operational modes.

Attachment A1
Construction and Completion Status

Marcia A. Cooper, Project Director
Watts Bar Nuclear Unit 2

Aaron P. Melda, Executive Director
Watts Bar Nuclear Unit 2 Completion

Attachment A2
Design Basis Verification

This attachment discusses the programs and processes implemented by TVA to verify that WBN Unit 2 structures, systems and components (SSCs) have been constructed in accordance with the design and licensing bases. The activities that have been completed include a Design Baseline Verification Program (DBVP) Corrective Action Program (CAP), conduct of an Independent Design Inspection (IDI), and self-assessments. Additionally, other activities are ongoing, such as implementation of configuration management processes, Quality Assurance oversight, and the implementation of rigorous processes for the turnover of systems and WBN Unit 2 areas from the construction organization to the startup and operations organizations. Combined, completion of these activities will provide confidence that WBN Unit 2 will complete construction in accordance with the design and licensing bases. The NRC staff's Supplemental Safety Evaluation Reports reflect that the DVBP CAP is resolved. In addition, numerous NRC Inspection Reports discuss DBVP implementation and state that the DBVP CAP is closed.

References:

[A2-1] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) – Units 1 and 2 – Final Safety Analysis Report Amendment 91," dated October 24, 1995

[A2-2] NUREG 0847, "Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant Units 1 and 2, Docket Nos. 50-390 and 50-391," Supplement 19, dated November 1995

[A2-3] NUREG 0847, "Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant Units 1 and 2, Docket Nos. 50-390 and 50-391," Supplement 20, dated February 1996

[A2-4] NRC letter to TVA, "Request for Information Pursuant to 10 CFR 50.54(f) Regarding Adequacy and Availability of Design Bases Information" dated October 9, 1996

[A2-5] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Key Assumptions for the Possible Completion of Construction Activities," dated April 3, 2007

[A2-6] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2," dated January 29, 2008

[A2-7] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Units 1 and 2 - Final Safety Analysis Report Amendment 91," dated July 2, 2008

[A2-8] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Final Safety Analysis Report (FSAR), Amendment 92," dated December 18, 2008

[A2-9] NUREG 0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2, Docket 50-391," Supplement 21, dated February 2009

[A2-10] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Operating License Application Update," dated March 4, 2009

[A2-11] NRC (Region II) letter to TVA, "Watts Bar Nuclear Plant Unit 2 Construction - NRC Integrated Inspection Report 05000391/2010605," dated February 9, 2011

[A2-12] NRC (Region II) letter to TVA, "Watts Bar Nuclear Plant Unit 2 Construction - NRC Inspection Report 05000391/2011606," dated May 13, 2011

[A2-13] NRC (Region II) letter to TVA, "Watts Bar Nuclear Plant Unit 2 Construction - NRC Integrated Inspection Report 05000391/2014605," dated August 13, 2014

1. DESIGN BASELINE VERIFICATION PROGRAM (DBVP)

1.a Establishing the DBVP

The WBN Unit 2 DBVP CAP was established when construction resumed to facilitate the completion of WBN Unit 2 construction. The WBN Unit 2 DBVP CAP used the WBN Unit 1 DBVP approach to design basis verification. Its purpose is to ensure that the WBN Unit 2 licensing and design basis documentation is accurate, retrievable, and consistent with the as-installed plant configuration. The DBVP, combined with WBN Unit 2 Construction and TVA processes described below, ensure maintenance of the design basis and licensing basis during construction, system turnover, preoperational testing, and operation of WBN Unit 2 SSCs.

In a letter dated January 29, 2008 (Reference [A2-6]), TVA committed to implementation of the WBN Unit 2 DBVP CAP following the WBN Unit 1 approach, which NRC accepted in Supplemental Safety Evaluation Report (SSER) 19 (Reference [A2-2]). The WBN Unit 2 DBVP recognized the objectives and procedural improvements established by the WBN Unit 1 DBVP.

The scope of the WBN Unit 2 DBVP, consistent with that used for WBN Unit 1 DBVP, was as follows:

Licensing Verification – Ensure that commitments to the NRC are captured in the appropriate controlling document and establish procedures to maintain compatibility between commitments and controlling documents.

Design Basis – Ensure design basis documents contain or reference appropriate engineering requirements including design basis commitments, and establish procedures and programs to maintain consistency with plant changes, technical requirements, and licensing commitments.

Configuration Control – Establish and maintain a design change control system which ensures that appropriate Configuration Control Drawings (CCDs) have been developed and verifies that the functional configuration of systems that mitigate design basis events are consistent with the CCDs.

Calculations – Identify required calculation type, and ensure appropriate calculations exist, which are retrievable, technically adequate, and consistent with safety-related design, with revision regeneration as required. Also initiates a process by which calculations are tracked in order to ensure consistency with plant design changes.

As discussed below, the DBVP CAP has been closed by TVA and accepted by the NRC, subject to a final inspection.

1.b Implementation of the DBVP

This section describes how TVA implemented the WBN Unit 2 DBVP during the WBN Unit 2 construction completion program.

Licensing Verification

The *Licensing Verification* activity within the DBVP consisted of verification that docketed WBN commitments associated with design, construction, operations, maintenance, and inspection were appropriately identified and captured in the following types of documents.

- WBN Unit 2 Final Safety Analysis Report (FSAR)
- NRC Safety Evaluation Report (SER) and Supplements
- 10 CFR 50.55(e) Final Reports
- Responses to NRC regarding:
  - Violations/Deviations
  - Bulletins and Circulars
  - Generic Letters
  - Confirmatory Action Letters
  - Show Cause Letters
- Correspondence referenced in the SER Supplements

NUREG 0847, Supplement 20 (SSER 20) (Reference [A2-3]), was issued by the NRC to support issuance of the full power operating license for WBN Unit 1. The staff, in SSER 20, documented its review of the WBN FSAR up to Amendment 91 (A91) submitted on October 24, 1995 (Reference [A2-1]). In Supplements 1 through 20 to the SER, the NRC staff concluded that WBN Unit 1 met all applicable regulations and regulatory guidance. FSAR A91, which applied to both Units 1 and 2, was the licensing basis for WBN Unit 1. (For the purposes of the WBN Unit 2 DBVP, A91 was also taken as the original licensing basis for WBN Unit 2.)

TVA's letter dated July 2, 2008 (Reference [A2-7]) resubmitted A91 in electronic format including the full FSAR with sensitive information and a redacted version for public release. The purpose of the resubmittal was to establish a licensing baseline to assist in the licensing process for completion of construction and licensing activities for WBN Unit 2.

In a letter dated December 18, 2008 (Reference [A2-8]), TVA transmitted WBN Unit 2 FSAR Amendment 92 (A92) to the NRC. A92 incorporated changes to A91, the focus of which was to incorporate both administrative changes and significant changes to "common systems" that had occurred since WBN FSAR A91 was submitted in October 1995. The administrative changes incorporated in this amendment included changes resulting from the re-verification of the WBN Unit 1 Updated FSAR (UFSAR) in response to NRC's October 9, 1996, 10 CFR 50.54(f) request for information regarding the adequacy, availability, and control of design bases information (Reference [A2-4]), as well as changes to common systems made in accordance with 10 CFR 50.59 and documented through Amendment 6 of the WBN Unit 1 UFSAR in accordance with 10 CFR 50.71(e).

Attachment A2
Design Basis Verification

By letter dated March 4, 2009 (Reference [A2-10]), TVA submitted an updated application in support of its request for an operating license for WBN Unit 2. As part of this updated operating license application, TVA separated the FSAR Amendment 91 for WBN Units 1 and 2. TVA has subsequently submitted WBN Unit 2 FSAR Amendments 92 through 113 to address the "open" topics in support of its operating license application for WBN Unit 2. These FSAR amendments reflect changes that have occurred at WBN since 1995. Amendment 114 is planned for submittal immediately prior to issuance of the WBN Unit 2 operating license with any last minute edits. WBN Unit 1 UFSAR changes since Amendment 6 have been incorporated, as appropriate, in amendments to the WBN Unit 2 FSAR.

A WBN Unit 2 Construction procedure (25402-3DP-G04G-00081, Engineering Document Construction Release (EDCRs)) defines the work process for the preparation, review, approval, issuance, management, and control of the engineering-related deliverables needed for installing permanent equipment and materials or in support of temporary construction activities.

The EDCR process controls design changes to WBN Unit 2 SSCs during construction completion to ensure that the licensing basis in the FSAR and responses to NRC reflect the WBN Unit 2 configuration. TVA processes ensure that NRC commitments are captured and provide for validation of the licensing basis as reflected in WBN Unit 2 Technical Specifications, FSAR, SER and responses to NRC violations, deviations and generic letters. The TVA processes and procedures include fleet-wide procedures that address managing commitments and licensing documents and procedures specifically related to WBN Unit 2 and its licensing basis:

- NRC Commitment Management (NPG-SPP-03.3)
- Watts Bar Unit 2 Licensing Basis Preservation (NGDC PP-20)
- Watts Bar Unit 2 Closure of Commitments/Open Items Required for Licensing (NGDC PP-19)
- Administration of Site Technical Procedures (NPG-SPP-01.2)
- Administration of Standard Programs & Processes (SPPs); and Standard Department Procedures (SDPs) (NPG-SPP-01.1)
- Technical Specifications/Licenses and Amendments (NPG-SPP-03.12)
- FSAR Management (NPG-SPP-03.15)
- Watts Bar Unit 2 Changes to Final Safety Analysis Report, Technical Specifications, TS Bases, and/or Technical Requirements Manual (NC PP-10)
- Watts Bar Unit 1 and Common Plant Modifications and Engineering Change Control (NPG-SPP-09.3)

The adoption of the processes and procedures described above has helped to ensure that regulatory commitments have been and continue to be appropriately captured in the relevant licensing documents.

Design Basis

The *Design Basis* activity within the DBVP included evaluation of the adequacy of existing WBN design criteria and system descriptions. The existing criteria were revised and new criteria were issued as necessary to ensure that the design basis for WBN was adequately addressed in the appropriate design criteria and system description documents and were in accordance with licensing commitments and design requirements.

Design Criteria Documents (DCDs) are considered design input documents. Prior to the WBN Unit 2 construction completion project, the WBN DCDs were applicable to WBN Unit 1 and Unit 0 (common) components. The WBN Unit 1 design criteria have been and continue to be revised to incorporate the WBN Unit 2 design as the WBN Unit 2 completion project progresses. This ensures that the same quality and standards used in WBN Unit 1 documents are incorporated in the WBN Unit 2 design, supplemented as necessary with new standards that apply to any newer equipment installed in WBN Unit 2.

The WBN Unit 1 System Description Documents (SDDs) were copied to produce the WBN Unit 2 SDDs at the conclusion of the WBN Unit 1 Cycle 8 (U1 C8) refueling outage. This ensures that the same quality and standards used in the WBN Unit 1 documents are incorporated in the WBN Unit 2 SDDs. Prior to the WBN Unit 2 completion project, the WBN SDDs were applicable to WBN Unit 1 and Unit 0 (common) components. As the project progresses, the WBN Unit 2 design is being validated and rolled into the WBN Unit 2 SDDs.

The WBN Unit 1 information, in conjunction with the updated information from the WBN Unit 2 completion project, is confirmed following the validation of the WBN Unit 2 system description segments (figures, references, sections or tables) requiring a WBN Unit 2 applicability review. This task is completed as part of the process controlling turnover of WBN Unit 2 systems from the Startup organization to the plant Operation organization. At this point the WBN Unit 2 system description is combined with the WBN Unit 1 system description and reissued as a Unit 0, 1, and 2 document.

WBN Unit 2 Construction procedures provide for design basis development, preparation of Design Basis Documents (DBDs), SSDs and essential calculations during completion of construction. These include:

- Watts Bar Unit 2 Engineering Department Procedure Design Criteria Documents (25402-3DP-G04G-00001)
- Watts Bar Unit 2 Engineering Department Procedure System Description Documents (25402-3DP-G04G-00504)
- Engineering Department Procedure Design Calculations (25402-3DP-G04G-00037)

TVA processes provide for design basis development, maintenance of DBDs and essential calculations following turnover of systems to TVA, as implemented through the following procedures:

- Engineering (NPG-SPP-09.0)
- Design Basis/Design Input Control (NEDP-1)
- Design Output (NEDP-10)
- Plant Modifications and Engineering Change Control (NPG-SPP-09.3)
- Watts Bar Unit 2 PTI Test Deficiency Notices (SMP-14.0)
- NPG Standard Department Procedure Design Calculation Process Control (NEDP-2)

These processes and procedures have ensured that design basis documents address applicable engineering requirements and remain consistent with plant changes, technical requirements, and licensing commitments.

Configuration Control

The *Configuration Control* activity within the DBVP included the existing WBN Unit 1 design change control processes, which will be utilized for subsequent plant changes. The purpose of this activity is to establish and maintain a design change control system which ensures that appropriate Configuration Control Drawings (CCDs) have been developed and verifies that the functional configuration of systems that mitigate design basis events are consistent with the CCDs. CCDs are being developed for the following categories of safety-related control room drawings.

- Flow Diagrams
- Electrical Single Lines
- Control Diagrams
- Schematics
- Logic Diagrams

For the portions of plant systems required to mitigate design basis events, assurance that the plant functional configuration agrees with the CCDs is provided through walkdowns, component testing, preoperational testing, or other evaluations.

During the WBN Unit 2 completion project, configuration control has been maintained in accordance with WBN Unit 2 Construction and TVA processes. WBN Unit 2 CCDs were primarily governed by TVA Procedure NEDP-3, Drawing Control, and Bechtel Procedure 25402-3DP-G04G-00046, Engineering Drawings. NEDP-3 establishes requirements and methods for preparation, revision, review, approval, and issuance of engineering drawings and Drawing Change Authorizations (DCAs), while 25402-3DP-G04G-00046 defines the requirements for preparation, review, approval and control of engineering drawings and Drawing Revision Authorizations (DRAs). Project Procedure PP-27, Engineering Drawings, effectively combines both procedures for the WBN Unit 2 completion project.

Walkdowns were performed to verify that systems conformed to their respective drawings. The CCDs were updated with notes and clear identification as to what state a component was in if it was not fully present and complete. Where construction actions specific to WBN Unit 2 were needed to address walkdown results, EDCRs were prepared in accordance with Construction procedure 25402-3DP-G04G-00081. Where action was needed on components serving both units, Design Change Notices (DCNs) were issued in accordance with NPG-SPP-09.3.

The EDCRs generated DRAs for WBN Unit 2-specific SSCs and DCNs issued DCAs for common SSCs required to support both WBN Unit 1 and Unit 2 power generation. Following field work completion, the corresponding DRAs and DCAs were incorporated onto their respective CCDs. The drawing changes were tagged to connect each DRA/DCA to the affected component. These CCDs had the tags removed as each affected component was procured and installed. When a CCD no longer had tags on components and the system was physically complete, these drawings became the final drawings.

WBN Unit 2 CCDs are retained in the TVA Business Support Library in the same manner as WBN Unit 1 drawings. This ensures the WBN Unit 2 CCDs are maintained with the same quality standards applicable to all TVA licensed nuclear plants.

The final configuration of the CCDs is validated via walkdowns and pre-operational testing of plant systems and components. This methodology, along with utilizing the WBN Unit 1 CCDs for comparison purposes, further ensures that the WBN Unit 2 design is consistent with the WBN Unit 1 design. The walkdown validations are completed prior to turning over each system to Operations.

System turnover from WBN Unit 2 Construction to TVA Preoperational Startup Engineering (PSE) is governed by SMP-4.0, Watts Bar Nuclear Plant Unit 2 System Completion and Turnover, and turnover from PSE to Operations is governed by NC-PP-37, System Turnover to Operations, both of which direct actions to verify configuration control actions are completed, as appropriate:

- SMP-4.0 Appendix F is used by the Bechtel Engineering Manager to evaluate the applicable system for readiness for turnover from a design standpoint. The objective is to ensure all design documentation that provides the as-built status and defines the expected function and performance has been completed and is available for use in testing, and to ensure that there are no outstanding ongoing engineering items that may result in changes to the system. The Appendix F signoff sheet and process confirms the following:
    - System flow, control, schematic drawings and other drawings requested by PSE for testing have been updated and issued.
    - Applicable system and design criteria have been issued.
    - Test scoping document(s) (as applicable) have been issued for the system.

- EDCRs/DCNs coded against the system have been closed or have been reviewed and determined to be acceptable for turnover.
- Essential Calculations have been issued for the system, including identification of unverified assumptions.
- CAPs/Special Programs have been reviewed and no remaining work or analysis remains for the system.
- Review of Engineering PERs and Engineering owned actions with no expected impact to the system.
- All identified commodity clearance issues have been resolved or identified and dispositioned to be acceptable for turnover.
- The Integrated Cable Routing and Raceway Design System (ICRDS) has no items impacting the turnover.
- Review of WBN2 Integrated Task Equipment List (WITEL) exceptions have no impacts identified for the turnover.
- Master Equipment List (MEL) updates completed to support turnover.
- Verify PSE-identified Vendor Manuals are issued.
- N-5 Code data report completed for the system, if applicable.
- Review of outstanding WBN Unit 1/Unit 2 interface issues.
- List of engineered temporary configurations provided to PSE.
- System isometrics, spring can drawings, snubber drawings and other support drawings in all buildings requested by PSE for testing (to show cold load settings and locations) have been updated and issued for testing.

- NC-PP-37 Attachment 2 provides a checklist of critical review attributes to be validated prior to system turnover from PSE to Operations and an index of CCDs required to support operation of the system boundary, including:

  - Revision and issuance of Critical and Primary drawings.
  - Verification of the MEL for all applicable data fields and switching of status for those UNIDs (components) that are ready to be switched to “operating”.
  - For ASME Section III, Division 1 Code piping systems, the applicable N-5 Code Data Report has been reviewed and approved and the ASME nameplates have been stamped and installed.
  - For the Reactor Coolant System, the N-1 and NPV-1 Code Data Reports have been reviewed and approved for the Reactor Coolant Pumps, Steam Generators, Pressurizer, and Reactor Vessel.
  - Construction and maintenance items affecting the turnover boundary have been confirmed complete and associated work documents closed.
  - Exceptions taken in SMP-4.0 and breakage rework from startup testing have been resolved or tracked.
  - Related WITEL actions have been confirmed complete, have been assessed for applicability to the system turnover boundary and determined to have no impact or are controlled by approved deferrals to be completed after system turnover.
  - Any special operating conditions or limitations have been documented and approved by the Operations manager.

  - Providing a Drawing Index for the system.

- NC-PP-37 Attachment 3 provides for a listing of test instructions performed with Test Deficiency Notices (TDNs) and their resolution methodology. Applicable results and dispositions of TDNs are reviewed by the Joint Test Group (JTG). This attachment also serves to confirm completion or approved deferral of WITEL and/or MAXIMO actions directly associated with the system boundary.

- NC-PP-37 Attachment 5 provides the confirmation of design basis completion. WBN Unit 2 Engineering completes Attachment 5 affirming design completion of the associated system. EDCRs are confirmed closed or partially closed with an exception allowed where multi-system EDCRs are involved. Attachment 5 documents the following:

  - Essential calculations required to support system operation have been issued with all unverified assumptions removed and any calculation special limiting conditions transmitted to Operations in Design Output Documents.
  - WBN Unit 2 Design Criteria and/or System Descriptions have been developed.
  - Corrective Actions (PERs) and/or WITEL items generated after completion of SMP- 4.0 affecting system design have been closed/archived.
  - WBN Unit 1 UFSAR/Unit 2 FSAR Change Packages have been issued to Licensing for any ready-for-turnover or closed DCNs impacting SAR text, tables, or figures.
  - Impacted Vendor Manuals have been revised and/or issued.
  - DCNs or DCN stages affecting the system boundary have been closed.
  - EDCRs are confirmed closed or partially closed as necessary for the system boundary and any remaining open multi-system EDCRs listed.

The processes governing Configuration Control establish and maintain a design change control system which ensures that CCDs have been developed and verifies through walkdowns and testing that the functional configuration of systems that mitigate design basis events are consistent with the CCDs.

Calculations

The DBVP *Calculations* activity identifies required calculation types and ensures appropriate calculations exist, are retrievable, technically adequate, and consistent with safety-related design, with revision regeneration as required. Calculations encompassed by this activity are those calculations that are necessary to establish or support the WBN Unit 2 operation and common safety-related plant systems or design features necessary to ensure:

- The integrity of the reactor coolant pressure boundary,
- The capability to shut down the reactor and maintain it in a safe shutdown condition, or
- The capability to prevent or mitigate the consequences of an accident which could result in potential off site exposures comparable to those specified in 10 CFR 100.

These criteria were used in the review of design calculations to determine which calculations were within the scope of the DBVP *Calculations* activity.

The scope of the DBVP *Calculation* activity also encompassed certain calculations necessary to establish or support plant features that must either:

- Retain adequate structural integrity because its failure could jeopardize to an unacceptable extent the achievement of a primary safety function or because it forms an interface between seismic category I and non-seismic category I plant features, or
- Perform a function that is not a primary safety function, but whose failure or unwanted action could jeopardize to an unacceptable extent the achievement of a primary safety function.

The following are examples of other calculations required by federal regulations and thus are included in the DBVP scope:

- 10 CFR 50.49, Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants
- 10 CFR 50.62, Requirements for Reduction of Risk from Anticipated Transients without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants
- 10 CFR 50.63, Loss of All Alternating Current Power
- 10 CFR 50 Appendix A; General Design Criteria 5, Sharing of Structures, Systems, and Components
- 10 CFR 50 Appendix A; General Design Criteria 19, Control Room
- 10 CFR 50 Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979
- 10 CFR 100, Reactor Site Criteria

Equipment vendor calculations were prepared under a vendor quality assurance program and therefore were not covered by the DBVP *Calculations* activity. Vendors used by TVA are subject to audit or other verification, by TVA or the Nuclear Procurement Issues Committee, to ensure that they maintain a QA program in compliance with 10 CFR Part 50, Appendix B requirements.

The WBN Unit 2 completion project uses current WBN Unit 1 procedures, databases, templates, design basis documents, specifications, calculations, design standards, and drawings to the fullest extent practical so as to implement the same technical approach for WBN Unit 2 completion. Where possible, WBN Unit 2 analyses were performed by revising corresponding WBN Unit 1 calculations to address WBN Unit 2 applicability. Consequently, the quality standards developed during the WBN Unit 1 DBVP are inherently incorporated in the WBN Unit 2 analyses. In other cases where WBN Unit 2 specific calculations were required, Bechtel procedure 25402-3DP-G04G-00037, Design Calculations, was used. Procedure 25402-3DP-G04G-00037 mimics the TVA procedure NPG-NEDP-2, Design Calculation Process Control.

System turnover from WBN Unit 2 Construction to PSE and from PSE to Operations, governed by SMP-4.0 and NC-PP-37, respectively, includes verification that calculations are appropriately completed, as discussed above related to Configuration Control.

The processes described above, including system turnover requirements and other procedures governing design calculations, have ensured that required calculations exist and are retrievable, technically adequate, and consistent with safety-related design.

1.c Closure of the DBVP CAP

NUREG-0847 SSER 19 (Reference [A2-2]) reflected that the WBN Unit 1 DBVP CAP was complete. SSER 21 (Reference [A2-9]), Section 1.13.1, indicates that the WBN Unit 2 DBVP CAP is resolved.

NRC Inspection Report 05000391/2010605 (Reference [A2-11]) discusses observation of the IDI (called “Independent Design Review – IDR” in the Inspection Report), concluding that the IDI/IDR was a competent and substantial engineering review activity with appropriate results.

NRC Inspection Report 05000391/2011606 (Reference [A2-12]) also discusses the IDI, review of PERs written as a result of the IDI and results of NRC inspection of additional aspects not covered by the IDI team. The inspectors confirmed that findings of the IDI had been acceptably addressed and concluded, “the findings and conclusions of TVA's IDI that regulatory requirements have been appropriately addressed for the Residual Heat Removal (RHR) system appear satisfactory.”

Inspection Report 2011606 also reported the results of an NRC Independent Design Verification Program (IDVP) review to determine if the design process used for the facility effectively implemented NRC regulations and TVA’s licensing design commitments. The IDVP focused on the Essential Raw Cooling Water (ERCW) system and High Head Safety Injection (HSSI) system. The IDVP resulted in no findings of significance.

TVA tracked the commitment to close the DBVP CAP as Commitment Number 111032068, corresponding to NRC (Region II) Inspection Planning and Scheduling (IP&S) items 005 and 323. Documentation of activities related to this commitment was developed in October 2014 in accordance with NC PP-19, Closure of Commitments/Open Items Required for Licensing. TVA internally closed this commitment based on the following:

- Completion of the IDI in 2010;
- Self-assessment 25402-SA-ENG-11-008 in June and July 2011;
- A partial closure report in August 2011;
- Implementation of the procedures and programs for maintenance of design and licensing bases during construction (discussed above);

- Implementation of processes and controls for turnover of SSCs from Construction to Pre-operational Startup Engineering (PSE) and from PSE to Operations (discussed above).

NRC Inspection Report 05000391/2014605 (Reference [A2-13]) closed the DBVP CAP pending the results of a Final Corrective Action Program/Special Program Inspection. This inspection report also closed the inspection item for the IDI.

2. INDEPENDENT DESIGN INSPECTION

In September and October 2010, a TVA team performed an independent design inspection of the RHR system and the Component Cooling System (CCS – a system shared with WBN Unit 1) based on the applicable guidance in NRC Inspection Manual Chapters MC 2530, Integrated Design Inspection Program, and MC 2535, Design Verification Programs. In addition, the following systems were partially reviewed in conjunction with interfaces or support to the RHR or CCS: HVAC, Control Air, Chemical Volume Control System (CVCS), Safety Injection System (SIS), containment isolation, Digital Control and Electrical systems.

The IDI team comprised members who were independent of the WBN Unit 2 organization and who were not providing day-to-day input to the organization within the area assigned for review. Most team members were staff from the TVA Bellefonte engineering staff, with a representative from the Institute for Nuclear Power Operations (INPO). The review activities included an NRC observer.

The IDI team approached the review by selecting Probabilistic Risk Assessment (PRA) risk-significant components as the starting point for the design review, as well as reviewing the overall design process and procedures, calculations, drawings, EDCRs and DCNs, the interface with the Nuclear Steam Supply System (NSSS) (Westinghouse) and AE (Bechtel) safety analysis inputs, licensing commitments and FSAR requirements, and upper tier design documents (including the relation to TVA Nuclear Power Group standards and processes). In addition, training and qualifications of design personnel were reviewed, the procedural interface with design and engineering programs such as Equipment Qualification (EQ), Generic Letter 89-10 (Safety Related Motor-Operated Valve Testing and Surveillance) and Appendix R, the status of historical open items, applicable requirements to the DBVP CAP, design input to the Refurbishment program, and the applicable use of self-assessments and operating experience in the design process. (It should be noted that a complete review of some programs could not be completed due to the completion status of the particular engineering program.)

In summary, the team concluded that the design process, methodologies, technical adequacy and qualifications of personnel effectively implements TVA design requirements and satisfies NRC regulations. Problem evaluation reports initiated during the IDI team review for the above issues have been closed. Corrective actions identified during the IDI have been completed and implemented at WBN Unit 2. The IDI provided assurance that the WBN Unit 2 was being constructed in accordance with the design and licensing basis.

3. SELF ASSESSMENTS

3.a Self Assessment of DBVP CAP

A snapshot self-assessment (25402-SA-ENG-11-008) of the DBVP CAP was conducted in June and July 2011. The purpose of this Self-Assessment was to confirm that the CAP complied with regulatory commitments and to determine if the DBVP CAP was ready for closure. The self-assessment involved a review and comparison of the DBVP Implementation Plan, FSAR impacts, Quality Surveillance Reports, System Description Documents (SDDs), Design Criteria Documents (DCDs), Configuration Control Procedures, Corrective Action Tracking Documents, Problem Evaluation Reports (PERs), and Historical Document Reviews.

Calculations – The team sampled calculations for mechanical design, the GL 89-10 Program (MOV testing and surveillance), electrical design, and Instrumentation and Controls (I&C) design. Civil design calculations were assessed by reviewing evaluation results from two Quality Surveillance Reports. The review did not identify any discrepancies in these areas.

Licensing Verification – The team confirmed that regulatory requirements were appropriately addressed and implemented in the WBN Unit 2 Technical Specifications and associated Bases, the Final Safety Analysis Report (FSAR), the Technical Requirements Manual, and System Descriptions for the Component Cooling System and Residual Heat Removal System.

A review of NUREG-0800 Section 5.4.7, Residual Heat Removal (RHR) System, and Section 9.2.2, Reactor Auxiliary Cooling Water System, concluded that regulatory requirements for the RHR System and Component Cooling System have been appropriately addressed and translated into WBN Unit 2 licensing and design documents and these systems meet the applicable requirements and GDCs.

The team confirmed that Bechtel and TVA procedures were being applied in the maintenance of the licensing commitments and verification of the design basis; design change evaluations and completion of engineering and construction are addressed in the procedures related to WBN Unit 2 construction completion, system turnover and testing (discussed below).

Self Assessment LIC-2010-001 evaluated the effectiveness of the Licensing Basis Preservation Program as defined in PP-20, "Licensing Basis Preservation". The self-assessment determined the use of "Attachment J" as specified in the EDCR procedure has been effective in identifying whether the approved licensing basis has been impacted by the WBN Unit 2 construction completion effort.

Review of Quality Surveillances and Procedural Controls – The team reviewed twenty-one Surveillance Reports and twenty-eight procedures related to the DVBP, which showed that the WBN Unit 2 completion project is utilizing current WBN Unit 1 procedures, databases, templates, design basis documents, specifications, calculations, design standards, and drawings to the fullest extent practical so as to implement the same technical approach for WBN Unit 2 completion.

Review of Corrective Action Tracking Documents (CATDs), PERs and Historical Document Reviews (HDRs) associated with DBVP – The team conducted a search of the WBN U2 Integrated Task Equipment List (WITEL) database and identified 24 CATDs (all historical document reviews) associated with the DBVP. Word searches of the PER database were initiated for words or phrases for "DBVP," "design baseline," "verification program," and "design" for the period of October 1, 2007 to June 9, 2011. These reviews resulted in the generation of two potential trend PERs related to unclear procedure requirements. These PERs have been closed. The reviews did not identify any significant problems within the design basis verification program.

In connection with the WBN Unit 2 completion project, a process was established to conduct historical document reviews to ensure that issues resolved for WBN Unit 1 were adequately addressed for WBN Unit 2. HDRs are identified, tracked and resolved in accordance with Bechtel procedure 25402-3DP-G04G-00501, Historical Document Review Process. The self-assessment developed a list of HDRs (provided as Attachment 3 to the self-assessment) and confirmed they were being processed according to the procedure.

System Description Documents (SDDs) and Design Control Documents (DCDs) – DCDs are considered design input documents and SDDs are design output documents. Pending completion of the WBN Unit 2 completion project, DCDs and SDDs were controlled in accordance with Construction (Bechtel) procedures, and following system turnover in accordance with TVA procedures. The self-assessment information was used to develop the description of SDDs and DCDs that was used to document closure of the DBVP CAP, as well as the description used to document closure of the DBVP CAP.

There are no open items remaining regarding the self-assessment. The self-assessment determined that WBN Unit 2 is being constructing in accordance with the design and licensing bases.

3.b System Completion Review Audit

In March 2015, WBN Unit 2 Quality Assurance began a system completion review under the TVA audit program as QA Audit NC1501. The purpose of the review is to assess completion activities for the WBN Unit 2 RHRS by conducting a performance-based vertical slice audit of the RHRS. Successful completion of this audit will indicate that WBN Unit 2 was constructed in accordance with the design and licensing basis. The audit report is not final, but the preliminary results did not yield any issues that would undermine the design basis verification program.

In summary, TVA has implemented a number of programs and procedures to verify that WBN Unit 2 SSCs have been constructed in accordance with the design and licensing bases. The activities that have been completed include the DBVP CAP, an independent design inspection, and self-assessments, each of which supports the conclusion that WBN Unit 2 has been constructed in accordance with its design and licensing bases.

Attachment A2
Design Basis Verification

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Attachment A3

Refurbishment and Qualification Programs

Construction of WBN Unit 2 began over forty years ago and many of the structures, systems, and components (SSCs) at WBN Unit 2 were delivered and installed prior to suspension of Unit 2 construction in 1985. To ensure that safety-related and quality-related SSCs are still capable of meeting their required design specifications, TVA has implemented a refurbishment program, as well as equipment qualification programs. This attachment describes those programs.

References:

[A3-1] NUREG-1232, Volume 4, "Safety Evaluation Report on Tennessee Valley Authority: Watts Bar Nuclear Performance Plan," January 1990

[A3-2] TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2 and 3, Sequoyah Nuclear Plant (SQN) Units 1 and 2, and Watts Bar Nuclear Plant (WBN) - Nuclear Regulatory Commission (NRC) Generic Letter (GL) 2007-01: Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients – 90 Day Response," dated May 4, 2007

[A3-3] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 – Initial Responses to Bulletins and Generic Letters," dated September 7, 2007

[A3-4] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 – Corrective Action and Special Programs, and Unresolved Safety Issues," dated September 26, 2008

[A3-5] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2," dated January 29, 2008

[A3-6] TVA letter to NRC, "Watts Bar Nuclear Plant, Unit 2 Regulatory Framework for the Completion of Construction and Licensing for Unit 2 - Revision 1," dated June 16, 2008

[A3-7] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Licensing Basis Preservation and Construction Refurbishment Program for Structures, Systems and Components (SSCs)," dated December 9, 2008

[A3-8] TVA letter to NRC "Watts Bar Nuclear Plant (WBN) – Unit 2 – Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 – Corrective Action and Special Programs, and Unresolved Safety Issues," dated September 26, 2008

[A3-9] NUREG-0847, Supplement 21, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," February 2009

[A3-10] NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 2 - Request for Additional Information on Programs for Licensing Basis Preservation and Construction Refurbishment," dated April 28, 2009

[A3-11] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Response to Request for Additional Information on Program for Construction Refurbishment," dated July 8, 2009

[A3-12] NRC letter to TVA, "Summary of August 6, 2009, Meeting with Tennessee Valley Authority (TVA) Regarding Waits Bar Unit 2 Construction Refurbishment Program," dated August 31, 2009

[A3-13] TVA letter to NRC, "Summary of August 6, 2009, Meeting With Tennessee Valley Authority (TVA) Regarding Watts Bar Unit 2 Construction Refurbishment Program," dated September 22, 2009

[A3-14] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Construction Refurbishment Program Additional Information," dated February 5, 2010

[A3-15] NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 2 – Request for Additional Information Regarding Construction Refurbishment Program Plan (TAC No. MD 6581)," dated April 19, 2010

[A3-16] TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Request for Additional Information Regarding Construction Refurbishment Program Plan," dated May 27, 2010

[A3-17] NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 2 - Program for Construction Refurbishment (TAC No. ME1708)," dated July 2, 2010

[A3-18] NRC letter to holders of an operating license or construction permit, "NRC Information Notice 2011-20: Concrete Degradation by Alkali-Silica Reaction," dated November 18, 2011

[A3-19] NEI 09-14, "Guideline for the Management of Underground Piping and Tank Integrity," Revision 3, April 2013

1. BACKGROUND

In 2008, as described in Reference [A3-6], TVA stated that it was creating an inspection and restoration process to identify and address WBN Unit 2 SSCs important to safety that had been placed in the WBN Unit 2 lay-up program. These SSCs were subject to component inspection and restoration activities to ensure the equipment supports the plant design lifetime by reworking or replacing items based on programmatic requirements, vendor recommendations, operational experience or sound technical judgment. Component testing and system preoperational test programs serve as the final confirmation of the components' restoration.

The refurbishment program was established in Procedure 25402-000-GPP-0000-TI216, *Watts Bar Unit 2 Completion Project Refurbishment Program*, in November 2008. TVA submitted a copy of this procedure to the NRC in December 2008 (Reference [A3-7]). The NRC requested that TVA provide a discussion of the rationale for the selection of SSCs to be refurbished based on the expected degradation mechanisms and the guidance that would be

used to insure the objective and consistent application of refurbishment activities (Reference [A3-10]). In response, TVA provided a copy of the revised procedure (hereafter, TI216) in July 2009 (Reference [A3-11]), and explained that the refurbishment program was designed to ensure that SSCs are still capable of performing their required function in accordance with design specifications by performance of inspections/evaluations, refurbishment, replacements, and system testing.

In July 2010 (Reference [A3-17]), the NRC provided the staff's evaluation of TVA's refurbishment program (including the information provided in References [A3-7], [A3-11], [A3-13], [A3-14], and [A3-16]). The staff concluded that the program plan is of adequate scope, considers appropriate program elements, and would provide reasonable assurance that the SSCs covered by the program would meet their design criteria and perform their intended function.

In addition to the TI216 refurbishment program, by letter dated January 29, 2008 (Reference [A3-5]), TVA committed to implementation of the Equipment Seismic Qualification Corrective Action Program (ESQ CAP) for WBN Unit 2 (Reference [A3-5]). Later, in a letter dated September 26, 2008 (Reference [A3-8]), TVA summarized the history and status of the ESQ CAP. The WBN Unit 2 ESQ CAP was developed following the same basic approach as for WBN Unit 1 with the objective to provide assurance that ESQ issues have been adequately addressed to ensure: seismic qualification of seismic Category I and I(L) equipment; and ESQ documents are complete, retrievable, and in accordance with applicable WBN design criteria, procedures, and licensing requirements (Reference [A3-8]).

2. EQUIPMENT REFURBISHMENT AND QUALIFICATION PROGRAM IMPLEMENTATION

NRC regulations at 10 CFR 50.49, *Environmental qualification of electric equipment important to safety for nuclear power plants*; and 10 CFR Part 50, Appendix A, *General Design Criteria for Nuclear Power Plants* (GDCs), GDC 2, *Design Bases for Protection Against Natural Phenomena* and GDC 4, *Environmental and Dynamic Effects Design Bases*, require qualification of certain equipment to provide assurance that they will be capable of performing their required functions when subjected to conditions such as design basis seismic events and design basis accidents. In conjunction with completion of WBN Unit 2 construction, TVA has conducted inspections and equipment replacements and refurbishment to ensure equipment qualification to meet these requirements.

Qualification of equipment to meet the seismic aspects of GDC 2 is addressed by the Equipment Seismic Qualification CAP (ESQ CAP). To provide assurance that Category I and I (L) equipment is seismically qualified, that the qualification documentation is retrievable, and that this documentation is consistent with the design and licensing basis, the ESQ:

- Reviewed design bases to ensure that they were technically adequate and consistent interfaces existed between them and other design bases;

- Resolved specific technical issues utilizing:
  - Document retrieval;
  - Walk downs to identify and describe actions required to resolve them;
  - Engineering evaluations (typically in calculation files) and modifications (implementation of EDCRs) when equipment could not be qualified in the as-built configuration.
- Developed and populated an ESQ database; and
- Performed process improvements to prevent recurrence.

Completion of actions on individual components under the CAP are documented as part of the turnover of systems from WBN Unit 2 Construction to TVA Preoperational Startup Engineering (PSE) under SMP-4.0, *Watts Bar Nuclear Plant Unit 2 System Completion and Turnover*, and turnover from PSE to Operations under NC-PP-37, *System Turnover to Operations* (see further discussion of these processes in Attachment A1 of this document). As a result, TVA considers this CAP to be open.

Environmental qualification of equipment in accordance with 10 CFR 50.49 is discussed in the following sections.

As discussed in Reference [A3-11], most of the WBN Unit 2 safety-related and quality-related equipment was installed during original construction. The TI216 refurbishment program was developed to ensure that this equipment is capable of performing its required function in accordance with design specifications. The safety-related and quality-related SSCs were inspected and evaluated for pre-service degradation in accordance with the requirements of TI216 to ensure that the item is capable of meeting its design specifications and vendor functional specifications.

To verify that equipment will be capable of meeting its specified life, the results of inspections and tests were evaluated to determine if pre-service degradation had impacted the equipment and components. If the equipment was found to not be capable of meeting its required design/licensing/vendor requirements, then a Problem Evaluation Report (PER - now Condition Report - CR) was initiated. If an unexpected degradation mechanism was identified, then a PER/CR was generated. Equipment whose evaluation determined that it would not be capable of meeting its design criteria for its specified life received appropriate refurbishment or replacement.

For equipment and components that had been predetermined to be refurbished, cleaning, lubrication and replacement of consumable parts (such as gaskets or seals) was performed in accordance with vendor technical requirements to ensure the equipment is capable of meeting its technical requirements. If during refurbishment an unexpected degradation mechanism was identified, then a PER/CR was generated.

If equipment inspections and evaluations demonstrated that a component had experienced no detrimental pre-service degradation, it was documented as acceptable and no further action taken. If unacceptable degradation had occurred, then the equipment was refurbished or replaced to ensure it would be capable of meeting its design criteria. Replacement items were procured using current design criteria.

Industry standard or special component tests have been performed, consisting of actions such as motor bumps for rotation, instrument calibrations, flushing, and functional testing of individual components. These tests demonstrate compliance with component specific specifications and requirements. System flushes, system hydrostatic tests, and system preoperational test programs performed in accordance with NRC Regulatory Guide 1.68, *Initial Test Programs for Water-Cooled Nuclear Power Plants*, serve as the confirmation of the components' capability to meet design criteria. Preoperational testing has been conducted as plant conditions allow; testing will continue through fuel load, initial criticality, low power testing, and power ascension testing.

2.a Electrical Components

Electrical components are comprised of conducting materials (e.g., cables, penetrations, hand switches, terminal blocks, relays) or the associated insulating material. These components are subject to degradation due to thermal and radiation effects, contactor oxidation and surface contamination.

All safety-related, quality-related or environmentally qualified (EQ) electrical components were inspected. Based on inspection results, components were replaced or refurbished as necessary to ensure that the item is capable of meeting its design specifications and vendor functional specifications. Any components found to have corrosion or significant dust were cleaned or appropriate corrective action was taken, including replacement if necessary..

In accordance with TI216, some electrical components were subject to replacement or refurbishment without an initial inspection, as follows:

Component	Replaced	Refurbished	Replaced or Refurbished
Fuses	X		
Molded case circuit breakers	X		
Switchgear		X	
Contacts in Motor Control Center buckets	X		
Misc. Contactors			X
Starters			X
Medium voltage motors		X	
Low voltage motors			X
Relays			X
Seals subject to EQ	X		
Splices subject to EQ or submergence	X		

Component	Replaced	Refurbished	Replaced or Refurbished
Multi-axial cables subject to EQ	X		
Hand switches subject to EQ	X		
Hand switches not subject to EQ		X	

For electrical components, testing is the primary means of verifying component capability. Visual inspections are performed in support of testing. Contactor oxidation as well as the functionality of non-moving components (e.g., resistors, capacitors, integrated circuits) is demonstrated via component/system testing.

The installation and maintenance requirements for EQ equipment are specified in the Qualification Maintenance Data Sheets (QMDS) based on vendor recommendations, EQ testing and operating experience. With the exception of new equipment installed in WBN Unit 2 to replace obsolete equipment, the WBN Unit 2 EQ equipment was addressed in the existing EQ binders and has the same QMDS requirements as the comparable WBN Unit 1 equipment. For new equipment that is not installed in WBN Unit 1, the QMDS requirements were specified in the QMDS section of a new EQ binder. Implementation of the QMDS requirements was tracked and documented for WBN Unit 2 EQ equipment.

2.b Cable

The Corrective Action Programs (CAPs) for Cable Issues and Electrical Issues provide assurance that the safety-related cables were installed appropriately or have been reworked or replaced (see Attachment A4 of this document for more detail). Mechanical effects on WBN Unit 2 cables, including cable installation issues, were addressed as part of the Cable Issues CAP.

The WBN Unit 2 Cable Program is based upon the operating experience from TVA's other operating nuclear plant sites. The only issue that operating experience has identified pertains to submerged medium voltage cable treeing. This is addressed at TVA's nuclear plants by periodic testing in accordance with IEEE 400.2 ("Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency [VLF]").

WBN Unit 2 Class 1E cables were evaluated for ampacity, voltage drop, short-circuit protection and Appendix R. As a result of the calculations/analysis of WBN Unit 2 safety-related cables, a portion of the original WBN Unit 2 cables were replaced with new Class 1E cable.

TVA visually inspected safety-related cables and compiled jacket data to identify the cable mark number and contract information. At the same time, the cables were inspected for any visible damage such as cuts, tears, discoloration, conductor corrosion, cracking, hardening, swelling, or jacket separation from insulation. Any cable found with visible damage was either replaced or repaired using an approved WBN procedure. From these inspections, TVA concluded that WBN Unit 2 cables generally were in good material condition.

WBN Unit 2 cable in the Auxiliary and Control Buildings is in raceway (i.e., tray or conduit) that is in the same environment as the corresponding WBN Unit 1 cable. Since most cable in WBN Unit 2 had either not been energized or had been energized for limited periods of time, cable degradation caused by internal heating is not applicable. For WBN Unit 2 cable that has been in service supporting WBN Unit 1 or common equipment, cable degradation due to internal heating is equal to the degradation of the similar cables of WBN Unit 1.

Electrical boxes for EQ cables were inspected for moisture collection. If signs of moisture collection were identified, then the cable was assessed under the Corrective Action Program and replaced, if necessary.

No chemical effects were identified during the visual inspections of WBN Unit 2 cables. The WBN Unit 2 cables are in the same environment as WBN Unit 1 cables and are subject to the same housekeeping requirements at the WBN site.

Degradation During Layup Period

Industry literature searches provide historical evidence that when cables are not subjected to long-term temperature or condensation extremes, normal service life of these cables is easily extended beyond their normal service life of 40 years. The lay-up conditions of WBN cable are equal to or better than the Level C or D storage requirements of ANSI N45.2.2. When installed in their final configuration in tray or conduit, the cable is constrained to bend radius values that meet requirements for long-term installation. Additionally, the cable is protected from sunlight and external weathering elements and is not exposed to heating effects of being energized or temperature cycling. Even though WBN cable may have been in a lay-up condition for an extended period, factors that would cause accelerated degradation were not present, and therefore cable life has not been diminished.

The qualified life of the EQ cables was evaluated and adjusted as necessary considering the effect of ambient temperature cycles since their installation in the 1980s. The effects of actual ambient temperature, heating due to energized WBN Unit 1 cables, and WBN Unit 1 related radiation is accounted for in the qualified life calculations. For Auxiliary Building areas where WBN Unit 2 safety-related or EQ cable may have been subjected to radiation because of WBN Unit 1 operation, the cables were evaluated and their qualified life adjusted as required in accordance with 10 CFR 50.49. For cables external to the buildings, the effects of external environments have been included.

Underground Cables

TVA's response to Generic Letter 2007-01 (Reference [A3-2]) addresses underground cables. Underground duct banks have sump pumps and are monitored for collection of water with local alarms for high water levels in the manholes.

The cables connecting to Essential Raw Cooling Water (ERCW) pump motors and the Emergency Diesel Generators (EDG) support WBN Unit 1 and will also support WBN Unit 2; these are VLF tested periodically. The ERCW and EDG cables are the only medium voltage safety-related cables that are underground. Reference [A3-2] stated that WBN Unit 1 reactor coolant pump (RCP) cables were routed in underground duct banks. As indicated in Reference [A3-3] the WBN Unit 2 RCP cables are not routed in an underground duct bank.

2.c Instrumentation and Controls (I&C) Components

All safety-related, quality-related or EQ I&C components were inspected. Based on inspection results, components were replaced or refurbished as necessary to ensure that the item is capable of meeting its design specifications and vendor functional specifications. Any components found to have corrosion or significant dust were cleaned or appropriate corrective action was taken, including replacement if necessary.

In accordance with TI216, some items were subject to replacement or refurbishment without an initial inspection, as follows:

Component	Replaced	Refurbished	Replaced or Refurbished
Circuit cards, except as noted below:	X		
Circuit cards in Power Range Nuclear Instrumentation		X	
Circuit cards in Valve Monitor		X	
Circuit cards in AFW Turbine Speed Controller		X	
Electronic controllers	X		
Pneumatic controllers			X
Electronic indicators	X		
Power supplies			X
Radiation monitors	X		
Recorders	X		
Sensors (bellows, diaphragms)	X		
Instrument switches subject to EQ	X		
Instrument switches not subject to EQ			X
Limit switches subject to EQ	X		
Limit switches not subject to EQ			X
Transmitters	X		

In accordance with 10 CFR 50.49, for active and passive instrumentation subject to EQ, the qualified life is specified in the QMDS Section of the applicable EQ binder for the components/subcomponents that have a qualified life that is less than the 40-year plant life.

The installation and maintenance requirements for environmentally qualified equipment are specified in the QMDS based on vendor recommendations, EQ testing and operating experience. With the exception of new equipment installed in WBN Unit 2 to replace obsolete

equipment, the WBN Unit 2 EQ equipment was addressed in the existing EQ binders and has the same QMDS requirements as the comparable WBN Unit 1 equipment. For new equipment that is not installed in WBN Unit 1, the QMDS requirements were specified in the QMDS section of a new EQ binder. Implementation of the QMDS requirements was tracked and documented for WBN Unit 2 EQ equipment.

2.d Mechanical Components and Commodities

Refurbishment of ASME Section III components referenced the original Code Data Report (ASME Form N-5, NPV-1 or N-1). For ASME Section III components, the scope of work was reviewed to determine whether the work included ASME Section III activities. Although refurbishment of ASME Section III components required Quality Control (QC) review, only the ASME Section III work requires Authorized Nuclear Inspector (ANI) review. Generally, any component disassembly for inspection and restoration activities were at the component designed disassembly points (i.e., bolted or flanged surfaces).

The ASME Section III work is documented on an ASME Data Report (e.g., N-1, NPV-1, N-5) by the ASME Certificate Holder. For components with Original Equipment Manufacturer (OEM) Data Reports (e.g., N-1, N-2, NPV-1, NPP-1), a supplement to the Data Report was prepared.

Active mechanical safety-related and quality-related commodities were refurbished to their original design specification. Vendor Technical Manuals and TVA work documents were used for each specific class or type of active commodity. Upon completion of the refurbishment, the component's qualified life was established.

For Mechanical Environmental Qualification (MEQ) equipment, the service life for non-metallic safety-related active mechanical equipment subcomponents is specified in the QMDS in the applicable section of the MEQ binder.

In accordance with TI216, some mechanical components and commodities were subject to replacement or refurbishment without an initial inspection, as follows:

Component	Replaced	Refurbished
Ice Condenser blanket panels	X	
Cranes		
Cranes		X
Brakes		X
Load cells		X
Lifting devices		X
HVAC		
Fans		X
Blowers		X
Dampers and gear boxes		X
Filters	X	
Pumps		X

Component	Replaced	Refurbished
Turbines		X

Piping and Valves

Walkdowns performed from 2007 to 2009, in accordance with NRC Bulletins 79-02 and 79-14, to determine the construction status of WBN Unit 2, concluded that the existing piping and support configurations were adequate such that no pipe sagging had occurred that could have resulted in damage to equipment nozzles or other piping components. The piping had been supported to withstand the design basis earthquake (seismic support requirements) which would have been more than enough support to prevent equipment damage.

Extensive system flushing of all major piping was completed. System flushes will be completed to support final system turnover and testing. Some final cleanliness verifications will be completed through Hot Functional Testing.

In accordance with TI216, some piping and valve items were subject to replacement or refurbishment without an initial inspection, as follows:

Component	Replaced	Refurbished
Snubbers		X
Shock absorbers		X
MOV Motors	X	
Air operated valve actuators		X
Hydraulic valve actuators		X
Solenoid valves	X	
Valves:		
Not-isolable		X
High pressure/temperature system		X
Radioactive fluid system		X

Pipe Supports

Spring hangers are installed for the life of plant. If the spring is locked in place, it sees no load as the load passes through the can body. If the spring is not locked, the spring will not be damaged as long as it is set within its design capacity.

Spring hangers are visually inspected under the IE Bulletin 79-14 program and prior to and during plant heatup. The parameters inspected include corrosion, deformation, misalignment, improper clearances, improper spring settings, and missing, detached, or loose support items. Repairs or replacement of the springs are made as required.

Underground Piping and Tanks

In 2009, the nuclear power industry developed an initiative to address buried piping integrity through inspections and assessments of site-specific components. The scope and milestones of the initiative were captured in Nuclear Energy Institute (NEI) document NEI 09-14, *Guideline for the Management of Underground Piping and Tank Integrity* (Reference [A3-19]). TVA has implemented a fleet-wide Underground Piping and Tanks Integrity Program (NPG-SPP-09.15) and a WBN site-specific Technical Instruction (TI-32.015) consistent with the commitments and industry requirements contained in NEI 09-14. As of mid-December 2014, WBN had completed condition assessment of piping containing radioactive materials and developed Asset Management Plans. The scope of TI-32.015 includes all buried and underground piping and tanks that are outside of a building and are: safety-related; contain licensed material or are known to be contaminated with licensed material; or contain environmentally hazardous material. Inspections are ongoing in accordance with TI-32.015 to monitor and trend buried piping and underground piping and tanks. Program health reports are developed for the Underground Piping and Tanks Integrity Program periodically (at least every six months) in accordance with NPG-SPP-09.16.1, *System, Component and Program Health*.

Safety-related piping and sections of non-safety-related piping that are seismically qualified and required for WBN Unit 2 operation have been included in the TI-32.015 program since the program began. The piping has been continuously monitored by the operating organization.

2.e Structures

Civil components that are made of concrete are subject to pre-service degradation due to material loss (i.e., freeze-thaw, abrasion or cavitation, elevated temperature, aggressive chemicals, and corrosion of embedded steel and steel reinforcement), cracking (freeze-thaw, reaction with aggregates, shrinkage, settlement, elevated temperature, irradiation, and fatigue), and change in material properties (i.e., leaching of calcium hydroxide, aggressive chemicals, elevated temperature, irradiation, and creep). Change due to phenomena such as elevated temperatures, cavitation, fatigue, irradiation or creep is not credible because WBN Unit 2 has not experienced operational conditions.

Concrete Quality

The NRC Safety Evaluation Report on the Watts Bar Nuclear Performance Plan, NUREG-1232, Volume 4 (January 1990) (Reference [A3-1]), evaluates implementation of Corrective Action Programs (CAPs) and Special Programs (SPs) at WBN Unit 1. Section 3.3.1 discusses concrete quality issues raised by an employee concern in 1985 and TVA actions under a Concrete Quality SP. The staff concluded that concerns related to the adequacy of the structural criteria for concrete strength and frequency of sampling were valid. On the basis of the review of the material provided by TVA, including an evaluation of the results of additional tests requested by the staff, it was concluded that the strength of concrete and bedding mortar at WBN is satisfactory from a safety standpoint and these issues were resolved.

In a September 26, 2008 letter to the NRC (Reference [A3-4]), TVA concluded that the Concrete Quality SP is complete for both units based on evaluation of testing of concrete from both units and walkdowns that included both units. The NRC staff concurred and in NUREG-0847, Supplement 21 (SSER 21) dated February 2009 (Reference [A3-9]), indicated that the Concrete Quality SP is resolved for WBN Unit 2.

Concrete Degradation

Plant features like concrete are addressed in TI216 as commodity items and evaluated within appropriate engineering programs. The field inspection and engineering evaluation of passive commodities during the WBN Unit 2 completion project were performed in accordance with Procedure 25402-3DP-G04G-00090, *Engineering Department Procedure Instruction, Engineering Evaluation for Commodity Refurbishment*. Structural design engineers perform the examinations and evaluations so that the civil portion of the subject refurbishment program remains aligned with the corresponding WBN procedure 0-TI-119, *Maintenance Rule Performance Indicator Monitoring, Trending, and Report - 10CFR50.65*. The Concrete Structures Examination Checklist references standard ACI 349.3R-02, *Evaluation of Existing Nuclear Safety Related Concrete Structures,* which was used for guidance in development of concrete crack monitoring criteria.

The inspections and evaluations under 25402-3DP-G04G-00090 effectively provide a baseline for Maintenance Rule monitoring of WBN Unit 2 concrete structures (applicable WBN Unit 1/Unit 2 common structures were already subject to Maintenance Rule monitoring).

NRC Information Notice 2011-20 (Reference [A3-18]) informed addressees of the occurrence of alkali-silica reaction (ASR)-induced concrete degradation of a seismic Category 1 structure at Seabrook Station. ASR is a slow chemical process in which alkalis, usually predominantly from the cement, react with certain reactive types of silica in the aggregate when moisture is present. This reaction produces an alkali-silica gel that can absorb water and expand to cause micro-cracking of the concrete. Excessive expansion of the gel can lead to significant cracking which can change the mechanical properties of the concrete.

TVA NPG addressed Information Notice 2011-20 through development of an Engineering Bulletin (B41130802001, dated August 2, 2013) to evaluate the potential for ASR relative to TVA's operating fleet and WBN. For WBN, the Engineering Bulletin noted that although there is no reason to suspect any ASR-related degradation in TVA's nuclear facilities, it is not possible to conclude with 100 percent certainty that degradation of concrete due to reaction with aggregates is not a plausible aging effect. It recommended that monitoring for ASR be added as an attribute to the Maintenance Rule Structural Monitoring Program. Accordingly, WBN Unit 1/2 Technical Instruction TI-445, "Examination of Structures for Maintenance Rule" was revised to add a concrete monitoring attribute for ASR to the program.

Masonry/Block Walls

The majority of masonry walls are in common buildings (part of the WBN Unit 1 operating envelope) such as the Control, Auxiliary, and Diesel Generator Buildings. Each Reactor Building contains three block walls. Walls in the common buildings and WBN Unit 1 Reactor Building were covered in the WBN Unit 1 masonry wall program. In addition, a calculation was prepared to qualify the masonry walls on the WBN Unit 2 side of the common buildings and in the WBN Unit 2 Reactor Building.

The following work activities were done to complete the WBN Unit 2 masonry wall program:

- Performed a walkthrough to identify which walls need to be constructed and which walls need to be enhanced with restraints and signage.
- Revised applicable calculations which determined the worst case masonry wall configuration to make them applicable to WBN Unit 2.
- Documented remaining construction work in applicable calculations.
- Revised applicable calculations that document acceptance of the WBN Unit 2 walls.
- Prepared design output (EDCRs) to complete remaining work; completion of field work will be confirmed as part of Reactor Building and Auxiliary Building area turnovers from Construction to PSE/Operations.

Within the refurbishment program, masonry/block walls are treated as civil passive commodities in accordance with Procedure 25402-3DP-G04G-00090, as discussed above for concrete structures. Civil/Structural inspections are performed as part of area turnover walk-downs to ensure that no physical damage or degradation has occurred to the block walls during WBN Unit 2 completion. Following startup, observations will be made as part of the Maintenance Rule and normal plant activities.

In summary, the TI216 refurbishment program and ESQ CAP were implemented to ensure that SSCs, some of which have been on site for a number of years, are able to meet their design specifications. Seismic qualification of equipment under the ESQ CAP will continue as systems are turned over, and the TI216 program has captured more than 20,000 discrete SSCs. Accordingly, these programs ensure that WBN Unit 2 is constructed in conformity with the construction permit and the OL application, as amended, and with applicable regulations.

Attachment A3
Refurbishment and Qualification Programs

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Attachment A4

Closeout of Corrective Action Programs and Special Programs

In connection with completion of WBN Unit 1, TVA developed the Watts Bar Nuclear Performance Plan (WBNPP) to address significant performance issues, including Corrective Action Programs (CAPs) and Special Programs (SPs). This Attachment describes the established framework for addressing the CAP and SP issues in the WBNPP during the WBN Unit 2 completion project. This Attachment also lists the CAPs and SPs for WBN Unit 2, indicating status and the necessary completion milestones. TVA plans to complete field work related to all CAPs and SPs prior to fuel load.

References

[A4-1] NRC letter to TVA Chairman, Board of Directors, dated September 17, 1985, with enclosures 1) SALP Report, 2) Request for Information Under 10 CFR 50.54(f) Related to Staff Concerns

[A4-2] Safety Evaluation Report on Tennessee Valley Authority: Watts Bar Nuclear Performance Plan, Watts Bar Unit 1 (NUREG-1232, Vol. 4), December 1989

[A4-3] TVA letter dated September 6,1991, Watts Bar Nuclear Plant (WBN) – Nuclear Performance Plan, Volume 4, Revision 1

[A4-4] Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2 (NUREG-0847, Supplement 19), November 1995

[A4-5] Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2 (NUREG-0847, Supplement 20), February 1996

[A4-6] TVA letter dated August 3, 2007, Watts Bar Nuclear Plant (WBN) - Unit 2 - Reactivation of Construction Activities

[A4-7] TVA letter dated January 29, 2008, Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2

[A4-8] TVA letter dated May 29, 2008, Watts Bar Nuclear Plant (WBN) - Unit 2 – Cable Issues Corrective Action Program for the Completion of WBN Unit 2

[A4-9] TVA letter dated September 26, 2008, Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 – Corrective Action and Special Programs, and Unresolved Safety Issues

[A4-10] NRC letter dated February 11, 2009, Watts Bar Nuclear Plant, Unit 2 - Status of Regulatory Framework for the Completion of Corrective Action and Special Programs and Unresolved Safety Issues

[A4-11] Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2 (NUREG-0847, Supplement 21), February 2009

[A4-12] NRC letter dated August 31, 2009, Watts Bar Nuclear Plant, Unit 2 - Corrective Action Program Plans for Cable and Electrical Issues

[A4-13] NRC letter dated September 8, 2009, Watts Bar Nuclear Plant, Unit 2 - Safety Evaluation Input Regarding Quality Assurance Records Corrective Action Program

[A4-14] NRC letter dated September 9, 2009, Watts Bar Nuclear Plant, Unit 2 - Safety Evaluation Input Regarding Replacement Items Corrective Action Program

[A4-15] Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2 (NUREG-0847, Supplement 22), February 2011

In a letter dated September 17, 1985 (Reference [A4-1]), the NRC requested that TVA submit information pursuant to 10 CFR 50.54(f) on its plans for correcting problems concerning the overall management of its nuclear program and for correcting plant-specific problems for Sequoyah, Browns Ferry and Watts Bar. As part of its systematic evaluation, TVA identified a number of nonconforming issues at WBN that were addressed in WBNPP. The WBNPP, initially issued in May 1989, described the actions taken and corrective actions planned to demonstrate or to ensure that the plant has been designed and constructed in accordance with applicable regulatory requirements and commitments.

The NRC staff issued NUREG-1232, Volume 4 (Reference [A4-2]) in 1990 to document its general review of the CAPs and SPs set forth in the WBNPP through which TVA would accomplish necessary corrective actions at WBN. At the time NRC issued NUREG-1232, Volume 4, some of the CAPs and SPs were in their initial stages of implementation at WBN.

By letter dated September 6, 1991 (Reference [A4-3]), TVA submitted the WBNPP, Revision 1, to the NRC. The revision addressed changes to the WBN organizational structure and corresponding functional responsibilities, as well as various changes to the CAPs.

Section 1.13 of Supplemental Safety Evaluation Report (SSER) 19 (Reference [A4-4]) identified the status of all CAPs and SPs at the time of its publication in November 1995. SSER 20 (Reference [A4-5]), published in 1996 to support issuance of the operating license for WBN Unit 1, incorporated Sections 1.13.1 and 1.13.2 of SSER 19 by reference.

Although SSERs 19 and 20 apply to both WBN Unit 1 and Unit 2, implementation of the CAPs and SPs focused on the construction and completion of WBN Unit 1 due to the deferred status of Unit 2. Therefore, reactivation of construction at WBN Unit 2 required that the CAPs and SPs be revisited by TVA.

Indeed, in a letter dated August 3, 2007 (Reference [A4-6]), TVA informed the NRC of its intention to reactivate and complete construction activities at WBN Unit 2. Attachment 2 to that letter included a summary of outstanding CAPs and SPs and a description of their proposed resolution for WBN Unit 2.

Specifically, Attachment 2 to the letter identified the following 18 CAPs:

1. Cable Issues
2. Cable Tray and Cable Tray Supports
3. Design Baseline and Verification Program
4. Conduit Supports
5. Electrical Issues
6. Equipment Seismic Qualification
7. Fire Protection
8. Hanger and Analysis Update Program (HAAUP)
9. Heat Code Traceability
10. HVAC Duct and Duct Supports
11. Instrument Sensing Lines
12. Pre-start Test
13. QA Records
14. Q-List
15. Replacement Items
16. Seismic Analysis
17. Vendor Information
18. Welding

Attachment 2 to the letter further identified the following 11 SPs:

1. Concrete Quality
2. Containment Cooling
3. Control Room Design Review
4. Environmental Qualification of Electrical Equipment
5. Master Fuse List
6. Mechanical Equipment Qualification
7. Microbiologically Induced Corrosion (MIC)
8. Moderate Energy Line Break
9. Radiation Monitoring System
10. Soil Liquefaction
11. Use-As-Is CAQs

In a letter dated January 29, 2008 (Reference [A4-7]), TVA described the regulatory framework for the completion of construction and licensing activities of WBN Unit 2, stating: “Activities that have not been completed on WBN Unit 2 will be completed in the same manner as WBN Unit 1.” The letter also stated: “In the event an activity cannot be completed in the same manner as WBN Unit 1, the alternate approach will be provided to the NRC for review and approval.” Table 3 attached to that letter summarized the proposed resolution of CAPs and SPs for WBN Unit 2. Consistent with this approach, TVA’s letter dated May 29, 2008 (Reference [A4-8]) requested NRC agreement with proposed approaches for sub issues within the Cable Issues CAP, some of which represented departures from what was done for WBN Unit 1.

Later, in a letter dated September 26, 2008 (Reference [A4-9]), TVA supplemented the Regulatory Framework (Reference [A4-7]) CAP and SP summaries to provide additional information on the status of these programs, basis for proposed action, and impact on other aspects of the licensing framework due to these programs. Summaries for the Cable Issues CAP were not included in that submittal since they were included in Reference [A4-8]. Enclosure 1 to that letter noted that the Concrete Quality SP had been completed for both units.

TVA has completed actions for many of the CAPs and SPs, and many of those have been inspected by the NRC. In almost all cases, the NRC has accepted TVA's approach to address the CAPs and SPs for WBN Unit 2 and indicated each is "closed," as documented in the NRC's construction inspection reports; however, field work to complete actions under the programs may have been ongoing at the time of NRC closure. Table A4-1 summarizes the outstanding actions related to CAPs and SPs for WBN Unit 2 that have not been closed by the NRC. Only a sub-issue (physical cable separation and electrical isolation) for the Electrical Issues CAP and the Fire Protection CAP remain to be closed. Only the Mechanical Equipment Qualification SP and the Radiation Monitoring Program SP remain to be closed. Two additional SPs (Environmental Qualification of Electrical Equipment SP and Moderate Energy Line Break SP) are pending closure. TVA plans to complete all CAPs and SPs prior to WBN Unit 2 fuel load.

Attachment A4
Closeout of Corrective Action Programs and Special Programs

Table A4-1, CAPs and SPs with Outstanding Actions			
No.	Title	Summary of Outstanding Action(s)	Expected Completion
CAP 5.b	ELECTRICAL ISSUES: Physical cable separation and electrical isolation	Completion of field work to resolve identified breakages per EDCR 55125 and EDCR 55127 (Commitment 113147544).	Before Fuel Load
CAP 7	FIRE PROTECTION	Complete actions under this CAP and notify NRC when complete (Commitment 111032090).	Before Fuel Load
Special Programs			
SP 6	MECHANICAL EQUIPMENT QUALIFICATION	Complete EDCRs and update MEQ binders for equipment listed in the WBN Unit 2 MEQ List Calculation, MDQ00299920090365 (Commitment 111032542).	Before Fuel Load
SP 9	RADIATION MONITORING SYSTEM	Complete work on EDCRs for installation of RMS as listed in the SP (Commitment 111032587).	Before Fuel Load

Attachment A4
Closeout of Corrective Action Programs and Special Programs

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Attachment 5
Status of Generic Communications and Generic Safety Issues

As explained in Appendix C of SSER 23, the NRC staff continuously evaluates safety requirements against new information as it becomes available. In some cases, the staff takes immediate action or interim measures to ensure safety, which could include issuance of generic communications such as Bulletins or Generic Letters for action by licensees and applicants. In many cases, however, the initial assessment indicates that immediate licensing actions or changes in licensing criteria are not necessary. In any event, further study may be deemed appropriate to make judgments as to whether existing requirements should be modified. The issues being studied are sometimes called generic safety issues because they are related to a particular class or type of nuclear facility. They also are often referred to as Unresolved Safety Issues (USIs).

Status of generic safety issues is tracked by NRC in periodic supplements to NUREG-0933, "Resolution of Generic Safety Issues." These generic safety issues are resolved by rulemaking, issuance of generic communications, or closure without further regulatory action by evaluation in a NUREG document. Review guidance for generic safety issues is often incorporated by revision of the NUREG-0800, Standard Review Plan (SRP).

This attachment provides the status of generic safety issues/USIs for WBN Unit 2. TVA plans to complete work related to all generic safety issues/USIs prior to fuel load or on a schedule that is appropriate for the issue as reflected in Table A5-1. This attachment also updates the status of generic communications (Bulletins, Generic Letters, and NUREG-0737 TMI action items) that have not yet been fully addressed for WBN Unit 2, summarizing the outstanding actions and expected completion milestones for those items. Preparation of this attachment included consideration of new generic communications not covered in the Safety Evaluation Report (SER) and supplements for WBN Unit 1 (e.g., Generic Letter 2008-01). TVA plans to complete work related to all applicable generic communications prior to fuel load or on a schedule that is appropriate for the issue as reflected in Table A5-2.

References:

[A5-1] SECY-07-0096, dated June 7, 2007, Possible Reactivation of Construction and Licensing Activities for The Watts Bar Nuclear Plant Unit 2

[A5-2] NRC Staff Requirements Memorandum SECY-07-0096, dated July 25, 2007, – Possible Reactivation of Construction and Licensing Activities for The Watts Bar Nuclear Plant Unit 2

[A5-3] TVA letter dated September 7, 2007, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Generic Communications Issued Prior to 1995"

[A5-4] TVA letter dated September 7, 2007, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Initial Responses to Bulletins and Generic Letters"

[A5-5] TVA letter dated January 29, 2008, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2"

[A5-6] TVA letter dated March 20, 2008, “Watts Bar Nuclear Plant (WBN) – Unit 2 – Generic Communications Status for Unit 2 – Restructured Tables”

[A5-7] NRC letter dated May 28, 2008, “Watts Bar Nuclear Plant, Unit 2 – Status of Generic Communications for Review (TAC No. MD8314)”

[A5-8] TVA letter dated July 29, 2008, “Watts Bar Nuclear Plant (WBN) – Unit 2 – Generic Communications Status for Unit 2 – Revision 1 (TAC No. MD8314)”

[A5-9] NRC letter dated August 25, 2008, “Watts Bar Nuclear Plant, Unit 2 – Status of Generic Communications for Review (TAC No. MD6706)”

[A5-10] TVA letter dated September 26, 2008, “Watts Bar Nuclear Plant (WBN) - UNIT 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 – Corrective Action and Special Programs, and Unresolved Safety Issues”

[A5-11] TVA letter dated April 29, 2010, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 2 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 2 (TAC No. MD8314)”

[A5-12] TVA letter dated July 30, 2010, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 3 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 3 (TAC No. MD8314)”

[A5-13] TVA letter dated October 28, 2010, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 4 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 4 (TAC No. MD8314)”

[A5-14] TVA letter dated January 21, 2011, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 5 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 5 (TAC No. MD8314)”

[A5-15] TVA letter dated January 25, 2011, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Unresolved Safety Issues”

[A5-16] NUREG-0847, Supplement 23, “Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2,” July 2011

[A5-17] TVA letter dated July 27, 2011, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 6 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 6 (TAC No. MD8314)”

[A5-18] TVA letter dated December 20, 2011, “Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 7 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 7 (TAC No. MD8314)”

[A5-19] TVA letter dated August 15, 2012, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 7 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 7 [sic] (TAC No. MD8314)" [The text identifies both status documents as Revision 8]

[A5-20] TVA letter dated January 17, 2013, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 9 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 9 (TAC No. MD8314)"

[A5-21] TVA letter dated July 25, 2013, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 10 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 10 (TAC No. MD8314)"

[A5-22] TVA letter dated January 30, 2014, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 11 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 11 (TAC No. MD8314)"

[A5-23] TVA letter dated September 2, 2014, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 12 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 12 (TAC No. MD8314)"

[A5-24] TVA letter dated July 27, 2015, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for Completion of Construction and Licensing for Unit 2 – Revision 13 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 13 (TAC No. MD8314)"

[A5-25] NUREG-0847, Supplement 27, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," January 2015

The NRC, in SECY-07-0096 (Reference [A5-1]), indicated that the staff intends to use the latest version of the NUREG-0800, Standard Review Plan (SRP), including resolution of generic issues and communications, in its assessment of WBN Unit 2. In the related Staff Requirements Memorandum (Reference [A5-2]), the Commission noted that there were current generic safety issues, such as GSI-191, that would be much easier to resolve before plant operation. The Commission suggested that the staff and TVA look for opportunities to resolve such issues where the unirradiated state of Unit 2 made the issue easier to resolve than at WBN Unit 1.

Generic Safety Issues / Unresolved Safety Issues (USIs)

By letter dated September 26, 2008 (Reference [A5-10]), TVA provided the NRC with a list identifying the status of USIs determined to be applicable to WBN Unit 2. By letter dated January 25, 2011 (Reference [A5-15]), TVA provided a WBN Unit 2 Implementation Plan for

USIs. Appendix C of SSER 23 (Reference [A5-16]) provides a discussion of the status of resolution of USI for TVA's application for an operating license for WBN Unit 2, incorporating information provided by TVA in References [A5-10] and [A5-15]. Some of the issues that are not covered by generic communications have been dealt with by revisions of the SRP and therefore are covered in appropriate chapters of the FSAR and SER. The status of these generic safety issues/USIs is provided in Table A5-1. As shown in that table, TVA only has outstanding actions for a few of the USIs.

Generic Communications

By letters dated September 7, 2007 (References [A5-3] and [A5-4]), TVA provided comprehensive listings of generic communications issued prior to 1995, which would have been considered in the licensing of WBN Unit 1, and thus applied to the licensing basis for WBN Unit 2. Reference [A5-4] also provided initial responses for Unit 2 to newer generic communications. By letter dated January 29, 2008 (Reference [A5-5]), TVA provided a list of commitments related to generic communications.

With a letter dated March 20, 2008 (Reference [A5-6]), TVA presented the results of its review of WBN Unit 2 generic communications, which included a comprehensive listing and status relative to Unit 2 generic communications and action items under NUREG-0737, "Clarification of TMI Action Plan Requirements," and NUREG-0737, Supplement 1. Action statements were provided for those generic communications with outstanding actions for WBN Unit 2.

The NRC, by letter dated May 28, 2008 (Reference [A5-7]), provided detailed results of the staff's assessment of generic communications for WBN Unit 2, including items for which further review or inspection verifications of implementation were necessary. Table 4 of Reference [A5-7] identified items where the staff disagreed with TVA's determination that topics were not applicable to WBN Unit 2.

By letter dated July 29, 2008 (Reference [A5-8]), TVA provided additional information in response to generic communications items listed in Table 4 of Reference [A5-7]. The NRC staff, by letter dated August 25, 2008 (Reference [A5-9]), documented its agreement with TVA's status in Reference [A5-6] as modified by Reference [A5-8].

TVA provided periodic updates to the status of generic communications in References [A5-11] through [A5-14] and [A5-17] through [A5-24]. The NRC, in Section 1.14 of supplements to NUREG-0847 (References [A5-16] and [A5-25]), reflected the implementation status of applicable bulletin and generic letter requirements.

TVA tracks and closes out commitments and open items required for licensing of Unit 2 in accordance with procedure NC PP-19, *Watts Bar Nuclear Plant Unit 2 - Closure of Commitments/Open Items Required for Licensing*. Beginning with a review of historical documents coded in the Watts Bar Integration Task Equipment List (WITEL), including CAPs and SPs, regulatory commitments have been assigned commitment tracking numbers to track

and document closure of commitments. This includes commitments related to generic communications listed in Reference [A5-5] and subsequent correspondence to the NRC. As activities are completed, a PP-19 closure package is prepared to document closure of open items and commitments.

Table A5-2 lists generic communications and TMI action items that have not yet been fully addressed for WBN Unit 2 (including some that are expected to remain open at the time of fuel load), summarizing outstanding actions for Unit 2, along with indication of the Unit 2 milestone related to expected closure.

Table A5-1, Status of Unresolved Safety Issues (Appendix C of SER)		
ID	**Description**	**Status**
A-1	Water Hammer	Closed for Unit 2. Covered in FSAR Sections 10.4.7 and 10.4.9. **Outstanding Action:** None.
A-2	Asymmetric Blowdown Loads on Reactor Primary Coolant Systems	Since TVA will meet the original design requirements for resolution of the USI on WBN Unit 2, this USI is considered closed. **Outstanding Action:** None.
A-3	Westinghouse Steam Generator Tube Integrity	Unit 2 has adopted Steam Generator Tube Integrity Technical Specifications Task Force traveler (TSTF)-510 for the Unit 2 Technical Specifications. **Outstanding Action:** None.
A-9	Anticipated Transient Without Scram (ATWS)	This issue is covered by Generic Letter 83-028, response to which involved installation of ATWS Mitigating Actuation Circuitry, including TS LCO and surveillance requirements and preventative maintenance procedures. **Outstanding Actions:** Closure of Commitments 112034035 and NCO840202004.
A-11	Reactor Vessel Materials Toughness	The WBN Unit 2 reactor vessel meets the fracture toughness requirements of Appendix G to 10 CFR Part 50 and is expected to meet the specified safety margins through its life. **Outstanding Action:** None.
A-12	Fracture Toughness of Steam Generator and Reactor Coolant Pump Supports	Based on the conclusions of NUREG-0577, this USI is resolved for WBN Unit 2, and the issue is considered closed. **Outstanding Action:** None.
A-17	System Interactions in Nuclear Power Plants	This issue was resolved by GL 89-18 and required no action by licensees. Since TVA will meet the original design requirements for resolution of the USI on WBN Unit 2, the NRC staff considers this issue to be closed. **Outstanding Action:** None.
A-24	Environmental Qualification of Safety-Related Electrical Equipment	This issue is addressed by the Environmental Qualification of Electrical Equipment Special Program. **Outstanding action:** See Appendix A4 regarding actions under this SP - (To be closed before Fuel Load).
A-26	Reactor Vessel Pressure Transient Protection	Since TVA will meet the original design requirements for resolution of the USI on WBN Unit 2, this issue to be closed with a required action by TVA to submit pressure temperature curves for NRC staff review and approval prior to fuel load of WBN Unit 2. **Outstanding action:** None – Pressure Temperature Limits Report submitted to NRC by TVA letter dated February 2, 2010.
A-31	Residual Heat Removal Shutdown Requirements	Since TVA will meet the original design requirements for resolution of the USI on WBN Unit 2, this issue is closed with a required action by TVA to install an RHR flow alarm to alert the operator to initiate alternate cooling modes in the event of loss of RHR pump suction for WBN Unit 2. **Outstanding Action**: None
A-36	Control of Heavy Loads Near Spent Fuel	For USI A-36 and Generic Letter 81-07, Unit 2 will utilize the same approach used for WBN Unit 1 including implementation of the guidelines of NEI 08-05 Rev. 0, Industry Initiative on the Control of Heavy Loads, as endorsed by the NRC per RIS 2008-08. **Outstanding Action:** None, program in place (0-MI-0.045).
A-40	Seismic Design Criteria	TVA will meet the original design requirements for resolution of the USI on WBN Unit 2; the evaluation of RWST structural integrity was performed during a civil calculation audit as part of the Design Baseline Verification CAP. **Outstanding Action:** None; Design Baseline Verification CAP is complete (see Appendix A4 of this document).
A-43	Containment Emergency Sump Reliability	This is being addressed under Generic Letter 2004-02. **Outstanding actions**: See status of GL 2004-02 outstanding actions in Table A5-2.
A-44	Station Blackout	Resolution of this USI led to revision of 10 CFR 50.63, "Loss of All Alternating Power." **Outstanding actions:** None.

Attachment 5
Status of Generic Communications and Generic Safety Issues

Table A5-1, Status of Unresolved Safety Issues (Appendix C of SER)		
ID	**Description**	**Status**
A-45	Shutdown Decay Heat Removal Requirements	TVA will meet the original design requirements for resolution of the USI on WBN Unit 2. **Outstanding actions:** None.
A-46	Seismic Qualification of Equipment in Operating Plants	USI A-46 does not apply to Unit 2 and is closed. **Outstanding actions**: None.
A-47	Safety Implications of Control Systems	The Unit 2 TRM contains the same information as included in the current WBN Unit 1 TRM; therefore, the basis for closure remains valid for Unit 2. Resolved under Generic Letter 89-19. **Outstanding actions:** None.
A-48	Hydrogen Control Measures and Effects of Hydrogen Burns on Safety Equipment	Generic resolution was by rulemaking under 10 CFR 50.44. **Outstanding action:** None.
A-49	Pressurized Thermal Shock	The issue was generically resolved by rulemaking under 10 CFR 50.61, RG 1.99, and GLs 88-11 and 92-01. **Outstanding action:** None.

Table A5-2, Status of Generic Communications that Have Not Yet Been Fully Addressed			
ID	**Description**	**Outstanding Actions Expected at Time of Fuel Load**	**Expected Completion**
BULLETINS			
B 1996-01	Control Rod Insertion Problems (PWR)	Demonstrate operability of the rod control system as part of the Power Ascension Test Program (Commitment 112048311).	Power Ascension Test Completion
B 2003-02	Leakage from RPV Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity (PWRs)	1) Perform baseline inspection before fuel load (Commitment NCO080008006) 2) Conduct VT-2 inspection of RPV lower head penetrations during first refueling outage and add 10-year ISI requirement to 2-TRI-0-10.1 (Commitment NCO080008005).	1) Before Fuel Load 2) During first refueling outage.
B 2004-01	Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at PWRs	1) Perform a bare metal visual (BMV) inspection of the upper pressurizer Alloy 600 locations at the first refueling outage (Commitment NCO080008009). 2) Submit the required response within 60 days after completion of the first refueling outage (Commitment NCO080008010).	1) During first refueling outage 2) 60 days following first refueling outage
B 2012-01	Design Vulnerability in Electric Power System	License condition added to FSAR 8.2.2 "Actions to resolve the issues identified in the Bulletin will be implemented on or before December 31, 2017" in Amendment 113 (Commitment 116123812).	December 31, 2017
GENERIC LETTERS			
GL 1980-90	NUREG-0737, TMI	See separate listing of NUREG-0737 items.	
GL 1982-33	Supplement to NUREG-0737, "Requirements for Emergency Response Capability"	1) Declare SPDS Operational (Commitment NCO830138002) (Also see GL 1989-06 and NUREG-0737, I.D.2). 2) Complete resolution of CRDR HEDs and notify NRC (Commitment NCO870297002). 3) Complete CRDR process for MCR panels (Commitment NCO820253101).	1) Prior to startup from first refueling outage. 2) Before Fuel Load 3) Before Fuel Load

Table A5-2, Status of Generic Communications that Have Not Yet Been Fully Addressed			
ID	**Description**	**Outstanding Actions Expected at Time of Fuel Load**	**Expected Completion**
GL 1989-06	Task Action Plan Item I.D.2 – Safety Parameter Display System – 10 CFR 50.54(f)	Declare SPDS Operational (Commitment NCO830138002).	Prior to startup from first refueling outage (Also see GL 1982-33 and NUREG-0737, I.D.2)
GL 1993-04	Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies, 10 CFR 50.54(f)	Implement testing of rod control systems (Commitment NCO930239002).	During Power Ascension Testing
GL 1997-06	Degradation of Steam Generator Internals	Perform SG inspections during each refueling outage (Commitment NCO080008016).	Refueling outages
GL 2004-02	Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at PWRs	1) Notify the NRC when the Welding CAP is completed (Commitment 111029357). 2) Install Containment Sump modifications (Commitment 112044279). 3) Perform the insulation inventory and latent debris walkdowns after completion of hot functional testing, and after containment has been cleaned (Commitment 112044367).	1) Before Fuel Load 2) Before Fuel Load 3) Prior to start of power ascension testing
NUREG-0737 TMI ACTIONS			
I.D.1	Control Room Design Review	1) Complete CRDR process for MCR panels (Commitment NCO820253101). 2) Submit photographs of control panels 120 days after receipt of an operating license. (Commitment NCO840165002). 4) Complete independent confirmation of installation of MCR components (field verification of all HEDs), issue CRDR SP closure report and notify NRC (IPS 166 and Commitments NCO860131002, NCO870297002 and 113114423).	1) Before Fuel Load 2) 120 days after receipt of OL (or sooner) 3) Before Fuel Load
I.D.2	Plant Safety Parameter Display Console	Declare SPDS Operational (Commitment NCO830138002).	Prior to startup from first refueling outage (Also see GL 1982-33 and GL 1989-06)

Attachment A5
Status of Generic Communications and Generic Safety Issues

James H. O'Dell, Manager
Watts Bar Unit 2 Compliance

Gordon P. Arent, Director
WBN Site Licensing

Attachment A6
Quality Assurance Activities

This attachment discusses the Quality Assurance Program, quality control reviews, assessments, inspections, and audits that provide reasonable assurance that construction activities have been and will continue to be accomplished in accordance with a Quality Assurance Program that meets the requirements of 10 CFR Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.

References:

[A6-1] TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan (NQAP) (Quality Assurance Program Description)

[A6-2] Bechtel Watts Bar Nuclear Plant Unit 2 Construction Completion Project Nuclear Quality Assurance Manual (PNQAM)

[A6-3] Bechtel QA Topical Report BQ-TOP-1, Rev 4A, Bechtel Quality Assurance Program for Nuclear Power Plants

[A6-4] NRC Information Notice 2007-04: Construction Experience Related to the Assurance of Quality in the Construction of Nuclear Facilities

[A6-5] INPO 83-011: Results of Self-initiated Evaluations, Construction Project Evaluation Program Phase I, February 1983

[A6-6] Nuclear Construction Project Procedure, NC PP-14, Audits and Assessments

[A6-7] NRC Integrated Inspection Report 05000391/2013609, dated December 18, 2013

[A6-8] NRC Integrated Inspection Report 05000391/2014602, dated March 27, 2014

[A6-9] NRC Integrated Inspection Report 05000391/2014611, dated May 15, 2014

[A6-10] Mid - Cycle Assessment Letter - Watts Bar Nuclear Plant Unit 2 (NRC Inspection Report 05000391/2014606), dated September 3, 2014

[A6-11] NRC Integrated Inspection Report 05000391/2014607, dated September 30, 2014

[A6-12] NRC Integrated Inspection Report 05000391/2014608, dated November 14, 2014

[A6-13] NRC Integrated Inspection Report 05000391/2014614, dated December 29, 2014

[A6-14] NRC Integrated Inspection Report 05000391/2014615, dated February 13, 2015

[A6-15] End-of-Cycle Assessment Letter – Watts Bar Nuclear Plant Unit 2 (NRC Inspection Report 05000391/2015601), dated February 27, 2015

[A6-16] NRC Integrated Inspection Report 05000391/2015602, dated March 24, 2015

[A6-17] NRC Integrated Inspection Report 05000391/2015603, dated May 1, 2015

[A6-18] NRC Integrated Inspection Report 05000391/2015604 and Notice of Violation, dated June 29, 2015

As owner of WBN Unit 2, TVA has the ultimate responsibility for oversight of the WBN Unit 2 Construction Completion Project. The Bechtel Power Corporation (Bechtel) is the primary contractor for the completion project. Both TVA and Bechtel have programs that adhere to the *Code of Federal Regulations*, Title 10, Part 50, Appendix B (10 CFR Part 50, Appendix B). 10 CFR Part 50, Appendix B delineates the requirements for the implementation of a quality assurance (QA) program for design, fabrication, construction, and testing of the structures, systems and components of the plant that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public.

The TVA Nuclear Quality Assurance Plan (NQAP)

The NQAP (Reference [A6-1]) defines and describes the nuclear quality assurance (QA) requirements for TVA. The NQAP applies to TVA Nuclear Power Group (NPG), Nuclear Construction (NC) personnel, and contractor activities that could affect quality-related structures, systems and components. Appendix F of the NQAP describes the organization and the methods of assuring quality and establishes the means to meet the requirements of 10 CFR Part 50, Appendix B and the Watts Bar Unit 2 construction permit. NQAP Appendix F was developed to take into account the unique requirements and commitments necessary to ensure effective quality assurance program implementation and oversight for the WBN Unit 2 Construction Completion Project. It incorporates lessons learned from WBN Unit 1 completion, Browns Ferry Nuclear Plant (BFN) recoveries, and construction projects in the late 1970s and early 1980s - NRC IN 2007-04 (Reference [A6-4]) and INPO 83-011 (Reference [A6-5]).

The execution and accountability for the WBN Unit 2 construction completion, construction phase tests and inspections, and related QA activities has been delegated through TVA's contract with Bechtel and is implemented through the project specific, TVA-approved Bechtel Project Nuclear Quality Assurance Manual (PNQAM) (Reference [A6-2]). Prior to the award of the contract to Bechtel as the project prime Engineering, Procurement, and Construction contractor including QA and Quality Control (QC), TVA conducted a line-by-line comparison of the PNQAM to the TVA NQAP. The TVA review and approval of the PNQAM and any changes thereto, ensures that regulatory requirements and TVA-specific commitments of the NQAP are incorporated into the PNQAM and that WBN Unit 2 is completed by a quality assurance program as rigorous as that used for completion of WBN Unit 1.

Bechtel Project Nuclear Quality Assurance Manual (PNQAM)

The Bechtel ASME Quality Assurance Manual is included by reference in the PNQAM and is audited in accordance with American Society of Mechanical Engineers (ASME) QA Program requirements. As part of the execution of the PNQAM, the Bechtel organization is accountable for performing the regulatory-required quality control inspection and quality assurance audit functions for the construction phase activities. TVA retains and exercises the overall responsibility for the establishment and execution of an effective QA program for the construction completion of WBN Unit 2. To ensure continued alignment with the TVA NQAP,

project procedures require that no change to the Bechtel PNQAM be implemented without the approval of the Senior Manager WBN Unit 2 QA. This approval is preceded by a detailed review by TVA Nuclear Construction (NC) QA to ensure that alignment with the NQAP commitments remains intact. This process provides reasonable assurance that WBN Unit 2 PNQAM fully meets the TVA NQAP.

WBN Unit 2 QA construction phase activities affecting the quality and performance of safety-related structures, systems and components includes, but is not limited to:

Designing	Procuring	Fabricating	Shipping	Receiving	Storing
Handling	Constructing	Installing	Erecting	Inspecting	Repairing
Cleaning	Construction Testing		Licensing	Training	

The TVA contract with Bechtel extends the quality assurance requirements to all applicable contractors and subcontractors through the TVA-approved PNQAM. The transition from the Construction QA Program (inclusive of the PNQAM) to the Operational QA Program under the TVA NQAP is discussed below and defined in project procedures and will occur prior to fuel load.

The Bechtel QA/QC corporate organization and lines of communication to project QA/QC are consistent with those described in the NRC reviewed and accepted Bechtel QA Topical Report BQ-TOP-1, Rev 4A, *Bechtel Quality Assurance Program for Nuclear Power Plants* (Reference [A6-3]). The project specific QA/QC organization is described in the PNQAM and ensures independence is maintained between the organization performing the checking (quality assurance and quality control) functions and the organizations performing the functions.

The PNQAM is implemented through project procedures and instructions that control engineering, procurement, construction, and QA/QC activities and were developed by Bechtel prior to commencement of those activities. Quality related procedures and changes thereto were reviewed and approved by TVA to assure inclusion of PNQAM requirements. These implementing documents and associated processes have been audited and reviewed routinely by Bechtel QA and QC. TVA oversight, including QA, has documented through reports and observations the effectiveness of the Bechtel QA organization. The results have indicated an overall satisfactory performance. The TVA NC audits and assessments are retrievable in TVA's Electronic Data Management System (EDMS).

<u>Oversight of Bechtel and Subcontractor QA Effectiveness</u>

Additionally, to establish a basis for concluding that Bechtel has provided complete and comprehensive oversight of the implementation of the PNQAM on the WBN Unit 2 project, NC QA has conducted a series of audits with emphasis on compliance to each of the applicable criteria of 10 CFR Part 50, Appendix B as documented in the PNQAM for project wide execution. These audits provide NC QA assurance of Bechtel QA effectiveness as well as

establish a basis for the subsequent transfer of WBN Unit 2 NC QA responsibilities to TVA Nuclear Power Group (NPG) QA.

The audits are performed and scheduled in accordance with NC project QA procedures utilizing both onsite and off-project personnel and form one part of the basis for acceptance of authority for execution of project QA activities for those systems and areas transitioned to NC QA.

The audit plans consist of verifying that PNQAM requirements, including those of the referenced American National Standards Institute (ANSI) Standards and other commitments, have been translated into the implementing Bechtel project procedures. The completed Bechtel audits were reviewed to verify that all of the project procedures have been the subject of an audit. Finally, the audit results are reviewed to assess that an appropriate level of rigor was present to provide reasonable assurance of the effectiveness of the QA oversight.

By contract, companies other than Bechtel performing construction activities on the WBN Unit 2 Construction Completion Project are required to implement the requirements of the TVA-approved PNQAM. This applies even if the companies are not contracted directly to Bechtel. Bechtel has the oversight of the implementation of all aspects of the PNQAM on the project until such time as a formal transition to NC QA has been documented.

Reporting to the Bechtel QA Manager is the Bechtel Supplier Quality organization. Early in the project it was understood that a significant amount of new manufacturing would be necessary to support WBN Unit 2 completion. This would involve identification and qualification of new suppliers. Use of the Bechtel worldwide supplier quality organization prevented overloading of the TVA NPG Vendor Audit and Services organization. Bechtel was the purchasing agent for TVA for WBN Unit 2. Suppliers on either the Bechtel Evaluated Suppliers List (ESL) or the TVA Acceptable Suppliers List (ASL) were acceptable to provide goods or services to Bechtel. Suppliers were audited regularly by TVA or Bechtel and as requested by Project Engineering. Supplier Quality Surveillance Reports of vendor activities were provided to NC QA for review. All Supplier Deviation Disposition Requests (SDDR) are required to have TVA approval of use-as-is dispositions.

An important lesson learned from review of early construction projects was that multiple corrective action programs led to confusion and lack of control and assurance of implementation of corrective actions. WBN Unit 2 NC QA established the project approach that all companies would use a single program software for corrective actions. An implementing procedure was developed for WBN Unit 2 separate from that used by NPG because of some inherent differences in a compliance-based construction program versus a performance-based operations program (e.g., nonconforming conditions (NCR)). A record of WBN Unit 2 Problem Evaluation Reports (PERs) resides in Maximo and is retrievable. For NCRs, NPG reviews service requests initiated by NC to evaluate potential impact to Unit interfaces or operating systems. NC QA has a representative on the NC Project Review Committee for the daily review of service requests (subsequently Problem Evaluation Reports - PERs, and now Condition Reports - CRs). The Senior Manager WBN Unit 2 QA is a member of the Construction

Completion Management Review Committee. The corrective action program is audited annually by Bechtel QA and NC QA. Additionally, NRC has conducted frequent reviews of corrective action program effectiveness (no less than two times a year). Transition of the corrective action program from NC to NPG will be managed through the Dual Unit Operational Readiness Team Transition Plan. NPG QA and NC QA will conduct oversight of the transition.

As a result of the ASME code of record for the 1973 construction permit, WBN Unit 2 is a partial ASME Section III Division 1 facility (supports on class 1, 2 and 3 piping are not under Section III). Bechtel Power Corporation holds the N and NA stamps for Engineering while Bechtel Construction Operations International holds the NPT stamp for construction completion of WBN Unit 2.

Bechtel QA performs audits and surveillances of the Bechtel and other contractors' ASME construction activities with NC QA oversight. TVA NC retains responsibility for those portions of systems that were completed previously by TVA when TVA held all the required ASME stamps. In addition, TVA NC QA conducts all the required ASME audits/assessments required by the TVA WBN Unit 2 NC ASME Owner's manual for all ASME Stamp holders doing work supporting the completion of WBN Unit 2. NC QA is the technical contract manager for the ASME authorized nuclear inspection (ANI) contract. Authorized Nuclear Inspectors independently conduct code related inspection activities of Bechtel. TVA NC and Bechtel have been subjected to two intrusive ASME accreditation surveys to retain the authority to implement the Code.

As part of the execution of the PNQAM, the Bechtel organization is accountable for performing the required quality control inspection and quality assurance audit functions for the construction phase activities. NC QA approves the Bechtel annual audit schedule. NC QA approves the oversight plans of Bechtel QA oversight of project work of contractors not subcontracted to Bechtel but who are working to the PNQAM. Since resumption of construction activities at WBN Unit 2 through October 2014, there have been:

- Over 2700 QA Surveillances performed
- 243 procurement supplier surveillance assignments
- 2229 supplier surveillance visits with 1385 surveillance reports being issued by procurement supplier quality
- 740 supplier performance unsatisfactory conditions being identified and corrected
- 12 Supplier Deviation Disposition Reports being issued
- 48 Audits/Surveys being performed to support the Evaluated Suppliers List

Bechtel QC inspections occur at a rate of approximately 6000/month.

<u>TVA NC QA Project Activities</u>

TVA Senior Vice President, Watts Bar Operations and Construction, ultimately retains and exercises the overall responsibility for the establishment and execution of an effective QA program for the construction completion of WBN Unit 2.

Audits and Assessments

NC implements the audit requirements from Section 12 (Auditing) of the NQAP through approved project procedures. The QA program was established while the QA organization was part of the NPG QA organization reporting to the General Manager (GM) QA. QA transitioned into the Nuclear Generation Development and Construction (NGDC) organization when it was expanding and a significant corporate structure was established as reflected in NQAP Appendix F. Another TVA re-organization established Nuclear Construction, which is focused on nuclear safety-related work on the construction site.

Audits and assessments have been conducted from the first days of the project in accordance with procedures and schedules covering all applicable 10 CFR Part 50, Appendix B criteria.

TVA NC QA conducts periodic assessments of Bechtel QC performance through evaluation by two Certified Level III NC inspectors. These same evaluations will carry over to inspections performed under the Startup organization work order processes.

NC QA Oversight of NC Startup Activities

In addition to oversight of the implementation of the PNQAM, NC QA has program responsibility for the Startup Testing (i.e., pre-operational testing) scope of work utilizing the TVA NQAP as implemented for WBN Unit 2 through project procedures. TVA NC approves all quality related procedures used by NC as well as any changes, to ensure NQAP requirements are addressed for quality related activities conducted by the Startup organization. NC QA has a representative on the Joint Test Group (JTG) responsible for review of Pre-operational Test Instructions for inclusion of QA requirements. NC QA reviews Startup work orders for the inclusion of QA requirements and the need for QC hold-points.

ASME Section XI Pre-service Inspection

NC QA is responsible for the execution of the ASME Section XI Pre-service Inspection Program for systems with ASME form N-5 completed. This form indicates that all ASME Section III work is complete and the Section XI program is in effect. TVA NC must control any future work on the completed Section III piping or components.

The system turnover processes from Bechtel Construction to NC Startup are described in project procedures. System turnovers receive oversight by both Bechtel QA and NC QA.

Oversight Transition from Bechtel QA to NC QA, and NC QA to NPG QA

Transition of authority for the execution of QA Program requirements from Bechtel QA to TVA NC QA, and then from TVA NC QA to NPG QA is described in NC PP-14, Watts Bar Unit 2 Audits and Assessments (Reference [A6-6]). This procedure provides the strategies for formal transition of QA from Bechtel to NC and from NC QA to NPG QA.

To support transition and to establish a basis for concluding that Bechtel has provided complete and comprehensive oversight of the implementation of the PNQAM within the WBN Unit 2 project, NC QA conducted a series of audits with emphasis on project wide compliance with each of the criteria of 10 CFR Part 50, Appendix B as documented in the PNQAM. These audits provide NC QA assurance of Bechtel QA effectiveness as well as establish a basis for the subsequent turnover of WBN Unit 2 NC QA responsibilities to TVA NPG QA.

ASME Program responsibilities are transitioned as follows: commencing with the ANI signature on the completed system N-5, TVA NC assumes responsibility for implementation of the ASME Section XI repair and replacement program for the system. Future work will be under the control of NC until turned over to TVA NPG. Bechtel non-ASME work will continue until the system is complete or turned over to NC startup. QA oversight will be maintained throughout the process.

The transition of full responsibility for the execution of the NQAP requirements from NC to NPG will occur prior to fuel load. Deletion of Appendix F of the NQAP pertaining to the WBN Unit 2 construction organization will be evaluated for reduction in commitments in accordance with TVA's procedure for QA Plan Management and will be submitted to the NRC as required by 10 CFR 50.55, Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses, for Units under a construction permit. The NC QA staff will be available to support NPG as requested by NPG QA.

QA Operational Phase Staffing

The staffing objective, including the Department Manager, is being met. The Site QA organization is currently staffed with an additional QA Assessor responsible for WBN Unit 1-Unit 2 interface and operational readiness. Once WBN Unit 2 is on-line, site QA staffing will be reduced by one and aligned with that of Sequoyah (TVA's dual unit operations staffing model).

Supplemental staffing will be utilized as necessary to support high activity periods that include system and area walkdowns, system turnovers, pre-operational testing, and power ascension oversight.

Training and qualification of NPG QA personnel to support the audit/assessment function will continue to be conducted in accordance with QADM 7.1, Quality Assurance Orientation.

QA Program Effectiveness

TVA is confident that WBN Unit 2 construction has been substantially completed in a quality manner and in compliance with the construction permit, design specifications, and regulations. With respect to quality of work:

- Bechtel and TVA QA performed thousands of periodic audits & surveillances.
- Quality control acceptance rate on the first inspection of 97%.
- Independent audits of the effectiveness of the project QA program implementation were performed annually. No programmatic issues were identified.
- ASME conducted two independent project team surveys/audits of Bechtel Power Corporation (engineering) and Bechtel Construction Operations Incorporated (construction) QA manual activities including the project QA organization performance with no significant issues.

TVA utilized multiple independent assessment teams to assure adequacy of approach, progress, and quality of work including:

- McKinsey and Associates
- Nuclear Construction Review Board
- Nuclear Safety Review Board

NRC is also validating results through inspections. The NRC has conducted over 100,000 man-hours of inspections during the WBN Unit 2 Construction Completion project. The following NRC Inspections document the NRC oversight of TVA's Quality Assurance activities:

- NRC Integrated Inspection Report 05000391/2013609 (Reference [A6-7])
- NRC Integrated Inspection Report 05000391/2014602 (Reference [A6-8])
- NRC Integrated Inspection Report 05000391/2014611 (Reference [A6-9])
- Mid - Cycle Assessment Letter - Watts Bar Nuclear Plant Unit 2 (NRC Inspection Report 05000391/2014606) (Reference [A6-10])
- NRC Integrated Inspection Report 05000391/2014607 (Reference [A6-11])
- NRC Integrated Inspection Report 05000391/2014608 (Reference [A6-12])
- NRC Integrated Inspection Report 05000391/2014614 (Reference [A6-13])
- NRC Integrated Inspection Report 05000391/2014615 (Reference [A6-14])
- End-of-Cycle Assessment Letter - Watts Bar Nuclear Plant Unit 2 (NRC Inspection Report 05000391/2015601) (Reference [A6-15])
- NRC Integrated Inspection Report 05000391/2015602 (Reference [A6-16])
- NRC Integrated Inspection Report 05000391/2015603 (Reference [A6-17])
- NRC Integrated Inspection Report 05000391/2015604 (Reference [A6-18])

There are no significant regulatory concerns identified by the above-listed inspections going forward. In addition, during the last week of June 2015, the NRC conducted the on-site phase of the Operational Readiness Assessment Team inspection with no significant issues identified. Thus, TVA is confident that WBN Unit 2 construction has been substantially completed in a quality manner and in compliance with the construction permit, design specifications, and regulations, as required by 10 CFR 50.57(a)(1).

Attachment A6
Quality Assurance Activities

Raul R. Baron, Senior Manager
NC Quality Assurance, WBN

L. Bryan Belvin, Senior Manger
NPG Site Quality Assurance WBN

As explained above, this attachment addresses the requirement in 10 CFR 50.57(a)(2) that TVA demonstrate that WBN Unit 2 will operate in conformity with the application as amended, the provisions of the Act, and the rules and regulations of the Commission. Completion of the WBN Unit 2 Test Program satisfies this requirement as preoperational and power ascension testing will confirm plant operability.

Specifically, the purpose of the initial test program for WBN Unit 2 is to assure that the installed plant structures, systems, and components: (1) are subjected to tests as required to verify that the plant has been properly designed and constructed, (2) are ready to operate in a manner that will not endanger the health and safety of the public, and (3) provide assurance of total plant reliability for operation. The test program also will ensure, to the extent practical, that the procedures for operating the plant safely have been evaluated and demonstrated and that the operating organization is knowledgeable about the plant and procedures.

The initial test program will utilize, to the extent practical, operations personnel and operating procedures to provide familiarization with the plant installation and demonstrate the adequacy of operating procedures.

The program is divided into two phases—the preoperational test phase and the power ascension test phase. Preoperational phase testing will be performed prior to fuel load, while power ascension testing will be performed during and following fuel loading activities. During each of these two phases, tests are performed to verify design requirements of safety-related and selected non-safety-related components, systems, and structures. A graded approach, based on criteria provided in Regulatory Guide 1.68, Revision 2, is used for selection of plant structures, systems, components, and design features to be included in the initial test program.

1. PREOPERATIONAL TESTING

During the preoperational testing phase, three types of tests will be performed: (1) component tests, (2) preoperational tests, and (3) acceptance tests. Regulatory guidance has been used for development of initial test program requirements as discussed in Section 14.2.7 of the FSAR.

Component (preliminary) tests are performed on safety-related and non safety-related components and consist of activities such as instrument calibration, flushing, cleaning, and functional tests of individual components to demonstrate conformance with design requirements. Component testing prepares individual components for system level testing.

Preoperational tests are performed on safety-related and selected non safety-related structures, systems, components, and design features as required to demonstrate their capability to perform in accordance with design requirements. Preoperational tests are intended to demonstrate the proper operation of system design features through integrated operation of components under normal and transient conditions, where practical, including system and component interactions. Such tests also demonstrate the capability of certain component

design features for which system operation is required to establish the necessary test conditions.

Summaries of preoperational test instructions are provided in FSAR Table 14.2-1. Preoperational test instructions were transmitted to the NRC by docketed correspondence beginning in 2010. The preoperational test instructions were the subject of comments and questions from the NRC resulting from review and inspection of preoperational test plans for compliance with commitments.

Components and systems that do not perform a safety-related function and that are not required for safe shutdown and cooldown of the reactor under normal or upset conditions are tested in accordance with Acceptance Test Instructions.

Preoperational tests summarized in FSAR Table 14.2-1 will be completed and test results approved prior to commencing fuel load. Tests, or portions thereof, which cannot be completed prior to fuel load will be evaluated to assure that incomplete tests will not adversely affect fuel loading operations or cause features that have not been tested to be relied upon for safe plant operation. Preoperational testing activities will be coordinated through the Joint Test Group (JTG), as described in FSAR Section 14.2.2.5. In addition, the JTG and the Plant Operations Review Committee (PORC) or the Test Review Group (TRG) will review the technical justification for delaying test completion until after fuel load. If approved by the Plant Manager, the technical justification and schedule, including power level for completion of delayed testing, will be provided to the NRC staff prior to fuel load.

2. POWER ASCENSION TESTING

During the power ascension testing phase, power ascension tests, surveillance tests, and other permanent plant tests and technical instructions will be performed to demonstrate satisfactory operation of systems. Summaries of power ascension testing to be performed during the initial test program are provided in Table 14.2-2 of the FSAR.

Power ascension tests will be performed beginning with activities leading to loading fuel and ending with full power operation. The intent of these tests is to assure that fuel loading is effected in a safe manner; that tests deferred from the preoperational test phase are completed satisfactorily; that the plant is safely brought to rated capacity; that plant performance is satisfactory in terms of established design criteria; and to demonstrate, where practical, that the plant is capable of withstanding anticipated transients and postulated accidents. Testing activities related to the power ascension program are further described in FSAR Section 14.2.10.

Tests will be conducted in accordance with approved test procedures. Review, approval, and revision of test procedures and the evaluation and disposition of test results will be accomplished by methods specified in the appropriate administrative procedures summarized in FSAR Section 14.2.3. Preoperational and power ascension tests are discussed in FSAR

Section 14.2.12. Power ascension testing activities will be coordinated through the TRG, as described in FSAR Section 14.2.2.6.

Both Preoperational and Power Ascension Testing activities are sequenced and scheduled around a series of major evolutions, including:

- **Preoperational Testing** (see FSAR Table 14.2-1):
  - Component Tests
  - Preoperational Tests
    - Open Vessel Testing - (Complete)
    - Safety Injection System Integrated Flow Testing - (Complete)
    - Hot Functional Tests - (Complete)
    - Integrated Safeguards Test (Engineered Safety Features (ESF) Actuating System)
  - Acceptance Tests
    - Primary (Cold) Hydrostatic Test - (Complete)
    - Secondary Side Hydrostatic Test - (Complete)
    - Containment Integrated Leak Rate Test

- **Power Ascension Testing** (see FSAR Table 14.2-2):
  - Fuel Load
  - Pre-Critical Tests
  - Initial Criticality
  - Low Power Tests
  - Power Ascension
  - Declaration Of Commercial Operations

Based on this comprehensive test program, TVA is confident that the requirements of Section 50.57(a)(2) are satisfied at WBN Unit 2 in conjunction with the substantial completion of plant construction. The test program also will ensure, to the extent practical, that the procedures for operating the plant safely have been evaluated and demonstrated and that the operating organization is knowledgeable about the plant and procedures.

Attachment B
WBN Unit 2 Test Program

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Preoperational Startup Test

Aaron P. Melda, Executive Director,
WBN U2 Completion

Craig S. Faulkner, Senior Manager
Power Ascension Testing

Attachment C1
Department Transition and Change Management Plans

This attachment discusses TVA's implementation of the Transition and Change Management Plans that were developed to manage the transition of the WBN site from single unit operation to dual unit operation. Thus, this attachment supports a finding under 10 CFR 50.57(a)(3) that there is reasonable assurance that activities authorized by the WBN Unit 2 operating license can be conducted without endangering public health and safety, and will be conducted in compliance with NRC regulations.

References:

[C1-1]	2-TI-433, Watts Bar Nuclear Plant Dual Unit Operational Readiness Review Process
[C1-2]	NPG-SPP-03.1.11, NPG Self-Assessment Program

In order to prepare for dual unit operation, in 2013 each major department at WBN developed and implemented a Transition and Change Management Plan. The transition plans were developed in accordance with the Watts Bar Nuclear Plant Dual Unit Operational Readiness Review Process (Reference [C1-1]). The plans ensure a clear path for operational excellence in the transition of WBN Unit 2 from construction to operation. These plans defined the actions necessary to establish dual unit readiness and drive these actions to completion to ensure a smooth transition to dual unit operation. The transition plans underwent a challenge board to verify parameters such as proper scope, detail, approach and consistency prior to issue. These plans addressed the following areas:

- Roles and Responsibilities
- Staffing and Organization
- Training
- Programs and Processes
- Procedures
- Facilities and Special Equipment
- Performance Indicators & Gaps
- Standards
- Transition from Construction to the Operating Organization
- Benchmarking
- Contingencies
- Change Management/Communication Plan
- Operating Experience Review
- Budget
- Action Plans and Tracking

Each organization assessed the effectiveness of the Transition and Change Management Plans and the organization's progress toward readiness to operate a second unit at WBN. These self assessments were performed in accordance with the NPG Self-Assessment Program (Reference [C1-2]). These assessments provide a basis for managers to conclude that the personnel, programs and processes of their organizations are in place to support the operation

of two units at WBN. To facilitate an independent appraisal of the organization's readiness, the Self-Assessment Team Leader was not part of the organization's Transition Team, and the assessment team had at least one team member with dual unit site experience. Additionally, the Dual Unit Operational Readiness Self-Assessment reports were subjected to an internal challenge board conducted prior to the Self-Assessment Review Board (SARB).

The self-assessments reviewed the following items to ensure all issues had been properly evaluated:

- Previous responses and actions for significant Operating Experience events
- Previous Readiness Self-Assessment Reports
- Applicable continuous improvement plans
- INPO 11-008, Pre-Startup Performance Objectives and Criteria
- INPO NX-1067, Browns Ferry Nuclear Plant Unit 1 Restart Operational Readiness Lessons Learned
- WBN-U2-S-13-001, Self-Assessment of Operational Readiness for WBN Unit 2
- WBN-U2-S-13-002, 2012 INPO OE New Plant Development Transition Plan Overview
- Staffing and Organization
- Training of Personnel
- Programs/Processes
- Procedures
- Facilities and Special Equipment
- Performance Indicators
- Standards
- Gap Plans
- Transition from Construction to the Operating Organization
- Contingencies
- Communications Plans

A site-wide Transition and Change Management Plan was also generated to document the site's readiness to display operational excellence in the transition of WBN Unit 2 to operation. This plan defined the site perspective and the actions necessary to establish dual unit readiness. Similarly, a corporate transition and change management plan was generated to define the actions necessary to certify the readiness of TVA corporate organizations to support seven operating units and to verify the ability to maintain excellence through the transition to dual unit operation at WBN.

The following table shows the department/organizations that performed a transition plan and/or self-assessment.

Dept/Org/Function	Transition Plan	Self-Assessments Initial	Self-Assessments Final
Operations	X	X	X
Fire Operations	Included in Ops	Included in Ops	Included in Ops
Maintenance	X	X	X

Engineering	X	X	X
Chemistry	X	X	X
Environmental	Included in Chem.	Included in Chem.	Included in Chem.
Work Control (Outage & Scheduling)	X	X	X
Radiation Protection	X	X	X
Emergency Prep	Included in SL	Included in SL	Included in SL
Training	X	X	X
Security	Included in SL	X	X
Safety and Licensing (SL)	X	X	X
Quality Assurance	X	NA	Included in Corp
Document Control	Included in SL	Included in SL	Included in SL
Performance	Included in SL	Included in SL	Included in SL
Modifications & Projects	Included in Corp	NA	Included in Corp
Supply Chain	X	NA	NA
Human Resources	Included in Corp	NA	Included in Corp
Site	X	NA	X
Corporate	X	NA	X

In addition to the transition plans and self-assessments to evaluate implementation of the transition plans, a detailed action item matrix was developed for each department to track action items initiated to resolve identified issues. The action item matrix is an ongoing list that contains a description of the action, the owner's name or title, the date when the action is due, and the latest status. The actions in the matrices are tracked in the site's action tracking system and reviewed at the weekly Operational Readiness meeting. This meeting reviews metrics and deliverables for each major department at WBN. The action item matrix tracks actions from sources such as the following (focus is on nearer term and critical actions, with completed actions dropping off the matrices):

- Transition Action Plans
- Dual-Unit Readiness Department Self-Assessment Actions
- Performance and Analysis Assessment (PAA) Organization Internal Self-Assessment Actions
- Mock WANO Pre-Start Up Review Actions
- WANO Pre-Start Up Review Actions
- ORAT Focused Self-Assessment Actions
- ORAT Readiness Assessment Actions

DEPARTMENTAL SELF-ASSESSMENT SUMMARIES:

Self-Assessments were performed in April 2013 and January 2014. The 2014 Self-Assessments, focusing on the organizations' staffing, training, programs, and procedures, are summarized below, along with corresponding completed actions to resolve any identified issues. Progress on critical actions is tracked and monitored by site management during weekly Operational Readiness meetings.

Operations

The overall assessment determined that the Operations organization is making satisfactory progress transitioning to dual unit operations. Operations Department "Dual Unit Readiness" is near completion and Dual Unit operations processes will be simulated during WBN Unit 2 Hot Functional Testing.

- Standards:
  The significance of maintaining high standards and expectations for the WBN Operations Department is clearly understood. This includes: Pre-Op Testing, Fuel Load, and Power Ascension Testing activities on WBN Unit 2. Operations Department supervision and staff will ensure standards are always met in accordance with the process or procedure used. High standards ensure personal, nuclear, and radiological safety is always met. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. Operations supervision will have the responsibility to ensure personnel follow the standards in accordance with the applicable procedure being utilized for the task or activity. Observations are being conducted on both Units with a focus on standards and professionalism. Shift Managers and Unit Supervisors will maintain their crews' standards high to ensure the success of WBN Unit 2 startup. Two Operations Superintendents will be in position as complex, infrequently performed tests or evolutions (CIPTE) managers for major tests and evolutions, providing additional oversight.

- Staffing:
  WBN Operations Department meets all regulatory requirements for dual unit staffing. An additional Licensed Operator class, in progress now, will be graduating in July of 2016 (11 ROs). Operations Non-License, Support, and Daily/Outage Work Control staffing is also met for dual unit operations. An adequate number of Non-Licensed Operators and Senior Reactor Operators (Unit Supervisors, or SROs working as ROs and Shift Technical Advisors) are on staff to support startup testing and dual unit operations. In the event of a dual unit trip, the Outage Control Center would be fully staffed, and the forced outage plan for the unit(s) would be implemented. No increase in Fire Operations personnel will occur as a result of transition to dual unit operation; the Fire Operations group already meets dual unit staffing requirements.

- Training:
  Operations Dual Unit License training is now complete. Dual Unit license applications, (NRC Form 398, Personal Qualification Statements, NRC Form 396, Certification of Medical Examinations) have been submitted to the NRC. Power Ascension Testing (PAT) Just In Time (JIT) training is scheduled to be conducted during 2015. Training on the WBN Unit 2 system and area turnover processes have been included in periodic Licensed Operator Requalification (LOR) and Non-LOR requalification training as changes to the processes have occurred. No significant changes in mitigation strategy

exist between WBN Unit 1 and Unit 2 in Abnormal Operating Instruction (AOI) or Emergency Operating Procedure (EOP) response due to plant designs. Initial WBN Unit 2 EOP training was administered and practiced in the simulator, with no performance changes noted. EOP differences are scoped into the WBN Unit 2 differences lessons that were administered through 2014 Training cycles.

The Fire Marshal and the WBN Unit 1 Operations Superintendent determined that formal training was required on the dual unit Fire Protection Report (FPR). Operations Training was conducted in 2014 Licensed Operator Requalification (LOR) cycle 5, for "Dual Unit FPR" training. Make-up for four Licensed Operators who did not attend the training was scheduled and completed before the end of LOR Cycle 1 in 2015. Formal training for Fire Operations has been completed.

- Programs:
  Operations programs and processes are fleet processes designed to address multi-unit sites and have already been established. The transition from Nuclear Construction (NC) processes to Nuclear Power Group (NPG) processes for Limiting Conditions for Operation (LCO) tracking, Work Management, Clearance Program, Annunciator Disablement, Locked Valve/Breaker, Fuse Control and Configuration Control will occur at System/Area Turnover for components for the specified system. Other processes will be implemented at WBN Unit 2 Fuel Load and during PAT, but will be simulated at the major milestone of WBN Unit 2 Hot Functional Testing to ensure a smooth transition prior to licensing of WBN Unit 2. Operations programs and processes have been reviewed with rigorous plans in progress to ensure a smooth transition to dual unit operations.

- Procedures:
  Operations procedures for “normal” (includes testing), “Abnormal” and “Emergencies” have been completed and issued or are waiting to be issued. Some Operations Procedures are tied to implementation of specific Design Change Notices (DCNs) or regulatory document issuance (e.g., the WBN Dual Unit FPR). Abnormal Operating Procedures cannot be issued ahead of the issuance of the Dual Unit FPR because this could cause a “non-compliance” for the current “single Unit” FPR. However, there is a rigorous plan in place to ensure smooth transition to these procedures. Fire Operations procedures are complete and are waiting to be issued.

Maintenance

The overall assessment determined that the Maintenance organization is making satisfactory progress transitioning to dual unit operations.

- Standards:
  The significance of maintaining high standards and expectations for the WBN Maintenance Department is clearly understood. This includes: Pre-Op Testing, Fuel

Load, and Power Ascension Testing activities on WBN Unit 2. Maintenance Department supervision and staff will ensure standards are always met in accordance with the process or procedure used. High standards ensure personal, nuclear, and radiological safety is always met. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. This will be performed by conducting observations on both WBN Unit 1 and Unit 2 activities while focusing on expectations and standards. Maintenance supervision will have the responsibilities for their crews to follow the standards in accordance with the applicable procedure being utilized for the task or activity.

- Staffing:
  The approved staffing plan in the Maintenance Department Transition and Change Management Plan was reviewed and found to be adequate for dual unit operation. An integrated staffing plan for WBN included additional support for WBN Unit 2 initial fuel loading, power ascension testing, and rapid response/site restoration (tool, material, and temporary facilities removal, grounds restoration). This final plan is complete and the Maintenance Department meets the resource needs for dual unit operations.

- Training:
  WBN Unit 1/Unit 2 Differences training was conducted and documented during the Maintenance continuing training in 2011 and 2014 with craft personnel. The Maintenance Department established minimum defense in depth qualification requirements for each maintenance task needed to support dual unit operation. Maintenance tracked qualifications for each needed task, including new maintenance tasks required by differences in equipment between Units 1 and 2 and will complete qualifications prior to the scheduled WBN Unit 2 fuel load. An area for improvement was identified for Maintenance department shops to improve the details of their qualification schedules to better support qualifications in a timely manner based on plant conditions and equipment availability. This issue has been reviewed by the Maintenance first line supervisor curriculum review committee.

- Programs:
  The programs that are managed by Maintenance Department (Welding, Valves, Cranes, Rework, Maintenance & Test Equipment, and Leak Management) were found to be sufficient for dual unit operation. A review of previous concerns with the management and execution of the Foreign Material Exclusion (FME) program has revealed that the corrective actions taken since the last assessment have been effective. The 2013 WBN WANO inspection team removed FME as an identified area for improvement.

  All actions from previous self-assessments have been completed and closed. Review of resource loaded schedules for maintenance requirements supporting pre-startup testing, fuel load and power ascension testing have determined that resources are available to support the indicated work load. Instrument and Control (I&C) has the largest challenge but there will be sufficient resources available to meet the demand with contractor

support that will migrate from WBN Unit 2 construction. Mechanical and Electrical resources are sufficient to meet the identified work load.

WBN Unit 1 and 2 differences have been evaluated and all areas in regards to special equipment, tools and procedures have been identified. All special tools required for dual unit operation have been acquired by WBN Unit 1 or are identified for turnover as part of the construction process.

- Procedures:
  Procedures required for dual unit operations have been identified and assigned to the appropriate group for completion. Procedure development is tracked by Dual Unit Operational Readiness Team (DUORT) Weekly Metrics. At the time of the self-assessment, Maintenance procedure development and issuance was challenged and progress was behind projected goals for completion due to staffing challenges with procedure writers. WBN Unit 2 was actively engaged to correct this issue and implemented a plan that was tracked by DUORT senior management on a weekly basis. To date, the procedures effort is on schedule.

Chemistry

The overall assessment determined that the Chemistry organization is making satisfactory progress transitioning to dual unit operations.

- Standards:
  Chemistry departmental standards are satisfactory for dual unit operations. Departmental standards are implemented by WBN station procedure CM-1.04 "Conduct of Chemistry" and governed by TVA corporate procedure CHDP-2 "Conduct of Chemistry". These procedures outline guidelines for the conduct of departmental activities and clearly define roles and responsibilities. Throughout the transition period, a high level of emphasis was placed on maintaining satisfactory standards. This was accomplished by sound training and reinforcement of high standards by managers and supervisors in the field.

- Staffing:
  Chemistry staffing was initially found unsatisfactory and as a result a Chemistry Staffing Plan was put in place. Progress on Chemistry staffing was tracked during weekly management meetings. Dual unit staffing has been achieved to support all phases of operation, including outages.

- Training:
  Unit differences training was provided to all Chemistry personnel during previous transition efforts. Additionally, unit differences were incorporated into existing lesson plans and qualification cards to ensure all future personnel receive this training. Interfacing systems affecting Chemistry are already owned and controlled by the

operating organization. Power ascension testing training will be conducted using the Just-In-Time training process.

- Programs:
  A potential issue with the condensate demineralizer system was identified during the self-assessment; limited availability of the regeneration portion of the system had the potential to adversely impact secondary cycle cleanup during pre-operational testing and power ascension testing. This issue was resolved by providing WBN Unit 2 Startup group with a more efficient ion exchange resin allowing for greater cleanup and longer lasting run times.

- Procedures:
  Chemistry developed a procedures group directed by the Chemistry Technical Support Supervisor. This group is comprised of a team of chemistry individuals, including WBN Unit 2 construction and TVA corporate personnel, who meet to provide oversight and review of test procedures. Routine meetings with appropriate WBN Unit 2 startup and testing personnel were established to integrate chemistry requirements into the startup and testing procedures for WBN Unit 2 cold hydro, hot functional, and power ascension testing. To date, the procedures effort is on schedule.

Engineering

The overall assessment determined that the Engineering organization is making satisfactory progress transitioning to dual unit operations. Actions as a result of the self-assessment are complete and the department is ready for dual unit operation.

- Standards:
  The significance of maintaining high standards and expectations for the WBN Engineering Department is clearly understood. This includes: Pre-Op Testing, Fuel Load, and Power Ascension Testing activities on WBN Unit 2. Engineering Department supervision and staff will ensure standards are always met in accordance with the process or procedure used. High standards ensure personal, nuclear, and radiological safety is always met. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. This will be performed by conducting observations on both WBN Unit 1 and Unit 2 activities while focusing on expectations and standards. Engineering supervision will have the responsibilities for ensuring personnel follow the standards in accordance with the applicable procedure being utilized for the task or activity.

- Staffing:
  The progression of newly hired engineering staff through the initial program was judged to be satisfactory. No gaps were identified in the area of qualifications based on the current staffing numbers and tenure of employees.

There will be supplemental contract staffing to support WBN Unit 2 transfer activities. These supplemental personnel will be on staff until the turnover of the systems is complete. Supplemental staffing needs beyond WBN Unit 2 system transfer activities (e.g., area turnovers, fuel load, and power ascension testing is fulfilled by site management.

Engineering has also implemented actions from the NPG Business Practice BP-120 (Retaining Critical Knowledge). This process is used to predict attrition/retirements and rotations and retain the critical knowledge to normal staffing and experience levels in the engineering organization.

- Training:
  Training was conducted for the Engineering Support Personnel (ESP) population on unit differences in 2011. This training incorporated HU (Human Performance) tool usage as related to performing work on the proper components (i.e., avoiding work on wrong unit/wrong train). Unit differences training was updated and was presented to the ESP population during 2014.

  Engineering management response to multi-unit events exists in the current procedural framework that is used at both Sequoyah (SQN) and Browns Ferry Nuclear (BFN), in addition to WBN.

  Engineering department training was performed including Start-Up engineering personnel to address WBN Unit 2 system, program, and component transfer processes. This training was conducted during the 3rd Quarter 2013 Engineering Continuing Training at WBN.

- Programs:
  The Focused Self Assessment found this area satisfactory. All programs and processes have been reviewed with rigorous plans to ensure a smooth transition to Dual Unit Operations. No open actions or other issues were identified within this area challenging dual unit readiness.

- Procedures:
  The Focused Self Assessment found this area satisfactory. WBN Unit 1 Engineering is involved in development of WBN Unit 2 procedures. Engineering procedures are tracking ahead of system turnover and no threat to completion of the Engineering procedures has been identified. Review of open actions identified a Learning Opportunity related to the job function and expectations of Reactor Engineering and tritium production. This resulted in generating a desktop guide to reflect the Roles and Responsibilities established by the Tritium Site Project Manager and Reactor Engineering Manager.

Work Control

The overall assessment determined that the Work Control organization is making satisfactory progress transitioning to dual unit operations.

- Standards:
  The significance of maintaining high standards and expectations for the WBN Work Control Department is clearly understood. This includes: Pre-Op Testing, Fuel Load, and Power Ascension Testing activities on WBN Unit 2. Work Management Department supervision and staff will ensure standards are always met in accordance with the process or procedure used. High standards ensure personal, nuclear, and radiological safety is always met. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. This will be performed by conducting observations on both WBN Unit 1 and Unit 2 activities while focusing on expectations and standards. Work Control supervision will have the responsibilities to ensure personnel follow the standards in accordance with the applicable procedure being utilized for the task or activity.

- Staffing:
  The Work Control department has developed a plan to be fully staffed for two unit operations in 2015. The WBN organization chart will mirror Sequoyah Nuclear Plant, which is a dual unit operating site. For dual unit operations, the department will need to fill additional positions. Staffing is on track to be completed in 2015.

- Training:
  The differences between the units have been greatly reduced by the implementation of the Distributed Control System upgrade on WBN Unit 1. Planner Training is addressed under TPD-PLN, Planner Training Program. The section for Continuing/Requalification Training discusses the Planner Curriculum Review Committee and provides the guidance to address continuing technical and administrative topics. The Training Program Description (TPD) also addresses the training needs for supplemental Planners.

  Work Control reviewed the major testing milestone and did not identify any scenarios that would require JIT training for Work Control personnel. Existing practices and procedures already in use adequately identify JIT training needs for applicable work groups.

- Programs:
  Work Control reviewed processes and programs and verified that there is no difference for single unit or dual unit operation with respect to planning and scheduling of daily and outage work schedules. The normal Work Control processes adequately address potential dual unit impacts.

Development of the approximately 4050 WBN Unit 2 preventative maintenance (PM) procedures needed to support system turnover is nearing completion and will be ready to support the system turnovers.

The generation of PM work orders needed for system turnovers, system operability, and the dual unit cycle plan are nearing completion with any exceptions being tracked each week in the DUORT meeting.

Work Management methods and protocols during multi-unit events are already in place. The NPG-SPP-07.2.4, Forced Outage or Short Duration Planned Outage Management procedure establishes philosophies and management requirements for the planning, scheduling, execution, and evaluation of all forced or short duration planned (non-refueling) outages, to ensure the station is prepared to safely recover the unit(s) in a safe, timely and well-coordinated manner. This procedure provides adequate guidance for the overall preparation, approval, and execution of the Forced Outage Plan.

- Procedures:
  No procedure changes or procedure development impact Work Control. WBN Unit 2 initial performance Surveillance Instruction Work Orders have been generated and scheduled for WBN Unit 2 startup. Site management is monitoring progress on development of PMs for WBN Unit 2.

Radiation Protection

The overall assessment determined that the Radiation Protection organization is making satisfactory progress transitioning to dual unit operations. Learning opportunities were identified, but the significance is minimal to the start-up of WBN Unit 2.

- Standards:
  The significance of maintaining high standards and expectations for the WBN Radiation Protection Department is clearly understood. This includes: Pre-Op Testing, Fuel Load, and Power Ascension Testing activities on WBN Unit 2. Radiation Protection Department supervision and staff will ensure standards are always met in accordance with the process or procedure used. High standards ensure personal, nuclear, and radiological safety is always met. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. This will be performed by conducting observations on both WBN Unit 1 and Unit 2 activities while focusing on expectations and standards. Radiation Protection supervision will have the responsibilities to ensure personnel follow the standards in accordance with the applicable procedure being utilized for the task or activity.

- Staffing:
  Radiation Protection (RP) department has developed a plan to be fully staffed for two unit operations in 2015. The WBN organization chart will mirror Sequoyah Nuclear Plant, which is a dual unit operating site. For dual unit operations, the department will need to fill additional positions. Staffing is on track to be completed in 2015.

- Training:
  Training has been conducted on specific training modules for dual unit operation. This includes training of augmented technicians on fundamental lesson plans and unit differences.

  System turnovers are being communicated within the RP organization to both WBN Unit 1 and Unit 2 personnel. The turnovers and their impacts to the station are communicated in daily briefings. The changes in system or equipment operating margin due to two-unit operation have been covered in training. In addition, RP is using the "right train-right unit" mental model and has formalized this in pre-job briefings and daily meetings. These behaviors are reinforced with peer to peer coaching and management observations.

  Emergency Preparedness training is covered on an annual basis for all TVA RP staff. The training is all-inclusive and is not unit specific. The organization has the skill set to respond to any emergency regardless of the unit.

- Programs:
  The NPG RP Instrument Working Group has sufficient neutron detectors to support WBN Unit 2 start-up. The Working Group has also commissioned a plan to perform neutron characterization of WBN and purchased the equipment to perform the study during power ascension activities. This plan was developed by a certified health physicist (CHP) and will be conducted with TVA resources. The Working Group has ordered sufficient numbers of individual dosimeters, neutron dosimeters and telemetry for such devices.

- Procedures:
  WBN Unit 1 technical staff has the responsibility for and control of all department procedures. RP procedures are all inclusive of all activities on both units.

  The assessment identified two learning opportunities: 1) Walkdown all WBN Unit 2 containment and WBN Unit 2 annulus penetrations and include these areas as a requirement to be surveyed during start up operations; and 2) Determine what WBN Unit 2 and/or potential common plant areas may need temporary shielding for WBN Unit 2 operation and outages. WBN Unit 2 containment and annulus penetrations were walked down and there are no differences between Units 1 and 2 requiring further action. Temporary shielding required for WBN Unit 2 startup is already in place.

Training

- Standards:
  Training began to address two-unit operation in 2011. Maintenance & Technical (M&T) training programs have used Dynamic Learning Activity (DLA) scenarios to emphasize the importance of technicians working on the right unit, in the right train, and on the right component as these behaviors are essential to safe, reliable operation of two units. In addition to the DLA's, M&T uses the following methods to reinforce strong human performance behaviors:
  - Model work packages include unit designator errors for the technicians to identify
  - Simulated procedure instructions are used on a device to validate proper operation of switches in a specified order that use multiple unit designators
  - Human performance tool exercises are designed to develop awareness of multiple unit designators and/or locations

  Engineering Training has developed training to address knowledge and/or expertise gaps in processes and procedures for WBN Unit 2 startup engineers who will be transferred to the operating organization upon completion of WBN Unit 2 testing and startup. Operations Training reinforces the use of unit designations in training classes and simulator scenarios. Instructor training included case studies using actual station and industry observations that led instructors to identify methods to reinforce appropriate behaviors and high standards in classroom, lab, and simulator training settings.

- Staffing:
  TVA specifies a standard organization headcount for fleet training departments. As vacancies occur, line or supplemental personnel are temporarily assigned until vacant positions are permanently filled. Three supplemental instructors are supporting concurrent Initial License Training classes.

- Training:
  Operations line and training collaborated to reconcile challenges associated with Power Ascension Testing during Licensed Operator Requalification (LOR) training cycles in 2015. In addition, the 2015 training plan includes:
  - WBN Unit 2 Hot Functional Testing
  - Engineered Safety Features
  - Power Ascension Tests
  - Procedures and requirements according to the Unit differences Training Plan
  - JIT training for WBN Unit 2 Reactor Coolant System flow coast-down testing
  - JIT training for WBN Unit 2 Turbine trip / Loss of Off Site Power
  - WBN Unit 2 50% Load Reject Testing
  - Plant shutdown from the Auxiliary Control Room

  Unit differences and unit interfaces were found to be adequately covered by training modules presented to Operators, Engineers, Maintenance, Chemistry and Radiation

Protection Technicians. Recurring refresher training updates personnel on unit differences.

In particular, Training reviewed the WBN Unit 1 abnormal and emergency procedures against the intended structure and content of the WBN Unit 2 procedures and has determined that they are nearly identical. The WBN Unit 2 Emergency Operating Instructions (EOIs) were developed to the same revision level and the exact format as the suite of WBN Unit 1 EOIs in use. The EOIs are symptom-based procedures and there is no change in logic for implementation as a result of any differences in design and control. Where differences exist in emergency or abnormal response, such as are associated with a Steam Generator Tube Rupture (SGTR) on WBN Unit 2, they are addressed by the training materials on unit differences.

All dual unit license training is complete and Dual Unit Operator License applications (NRC Forms 396 and 398) have been submitted to the NRC.

All Operations, Engineering, and Maintenance training for Fukushima FLEX Modifications and Procedures has been completed.

- Programs:
  Fleet procedures and processes established for multi-unit sites govern all of the accredited and non-accredited training programs for WBN. The Nuclear Power Group (NPG) follows the Systematic Approach to Training (SAT) process and uses approved fleet procedures and forms to implement this process.

  A review of the Training Department 5-year Self-Assessment plan found it to be adequate to address dual unit operation.

- Procedures:
  The Training Department currently operates using approved fleet procedures that support both SQN (two-unit site) and BFN (three-unit site). No new Training Department procedures are required for the transition to dual unit operations.

  The Unit 2 procedure development schedule is reviewed at least monthly by training instructors and training managers to ensure adequate time and resources are allocated to design and develop training materials for new or modified procedures prior to the affected training cycles.

Security

The Security self-assessment team concluded that the WBN Security Department's readiness for a WBN Unit 2 start and dual unit operation was satisfactory.

- Standards:
  The significance of maintaining high standards and expectations for the WBN Security Department is clearly understood. Security Department supervision and staff will ensure standards are always met in accordance with the process or procedure used. High standards ensure personal, nuclear, and radiological safety is always met. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. This will be performed by conducting observations on both WBN Unit 1 and WBN Unit 2 activities that focus on setting and reinforcing high standards. Security shift supervision will have the responsibilities to ensure personnel follow the standards in accordance with the applicable procedure being utilized for the task or activity and the Security staff will provide the governance and oversight to ensure these standards are met.

- Staffing:
  There is a sufficient number of security personnel who are qualified to support a dual unit site. WBN Site Security is configured with four primary squads, as well as an additional squad of security personnel that supports the WBN Unit 2 construction access control activities at the North Access Control Portal (NACP). The additional security personnel at the NACP represent a fifth squad. As WBN Unit 2 transitions from construction to start-up operations and the majority of construction personnel are released, the NACP will be closed and all personnel will access the WBN Protected Area via the West Access Control Portal (WACP). The Site Security organization will absorb the fifth squad personnel and will revert back to a four squad rotation with the closing of the North Access Control Portal. The NACP security staff will be used to offset the site's security attrition rate through the WBN Unit 2 start up and operation. No additional changes will be required for dual unit operation.

- Training:
  WBN Security's training tasks are governed by the WBN Training Plan and are not individual unit specific. No training program changes are required to support dual unit operation. The security equipment is the same except the NACP barriers and search equipment layout. These differences are accounted for in the procedure guidance and will not be an issue once the NACP is closed. No training program changes are required to support dual unit operation.

  The Security system itself will not change due to dual unit operation. Security has managers, coordinators and supervisors that attend plant meetings and who will be aware of any changing plant conditions during power ascension and normal operation. These same individuals are also kept aware of any changes to protected equipment and target set components by the Security Program Manager for Protective Strategy.

  Familiarization training with all security personnel to ensure mindset alignment to a dual unit site is ongoing and will be completed shortly after WBN Unit 2 hot functional testing.

- Programs:
  The WBN Physical Security Plan; Training, Qualification and Contingency Plan; and Site Security Instructions are not unit specific. The equipment is the same except the NACP barriers and search equipment layout. These differences are accounted for in the procedure guidance.

  Security Training and Force on Force preparations will include both units going forward. This includes new target sets for WBN Unit 2 equipment that will become active. WBN Unit 2 target sets are complete with table top exercises and planned limited scope drills.

- Procedures:
  The WBN Physical Security Plan will be revised to incorporate the requirements for dual unit operation.

  The applicable procedures that would be used by Security to deal with Contingency Response situations have been reviewed and do not need to be changed. Six Site Security Instructions (SSI) have been updated.

Safety and Licensing (Plant Support)

This assessment covered Emergency Preparedness (EP), Management Services (MS), Licensing (LIC), and Performance Improvement (PI). The assessment found that these departments were on track to support the transition from one unit to dual unit operations at the WBN Site.

- Standards:
  The significance of maintaining high standards and expectations regarding personnel, nuclear and radiological safety for the WBN Safety and Licensing (Plant Support) Department is clearly understood as vitally important to achieving our goal of safe and event-free performance through Pre-Op Testing, Fuel Load, and Power Ascension Testing activities on WBN Unit 2. Situational awareness will be emphasized as WBN Unit 2 activities move towards initial criticality to minimize potential error traps during the transition. This will be performed by conducting observations on both WBN Unit 1 and WBN Unit 2 activities while focusing on expectations and standards. Department supervision is responsible for ensuring personnel meet these standards in accordance with the applicable procedure being utilized for the task or activity.

- Staffing:
  EP - The Emergency Preparedness (EP) staff will not be increased as the current EP staffing meets the levels defined in the standard organization for WBN and is not forecast to change. Staffing was consistent with other multi-unit sites in the TVA fleet and is supported by a TVA Corporate structure.

MS - The ten Management Services positions budgeted for WBN dual unit operations were equal to the Sequoyah Nuclear Plant and the standard organization staffing. A transition plan existed to combine WBN Unit 1 and WBN Unit 2 Records Management personnel after the WBN Unit 2 outage in 2014. The WBN Unit 2 Site Support Manager will maintain ownership of all ASME Section III records until transfer to NPG, at which time WBN Unit 2 records management responsibilities will be completed.

LIC - The Licensing Manager position for WBN Unit 1 had recently been divided into three additional positions and three additional managers assigned (Compliance, Emergent Issues, and Commitment Management and Closure). This enabled better focus on long-term and day-to-day issues during the startup of WBN Unit 2. With these improvements, better focus on needed work was achieved and the planned staffing level was judged to be adequate. A previous concern about the lack of experience in the WBN Unit 1 Licensing personnel, both in WBN experience and in nuclear experience, had lessened because of the increased experience level of personnel due to the combination of WBN Unit 1 and WBN Unit 2 Licensing staffs. Contract staffing of licensing engineers will continue through the first WBN Unit 2 fuel cycle. Current and future Licensing department staffing was reviewed against Corrective Action Review Board (CARB), Self-Assessment Review Board (SARB), PER Screening Committee (PSC), and Plant Operations Review Committee (PORC) duty assignment requirements. Staffing was judged to be adequate to support these functions.

PI - Performance Improvement is currently at dual unit staffing. Supplemental staffing will be utilized, as needed, during the transition to dual unit operations.

- Training:
  EP - The Technical Support Center (TSC) and the Operations Support Center (OSC) and associated equipment will be utilized to manage an emergency for a two unit site. The training required for a two unit operation will be incorporated into the established training program and will be demonstrated during drills, table tops and exercises. New training items identified through drill critiques or line requests will be processed through department Curriculum Review Committees (CRCs) and the systematic approach to training process. EP is responsible for Radiological Emergency Plan (REP) training. In accordance with TRN-30, Radiological Emergency Preparedness Training, EP prepares REP lesson plans which in turn are used by Training and the site organizations during annual continuing training. Management methods/protocols in the TSC and the OSC during multi-unit events are the same as during a single unit event. The lead roles in the TSC and OSC will be unchanged; therefore, related training is unaffected. The EP Transition plan for REP duty assignments as needed for dual unit operation is adequate. The current skill set at the site needed to implement the requirements of the REP continues to be trained on in classroom settings and during drills and exercises.

  MS – Management Services evaluated training needs for differences in equipment between units and determined that no additional training is necessary to support MS

functions. There are no appreciable differences between WBN Unit 1 and WBN Unit 2 records management processes. All WBN Unit 1 personnel are qualified to handle WBN Unit 2 records. Management Services evaluated training needs for EP and REP duty assignments necessary to support two unit operations and determined that there is no additional training necessary to support MS functions.

LIC - No additional training has been identified as being required for equipment differences between the units. Training on interfaces between the units is currently planned for Licensing personnel. A WBN Unit 1/Unit 2 licensing bases differences document has been generated per ATI-1151-104, including Technical Specification differences, Offsite Dose Calculation Manual (ODCM) differences, and equipment/design differences.

PI - Performance Improvement will be unaffected by equipment differences and interfaces between the two units. Personnel will be trained on an as needed basis to ensure departments are able to address the corrective action program needs.

- Programs:
  EP - Emergency Preparedness has reviewed the programs and processes under its responsibility and found that dose assessment procedures used during a dual unit release should be presented in training to Dose assessors for the WBN site. Normally dose assessment is performed from the Central Emergency Control Center (CECC) by persons trained and proficient in multi-unit site dose releases based on training obtained during drills from other TVA sites. Two Learning Opportunities were identified during this assessment: 1) WBN site personnel needed to be trained in multi-unit release dose assessment; and 2) The Designated Emergency Response Equipment (DERE) component data base needed to be updated to reflect additional equipment associated with WBN Unit 2 operations. Actions to address these Learning Opportunities have been completed. [Note: DERE is now referred to as Equipment Important To Emergency Response (EITER)]

  MS - Bechtel holds the ASME Section III certificate for WBN Unit 2. The WBN Unit 2 Site Support Document Control and Records Management staff must remain in place, with ownership of WBN Unit 2 records processing, until all ASME code equipment has transitioned to ASME Section XI. To fulfill this requirement, the WBN Unit 2 Site Support Manager will maintain authority over ASME Section III related records and submittals until all have transferred. The majority of the WBN Unit 2 ASME Section III systems will transfer from Bechtel Construction to NC Startup in accordance with SMP-4.0, Watts Bar Nuclear Plant Unit 2 System Completion and Turnover.

  LIC - The interface between WBN Unit 1 and WBN Unit 2 personnel has improved due to the merger of the two groups. WBN Unit 1 and WBN Unit 2 review each other's submittals for applicability to each unit. The five year assessment plan was found to be adequate. The WBN Unit 2 framework letter and lists of closed commitments and the list

of letters with potential effect on the framework letter were also reviewed. All commitments have been identified and are being tracked appropriately.

PI - All required Performance Improvement programs are in place and functioning to support dual unit operations. Prior to fuel load on WBN Unit 2, the use of the Watts Bar Construction corrective action program will be phased out and all conditions adverse to quality will be entered into the TVA Nuclear corrective action program.

- Procedures:
  EP - Emergency Preparedness reviewed the REP and Implementing Procedures and found three procedures (EPIP-1 Emergency Plan Classification Logic, EPIP-13 Initial Dose Assessment for Radiological Emergency, and EPIP-14 Radiological Control Response) that required revision for two unit operation. These revisions are complete. All other EP procedures had been converted to the fleet standard template format and are ready for dual unit operation, including the Severe Accident Mitigation Guidelines (SAMG) procedures.

  MS - All required Management Services related procedures are in place.

  LIC – Based on a sampling of Licensing procedures it was concluded that Licensing programs are already covered by fleet procedures that apply to multi-unit sites and no procedure changes were required to support dual unit operation.

  PI – Performance Improvement evaluated procedures in place for the corrective action program, benchmarking, self-assessment and trending and determined that two unit operations will not impact the procedures guiding PI functions. All programs performed by PI are governed by fleet procedures which already apply to multi-unit sites.

TVA is confident that the self assessments discussed above support a finding under 10 CFR 50.57(a)(3) that there is reasonable assurance that activities authorized by the WBN Unit 2 operating license can be conducted without endangering public health and safety, and will be conducted in compliance with NRC regulations. In addition, during the last week of June 2015, the NRC conducted the on-site phase of the Operational Readiness Assessment Team inspection with no significant issues identified.

Attachment C1
Department Transition and Change Management Plans

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Attachment C2
Unit Differences - Design

The January 2008 regulatory framework for the completion of WBN Unit 2 construction (Reference [C2-5]) concluded that activities that had not been completed on WBN Unit 2 would be completed in the same manner as on WBN Unit 1. The framework also stated that TVA would identify differences between the Units to the NRC. This attachment discusses how TVA identified, tracked, and implemented, as necessary, design differences in WBN Unit 2. Thus, as noted above, this attachment also supports a finding under 10 CFR 50.57(a)(3) that there is reasonable assurance that activities authorized by the WBN Unit 2 operating license can be conducted without endangering public health and safety, and will be conducted in compliance with NRC regulations.

References:

[C2-1] TVA Letter to NRC, “Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program and Request for Review,” dated August 27, 2010

[C2-2] TVA Letter to NRC, "Watts Bar Nuclear Plant Unit 2 - List of Design Differences,” dated October 28, 2010

[C2-3] TVA Letter to NRC, “Watts Bar Nuclear Plant Unit 2 - List of Design Differences, Revision 1,” dated April 6, 2011

[C2-4] TVA Letter to NRC, "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program and Request for Review," dated September 19, 2013

[C2-5] TVA letter to NRC, “Watts Bar Nuclear Plant (WBN) - Unit 2 - Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2,” dated January 29, 2008

1. IDENTIFICATION OF DESIGN DIFFERENCES

By letter dated August 27, 2010 (Reference [C2-1]), TVA supplied the NRC with a list of design differences that affected multi-unit operator training at WBN. TVA updated that list of design differences with the Watts Bar Unit Differences and Training Plan Report that it transmitted to the NRC by letter dated September 19, 2013 (Reference [C2-4]).

In the interim, TVA provided the NRC with a list of 187 design differences to the NRC by letter dated October 28, 2010 (Reference [C2-2]). When TVA submitted that list, there were some remaining design changes in progress that could result in unit differences. Thus, by letter dated April 6, 2011 (Reference [C2-3]), TVA provided an updated list to the NRC capturing the design differences between Units 1 and 2 identified after October 28, 2010. This list added six new items and modified five others. With the submission of that letter, TVA satisfied the commitment to identify design differences between WBN Units 1 and 2.

2. DESIGN CHANGE CONTROL AND IMPLEMENTATION

WBN Unit 2 Construction procedure (25402-3DP-G04G-00081, Engineering Document Construction Release) defined the work process for the preparation, review, approval, issuance, management, and control of the engineering-related deliverables (EDCRs) needed for installing permanent equipment and materials during the WBN Unit 2 construction completion project. The EDCR process controls design changes to WBN Unit 2 SSCs during construction completion to ensure that the licensing basis in the Final Safety Analysis Report (FSAR) and responses to the NRC reflect the WBN Unit 2 configuration. TVA processes ensure that NRC commitments are captured and provide for validation of the licensing basis as reflected in WBN Unit 2 Technical Specifications, FSAR, SER and responses to NRC violations, deviations and generic letters. The TVA processes include:

- NRC Commitment Management (NPG-SPP-03.3)
- Watts Bar Unit 2 Licensing Basis Preservation (NC PP-20)
- Watts Bar Unit 2 Closure of Commitments/Open Items Required for Licensing (NC PP-19)
- Administration of Site Technical Procedures (NPG-SPP-01.2)
- Administration of Standard Programs & Processes (SPPs); Standard Department Procedures (SDPs); and Business Practices (NPG-SPP-01.1)
- Technical Specifications/Licenses and Amendments (NPG-SPP-03.12)
- FSAR Management (NPG-SPP-03.15)
- Watts Bar Unit 2 Changes to Final Safety Analysis Report, Technical Specifications, TS Bases, Technical Requirements Manual, and TRM Bases (NC PP-10)
- Modifications and Engineering Change Control (NPG-SPP-09.3)

Recognizing that the level of detail provided in References [C2-2] and [C2-3] generally exceeds the level of detail typically provided in the FSAR, Technical Specifications, TS Bases or the Technical Requirements Manual, the above processes ensure that any further design differences that emerge during construction completion are appropriately captured in the WBN Unit 2 licensing basis documents.

Reference [C2-3] indicated that additional unit differences could emerge through field implementation and TVA committed to provide another updated list, if necessary, when field implementation is complete.

TVA is confident that the processes discussed above have been implemented appropriately and that differences between the Units were identified, tracked and implemented, as necessary, in WBN Unit 2.

Attachment C2
Unit Differences - Design

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WBN2 Engineering

J. Mike Casner, Director
WBN Site Engineering

Attachment C3

Unit Differences - Licensed Operator Training

This attachment addresses the impacts of differences between WBN Unit 1 and Unit 2 on operator licensing and qualifications. TVA has established a program of licensed operator training and qualification such that operators will be licensed on both Units 1 and 2. The NRC has approved that program. Operators have completed dual unit training and examination, with dual unit licenses pending issuance of the WBN Unit 2 Operating License. Thus, as noted above, this attachment further supports a finding under 10 CFR 50.57(a)(3) that there is reasonable assurance that activities authorized by the WBN Unit 2 operating license can be conducted without endangering public health and safety, and will be conducted in compliance with NRC regulations.

References:

[C3-1] TVA letter to NRC dated August 27, 2010, "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program and Request for Review"

[C3-2] TVA letter to NRC dated November 18, 2010, "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program, Revision 1"

[C3-3] NRC letter to TVA dated April 11, 2011, "Watts Bar Nuclear Plant Units 1 and 2 Multi-Unit Operator Training and Certification Program, Revision 1"

[C3-4] TVA letter to NRC dated September 19, 2013, "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program and Request for Review"

[C3-5] NRC letter to TVA dated November 14, 2013, “Watts Bar Nuclear Plant Units 1 and 2 Unit Differences and Training Plan Report, September 2013”

[C3-6] TVA letters to NRC requesting dual unit operator licenses

[C3-6.1] TVA letter to NRC dated August 22, 2014, “WBN Units 1 and 2, Request for Dual Unit Operator License In Accordance with 10 CFR 55.47”

[C3-6.2] TVA letter to NRC dated September 4, 2014, “WBN Units 1 and 2 - Request for Dual Unit Operator License in Accordance with 10 CFR 55.47 - Supplement 1”

[C3-6.3] TVA letter to NRC dated September 25, 2014, “WBN Units 1 and 2 - Request for Dual Unit Operator License in Accordance with 10 CFR 55.47 - Supplement 2”

[C3-6.4] TVA letter to NRC dated October 8, 2014, “WBN Units 1 and 2 - Request for Dual Unit Operator License in Accordance with 10 CFR 55.47 - Supplement 3”

[C3-6.5] TVA letter to NRC dated October 22, 2014, “WBN Units 1 and 2 - Request for Dual Unit Operator License in Accordance with 10 CFR 55.47 - Supplement 4”

[C3-6.6] TVA letter to NRC dated October 29, 2014, “WBN Units 1 and 2 - Request for Dual Unit Operator License in Accordance with 10 CFR 55.47 - Supplement 5”

[C3-6.7] TVA letter to NRC dated June 3, 2015, “Watts Bar Nuclear Plant, Units 1 and 2 - Request for Dual Unit Operator License in Accordance with 10 CFR 55.47”

[C3-7] NRC letter to TVA dated March 17, 2015, “Watts Bar Nuclear Plant – Notification of Licensed Operator Initial Examination 05000390/2015301”

Attachment C3
Unit Differences - Licensed Operator Training

1. BACKGROUND

In a letter dated August 27, 2010 (Reference [C3-1]), TVA described its plan to seek dual-unit operator licenses for prospective WBN Unit 2 operators using a training program that was based on a rigorous analysis of the differences between WBN Unit 1 and Unit 2. In its submittal, TVA included a detailed report on WBN Units 1 and 2 plant differences and its training plan. By letter dated November 18, 2010, (Reference [C3-2]), TVA submitted Revision 1 to the plan.

By letter dated April 11, 2011 (Reference [C3-3]), the NRC acknowledged the TVA Multi-Unit Operator Training and Certification Program and preliminarily concluded that the proposed differences between WBN Unit 1 and Unit 2 were not so significant that they would affect the operators' ability to operate each unit safely and competently.

Subsequent to the NRC's initial review, TVA continued to assess the dual-unit operator training plan and in September 2013 updated the Watts Bar Unit Differences and Training Plan Report to incorporate facility changes that had reconciled previously described plant differences. The updated report was submitted to the NRC by letter dated September 19, 2013 (Reference [C3-4]).

Enclosure 1 to Reference [C3-4] provided the Watts Bar Unit Differences and Training Plan Report that superseded the previous version in its entirety. That report confirmed the criteria of NUREG-1021 Section ES 204 and provided the analysis required by NRC Regulatory Guide 1.149, Section C.2 - Use of Simulation Facility for Multiple Plants.

The NRC Region II Operator Licensing staff reviewed the proposed changes in the Watts Bar Unit Differences and Training Plan Report submitted by Reference [C3-4] and determined that the differences were not so significant that they would affect the operators' ability to operate each unit safely and competently. By letter dated November 14, 2013 (Reference [C3-5]), the NRC stated:

> "The final determination of whether the operators who are currently licensed on WBN Unit 1 meet the written and operating test waiver requirements for WBN Unit 2, in accordance with 10CFR55.47 and NUREG 1021, Revision 9, Supplement 1, ES-204, Section D.2, is contingent upon the following items.
>
> - The operators currently licensed on WBN Unit 1, who will be requesting WBN Unit 2 (dual) licenses, have sufficient "operating experience at a comparable facility" as required by 10 CFR 55.47(a)(1), that is, on WBN Unit 1, and that this operating experience has occurred "within two years prior to the date of application."
>
> - The facility "differences training," including the comprehensive "differences" written examination, JPM operating test, and simulator modifications, support the finding required by 10 CFR 55.47(a)(3) that each applicant "has learned the

operating procedures for and is qualified to operate competently and safely" WBN Unit 2. This includes startup training using WBN Unit 2 initial criticality procedures on the plant reference simulator using a simulator model that reflects WBN Unit 2 core design.

- All of the applicants issued WBN Unit 2 licenses per 10 CFR 55.33(a)(2), based on waivers of the requisite written examinations and operating tests, satisfactorily complete the facility licensee's Watts Bar Unit 2 "differences" Training and Certification Program and pass the program's comprehensive "differences" written examination and JPM operating test."

Consistent with the approach described in References [C3-1], [C3-2] and [C3-4], TVA has submitted license applications (References [C3-6.1] through [C3-6.7]) for a total of 66 personnel (48 SRO and 18 RO), requesting that dual unit operator licenses be granted prior to WBN Unit 2 initial fuel load in accordance with 10 CFR 55.47. This includes operators from Initial License Training Class 13-10 (ILT Class 13-10) who have been licensed on WBN Unit 1 and subsequently successfully completed the unit differences training.

Because both units are nearly identical, TVA also requested a waiver from the NRC--administered written and operating examinations for WBN Unit 2. Justification for the waiver is based on the following information.

- The Personal Qualification Statements (NRC Form 398) submitted for the applicants demonstrate that each applicant has sufficient operating experience at a comparable facility, that is, WBN Unit 1.

- Each applicant has satisfactorily completed the Watts Bar Unit 2 Differences Training and Certification Program and passed a comprehensive written examination and JPM operating test. The differences on which the applicants were trained and certified were based on the criteria given in NUREG 1021, Revision 9, Supplement 1, ES-204, Section D.2 and was provided to NRC with Reference [C3-4].

- The differences training included startup training using WBN Unit 2 initial criticality procedures on the plant reference simulator using a simulator model that reflects WBN Unit 2 core design.

- Additional training will continue through WBN Unit 2 hot functional testing, fuel load, initial criticality and start up testing, but will not be credited towards the request for dual unit licenses, since it occurs after submittal of the operators' license applications.

2. MINIMIZING OPERATIONAL DIFFERENCES

WBN Unit 1 completed the installation of the Distributed Control System (DCS) during Refuel Outage 12 in 2014. The WBN Unit 1 DCS upgrade eliminated many operational differences with WBN Unit 2, addressed obsolescent equipment issues, and deleted as many single points

of failure as practical. Post outage, the operational differences between WBN Unit 1 and Unit 2 were DCS hotwell level control only for WBN Unit 2, a few annunciator windows, and the Main Control Room (MCR) Center Work Desk Area Displays.

WBN Unit 1 and Unit 2 have separate Technical Specifications (TS) and Technical Requirements Manuals (TRMs). WBN has thoroughly reviewed the TS differences between WBN Unit 1 and Unit 2 and determined that they are nearly identical. Nuclear Steam Supply System (NSSS) setpoints are identical; therefore TS-related setpoints will be identical between the units. Final verification of NSSS setpoints will be provided as part of the "as-built" phase of construction completion of WBN Unit 2.

WBN Unit-specific Emergency Operating Instructions (EOIs) were developed to prevent human errors related to combining Unit procedure steps. The majority of the setpoint calculations pertaining to EOI actions have been completed. As remaining setpoint data is received, training staff will evaluate impacts and any differences will be rolled into the scheduled operator training and retraining. Based on calculations completed to date, the setpoint differences are not expected to be significant.

3. ADDRESSING PLANT CHANGES

Procedures and processes are in place to ensure any new plant changes (WBN Unit 1 or Unit 2) will be reviewed by training personnel for impact on operator training programs. This is also true for changes to setpoints, procedures, technical specifications and other changes that may occur.

Beginning with LOR Cycle 14-02, operator training on unit differences has included simulator exercises with the WBN Unit 2 steam generator model temporarily loaded in order to demonstrate the operational characteristics of the WBN Unit 2 steam generators.

Beginning with LOR Cycle 14-03, operator training on unit differences has included simulator exercises with the WBN Unit 2 reactor core model temporarily loaded to demonstrate the operational characteristics of the WBN Unit 2 reactor core.

Additional training will continue to be administered for WBN Unit 2 during LOR Cycles in preparation for WBN Unit 2 Hot Functional, Engineered Safety Features and Power Ascension Tests. Procedures and requirements, including review of topics covering fuel cycle one core design, initial criticality procedures, and 'just in time' start up training on WBN Unit 2 are included in this training. This training will be completed during the appropriate cycles based on the WBN Unit 2 Startup Schedule and will be conducted before WBN Unit 2 fuel load.

TVA is confident that the operator training on plant differences discussed above has been implemented appropriately and will continue to address Unit differences.

Attachment C3
Unit Differences - Licensed Operator Training

Walter F. Smith, Jr., Manager
Operations Training

Coleen T. Ware, Director
Training

Attachment C4

Employee Concerns Program and Safety Culture

This attachment discusses the initiatives at WBN Unit 2 to implement an Employee Concerns Program (ECP) and monitor safety culture. In 1985, WBN Unit 1 was essentially complete and nearly ready to receive an operating license when a large number of deficiencies, including safety culture issues, were identified and subsequently resolved by TVA. In consequence, TVA understands the importance of maintaining a positive safety culture at all its nuclear facilities. TVA has taken steps to monitor the safety culture at WBN Unit 2 and facilitate the identification and resolution of safety concerns raised by employees and contractors. Thus, as noted above, this attachment provides further support for a finding under 10 CFR 50.57(a)(3) that there is reasonable assurance that activities authorized by the WBN Unit 2 operating license can be conducted without endangering public health and safety, and will be conducted in compliance with NRC regulations.

References:

[C4-1] Policy statement "Commitment to Nuclear Safety" Approved by the TVA Board August 22, 2013

[C4-2] NC PP-7, Employee Concerns Program, (Nuclear Construction Organization)

[C4-3] NPG-SPP-01.7.1, Employee Concerns Program

[C4-4] Confirmatory Order Modifying License (Effective December 22, 2009, Paragraphs 2.d and 2.j - ECP Administrative Actions - NRC Commitments 111141087 and 111007158

Starting in mid-2009 and continuing to date, WBN Unit 2 has utilized a variety of tools (15 unique tools) to continually assess the safety culture of the construction organization. Using the multiple tool concept allows TVA to more closely monitor safety culture at WBN Unit 2 where the high turnover rate common to facilities under construction does not lend itself well to a single-point assessment. While the process uses essentially the same inputs (i.e., interviews, observations, and document reviews) as the assessments at WBN Unit 1, an operating facility, the data were gathered by different organizations and over different time periods. WBN Unit 2 uses internal and independent external organizations to gather and assess the results. WBN Unit 2 has conducted over 31 assessments since 2009 in addition to the routine monthly surveys and "check-out" surveys of departing employees.

To further demonstrate how WBN Unit 2 assesses the safety culture at the site, TVA generated a comparison matrix of the various assessments performed and identified the specific safety culture aspects that were evaluated. Although no single assessment evaluates all safety culture aspects as listed, the multi-tool approach has enabled WBN Unit 2 to cover all areas of safety culture. TVA believed the multi-tool approach is more appropriate due to the nature of the construction environment.

The following table denotes the key areas that compose the NRC definition of safety culture and how the various activities performed at WBN Unit 2 covered those areas in assessing the safety culture at the site. The information provided in the comparison matrix and the associated supporting data demonstrates that collectively, the assessments listed below met the intent of the NRC Confirmatory Order, Section V.3. (Reference [C4-4])

Attachment C4
Employee Concerns Program and Safety Culture

TVA WATTS BAR UNIT 2 - NUCLEAR SAFETY CULTURE ACTIVITIES COMPONENTS, CONDUCT, & RESULTS COMPARISON MATRIX															
TVA WATTS BAR UNIT 2 NUCLEAR SAFETY CULTURE ASSESSMENTS/SURVEYS CONDUCTED	SCWE Assessment (Levanway)	Alignment & Engagement Improvement Initiative	NGDC OHI	Construction Excellence Gap Assessment	NGDC-CSRB	TVA WBN U2 ECP SCWE Assessment	Bechtel ECP Survey	Completion Root Cause Assessment	Trait Gap Assess.	Work Environment Risk Assessment	McKinsey Assessments	TVA ECP Survey	EXIT Surveys	Nuclear Safety Culture Monitoring Panel	Other WBN2 Assessments
WHAT WE LOOKED AT . . .															
1. Human Performance															
a. Decision Making	X	X	X		X		X	X	X		X				
b. Resources				X				X			X				
c. Work Control	X			X	X			X	X	X	X				
d. Work Practices				X	X			X	X	X	X				
2. Problem Identification & Resolution															
a. CAP	X	X		X	X	X	X		X		X	X		X	
b. Operating Experience	X								X						
c. Self and Independent Assessments	X			X	X	X		X	X		X				X
3. Safety Conscious Work Environment															
a. Environment for Raising Concerns															
i. Non-ECP Related	X	X				X	X		X	X			X	X	X
ii. ECP Related	X	X			X	X	X		X		X	X	X	X	X
b. Preventing, Detecting & Mitigating Perceptions of Retaliation	X					X	X						X	X	X
4. Other Safety Culture Components															
a. Accountability			X	X		X			X	X	X				
b. Continuous Learning Environment			X				X		X		X			X	
c. Organizational Change Management															
d. Safety Policies	X	X		X											
HOW WE CONDUCTED THE SURVEYS . . .															
1. Conducted independent of the line organization	X		X		X	X	X	X		X	X	X	X		

TVA WATTS BAR UNIT 2 - NUCLEAR SAFETY CULTURE ACTIVITIES COMPONENTS, CONDUCT, & RESULTS COMPARISON MATRIX															
TVA WATTS BAR UNIT 2 NUCLEAR SAFETY CULTURE ASSESSMENTS/SURVEYS CONDUCTED	SCWE Assessment (Levanway)	Alignment & Engagement Improvement Initiative	NGDC OHI	Construction Excellence Gap Assessment	NGDC-CSRB	TVA WBN U2 ECP SCWE Assessment	Bechtel ECP Survey	Completion Root Cause Assessment	Trait Gap Assess.	Work Environment Risk Assessment	McKinsey Assessments	TVA ECP Survey	EXIT Surveys	Nuclear Safety Culture Monitoring Panel	Other WBN2 Assessments
2. Available to all target participants (not a sample)	X	X See Const Excell Gap	X	X	X	X	X	X	X	X	X	X	X		
3. Participation is voluntary	X	X	X	X	X	X	X	X	X	X	X	X	X		
4. Response is confidential/anonymous	X	X	X	X	X	X	X	X	X	X		X	X		
5. Demographic information on organization, position, and tenure to permit granularity	X		X				X					X	X		
6. Administered by structured questionnaire	X		X				X					X	X		
7. Validated method of assessing nuclear safety culture	See Levanway history					X NEI Driven	X NEI Driven					X NEI Driven	X NEI Driven		
8. Uses a numerical scale for responses			X				X								
9. Provides for write-in comments		Done as face to face	X	Done as face to face		Done as face to face	X		Done as face to face	Done as face to face	Done as face to face	X	X		
WHAT WE DID WITH THE RESULTS . . .															
1. Numerical results compared to industry benchmarks	No Industry Benchmark Data for Construction														
2. Numerical results compared to site benchmarks			X				X								
3. Results compared to previous results for trends	X		X		X	X	X		X		X	X		X	
4. Strengths/strong performing organizations identified			X		X						X	X		X	
5. Weaknesses/organizations needing special attention identified	X	X	X	X	X	X	X	X	X	X	X	X		X	
6. Conclusions/recommendations (based on analysis – numerical and comments)	X	X	X	X	X	X	X	X	X	X	X	X		X	

Based on these assessments, TVA believes that the safety culture at WBN Unit 2 is adequate. TVA continues to monitor the various areas of safety culture at the WBN Units (i.e., Human Performance, Problem Identification & Resolution, Safety Conscious Work Environment (SCWE), and Other). If an adverse condition is identified in one of these areas, then TVA evaluates the condition and proposes actions to improve performance.

The ECP is independent of the Site management chain. The ECP provides an alternate avenue for the resolution of differing views and opinions related to the safe construction and operation of WBN Unit 2. The procedures listed as References [C4-1] through [C4-3] provide guidance for ECP activities. Anonymous and confidential issues are accepted for investigation.

There are various tools that ECP is utilizing to monitor the health of the SCWE and to address safety concerns at WBN. These tools are as follows:

1) Robust exit process – ECP has implemented a process to review the personnel site exit records at the end of each month and compare them against the ECP records of those personnel who have completed an exit questionnaire. Exiting employees are asked to positively confirm that they have no safety concerns. If an ECP review identifies that the individual has not exited through the ECP, a certified letter is sent to the individual to afford the individual another opportunity to raise any concerns he or she may have had upon leaving the project.
2) Detailed ECP trending is provided to site senior management on a weekly basis. This is done to ensure management addresses negative trends in a timely manner.

3) ECP staffing is maintained to ensure adequate and timely investigation of concerns and to maintain the concern case backlog at a manageable quantity. The ECP has contingency plans in place to provide additional staffing if necessary.
4) Robust pulse survey program – ECP performs departmental surveys on a monthly basis as identified by various project milestones, work stress, anonymous PER/CR traffic and concern trends.

Conclusion:

An assessment of the current trends regarding employee concerns, allegations, PERs/CRs and anonymous PERs/CRs provides confidence that current ECP programs are effective and that issues are being identified at WBN. The ECP continuously monitors indicators of program health. If indicators are identified that show a decline in SCWE or ECP performance, then the ECP escalates the issue to management for corrective action.

Attachment C4
Employee Concerns Program and Safety Culture

Ruth A. Traugott

Ruth A. Traugott, Sr. Program Manager
Employee Concerns Program

ENCLOSURE 2

Watts Bar Unit 2
Key Activities Remaining Open

Enclosure 2
Watts Bar Unit 2
Key Activities Remaining Open

The purpose of this enclosure is to provide a listing of key WBN Unit 2 construction and testing activities that remain open following issuance of this letter and which TVA will complete prior to operation of WBN Unit 2. The following table lists the remaining open items and identifies the forecast operational mode milestone when the activity will be completed at WBN Unit 2. The information set forth below is based on the best available information at the time of submittal. TVA will keep NRC informed as it makes progress toward fuel load and the completion of these remaining open activities.

Key Activities Remaining Open

Project Activities Prior to Mode 6
Fire Protection Corrective Action Program (CAP)
Mechanical Equipment Qualification Special Program (SP)
Radiation Monitoring System SP (including NUREG-0737 requirements)
Finalize Operating Procedures and Technical Specification Review
Protective Strategy Evaluation
Cable Separation CAP
Frozen Lines Mitigation (Bulletin 1979-24)
Pressurized Water Reactor (PWR) Main Steam Line Break with continued Feedwater (FW) addition (Bulletin 1980-04)
Reactor Vessel Lower Head Penetrations Leakage and Reactor Coolant Pressure Boundary Integrity Verification (Bulletin 2003-02)
Instrument Air system test (GL 1988-14)
Motor-Operated Valve Analysis and Test System (MOVATS) program and tests (GL 1989-10 and GL 1996-05)
Three Mile Island (TMI) Action Items (NUREG-0737)
Establish Auxiliary Building Secondary Containment Enclosure (ABSCE) boundary
Required Pre-Operational Test Instructions
Containment Integrated Leak Rate Test (CILRT)
Integrated Safeguards Test (Engineered Safety Features (ESF) Actuation System)

Enclosure 2
Watts Bar Unit 2
Key Activities Remaining Open

Project Activities Prior to Applicable MODE(S)
System Transitions to Operations will occur as required to meet the applicable MODES
Surveillance Testing for Systems, Structures and Components Operability will occur as required to meet the applicable MODES as follows: a. 142 prior to Mode 6 entry b. 21 prior to Mode 5 entry c. 389 prior to Mode 4 entry d. 164 prior to Mode 3 entry e. 76 prior to Mode 2 entry f. 62 prior to Mode 1 entry
Area completion actions that support Operability will occur to meet the MODE in which it is first required including: a. Damaged Loose or Missing Hardware (DLMH) walk-downs b. Coatings compliant to technical requirements c. Remaining implementation elements of the following CAPs and SPs • Equipment Seismic Qualification • Conduit and Conduit Support • Cable Tray and Support • HVAC Duct and Duct Support • Hanger and Analysis Update Program
Penetration seals, including fire seals, will be confirmed installed and operable prior to the applicable MODE.
TVA documentation closure of CAPs and SPs will occur as required to meet the applicable MODES.
Open Commitments associated with physical actions required prior to plant operations will be completed as required to meet the applicable MODES.