UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 2, 2010

Mr. Ashok S. Bhatnagar
Senior Vice President
Nuclear Generation Development
and Construction
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – PROGRAM FOR CONSTRUCTION REFURBISHMENT (TAC NO. ME1708)

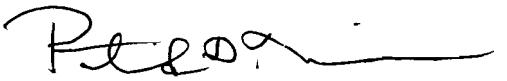
Dear Mr. Bhatnagar:

By letter dated December 9, 2008, as supplemented on July 8 and September 22, 2009, and February 5 and May 27, 2010, the Tennessee Valley Authority (TVA) submitted its Procedure 25402-000-GPP-0000T1216, "Watts Bar Unit 2 Completion Project Refurbishment Program" (T1216), for review by the U.S. Nuclear Regulatory Commission (NRC). Because most of the safety-related and quality-related equipment was installed at Watts Bar Nuclear Plant (WBN), Unit 2, during original construction along with equipment for Unit 1, the procedure was designed to ensure that the design and licensing basis, including original equipment design specifications, would be met.

The NRC staff has reviewed TVA's refurbishment program and finds that, (1) TVA was refurbishing or replacing most active components and instruments, (2) TVA had determined the potential degradation mechanism for each category of components, along with any contributing environmental factor, (3) the acceptance criteria were developed from the licensing basis, design specifications, and vendor specifications, (4) the proposed inspections and testing included in the program could be expected to identify degradation, and (5) refurbishment activities would be in accordance with applicable vendor and design specifications or requirements. The NRC staff also found that TVA's proposed refurbishment plan described in Procedure TI216 provides adequate guidance and objectives for the development of implementing procedures. Therefore, the staff concludes that the TVA refurbishment program plan is of adequate scope, considers appropriate program elements, and upon proper implementation, would provide reasonable assurance that the equipment would meet their design criteria and perform their intended function. The enclosed safety evaluation provides the details of the staff's review.

If you have questions regarding this correspondence, please contact me at 301-415-1457.

Sincerely,



Patrick D. Milano, Senior Project Manager
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Docket No. 50-391

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
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STAFF EVALUATION BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING PROGRAM FOR CONSTRUCTION REFURBISHMENT

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-391

1.0 INTRODUCTION

In a letter dated December 9, 2008, as supplemented on July 8, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML083460177 and ML091940094, respectively), the Tennessee Valley Authority (TVA) submitted its Procedure 25402-000-GPP-0000T1216, "Watts Bar Unit 2 Completion Project Refurbishment Program" (T1216), for review by the U.S. Nuclear Regulatory Commission (NRC). In response to requests for additional information by the NRC staff, TVA provided additional information on September 22, 2009, and February 5 and May 27, 2010 (ADAMS Nos. ML092680064, ML100470428, and ML101470248).

1.1 Background

TVA received construction permits for the Watts Bar Nuclear Plant (WBN), Units 1 and 2, in 1973 under Part 50 to Title 10 of the Code of Federal Regulations (10 CFR). Construction proceeded until 1985, when WBN Unit 1 was thought to be essentially complete and nearly ready to receive an operating license. However, as a consequence of the identification of a large number of deficiencies shortly before the WBN Unit 1 operating license was expected to be issued, the NRC sent a letter to TVA on September 17, 1985, requesting information under 10 CFR 50.54(f), on TVA's plans to address the deficiencies for its operating and construction activities at WBN and TVA's other nuclear facilities. In response to this letter, TVA developed a Nuclear Performance Plan to address corporate and site-specific issues, establishing programs to address a wide variety of material, design, and programmatic deficiencies. WBN Unit 2 construction was suspended at about that time, with major structures in place and equipment such as reactor coolant system piping installed.

On August 3, 2007, TVA had informed the NRC of its intent to complete construction and licensing of WBN Unit 2. TVA's letter also described its intent to align the licensing and design bases for WBN Units 1 and 2 to the fullest practical extent. TVA stated that it will complete WBN Unit 2 in compliance with applicable regulations and that it will incorporate modifications made to WBN Unit 1 into the Unit 2 licensing and design bases.

1.2 Proposed Activity

Because most of the WBN Unit 2 safety-related and quality-related equipment was installed during original construction, TVA has stated that Procedure T1216, as amended, is designed to ensure that the equipment design specifications will be met. TVA stated that it would perform inspections/evaluations, refurbishment, replacements, and system testing to ensure the plant meets its original design specifications. The safety-related and quality-related systems, structures, and components (SSCs) would be inspected/evaluated for preservice degradation in accordance with the requirements of T1216 to ensure that the items are capable of meeting design specifications and vendor functional specifications.

2.0 REGULATORY EVALUATION

Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," of 10 CFR Part 50 establishes the quality assurance requirements for the design, manufacture, construction, and operation of SSCs that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. The pertinent requirements of this appendix apply to all activities affecting the safety-related functions of those SSCs. These activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying.

Criterion XVI, "Corrective Action," of Appendix B states that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected.

Section 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants," of 10 CFR Part 50 requires that the safety-related electrical equipment, nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions as specified in 10 CFR 50.49, and certain postaccident monitoring equipment which are relied upon to remain functional during and following design-basis events be qualified for accident (harsh) environment. This provides assurance that the equipment needed in the event of an accident will perform its intended function.

Section 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," of 10 CFR Part 50 requires that the performance or condition of SSCs be monitored, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions. Portions of SSCs that are shared between WBN Units 1 and 2 and that are in operation to support Unit 1 are governed by the requirements of 10 CFR 50.65.

General Design Criterion (GDC) 4, "Environmental and dynamic effects design bases," in Appendix A to 10 CFR Part 50, requires, in part, that nuclear power plant SSCs important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.

GDC 17, "Electric power systems," requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of SSCs that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

3.0 TECHNICAL EVALUATION

3.1 Program Purpose

Most of the equipment at WBN Unit 2 was fabricated and installed during the original construction period along with the equipment for Unit 1. Because layup activities were terminated for a period of time after 2001, it is necessary to ensure the equipment is still capable of meeting its required design specifications. Thus, TVA has proposed to perform inspections or evaluations, refurbishment or replacements, and system testing to ensure the plant meets its original licensing, design and equipment vendor specifications. TVA Procedure TI216 provides the guidance for the refurbishment of active and passive safety-related, quality-related and nonquality related equipment. This procedure also identifies requirements for evaluation of pre-service degradation of active and passive safety-related, quality-related and nonquality related equipment that will not be replaced or refurbished.

3.2 Program Scope

TVA Procedure TI216 applies to all active and passive WBN Unit 2 safety-related, quality-related and nonquality-related equipment required for plant operation. This equipment falls into two groups. The first group consists of those SSCs (or portion of systems) that are shared between Unit 1 and Unit 2 (common equipment) and are in operation supporting Unit 1. The second group consists of the remaining Unit 2 SSCs that do not support the Unit 1 operation.

The population of the first group of SSCs is defined, monitored, trended, and reported in accordance with the Unit 1 Maintenance Rule requirements, pursuant to 10 CFR 50.65. The Unit 1 Maintenance Rule Program monitors the performance or condition of SSCs, against performance criteria, to provide assurance that such SSCs are capable of fulfilling their intended function.

Some of the Unit 2 piping on the Unit 1 side of the Units 1 and 2 operational boundary have been filled with water, but may have been under stagnant water conditions as early as Unit 1 startup. This piping will be identified and its condition confirmed to be satisfactory for Unit 2 operation. This confirmation will consist of inspections, flushes and/or ultrasonic test inspections of the affected piping.

In the second group, Unit 2 equipment that has been or will be replaced prior to startup will be identified and then excluded from this procedure because preservice degradation is not relevant. For the remaining Unit 2 equipment, some items will be refurbished, while others will be inspected/evaluated.

The staff reviewed the methodology that TVA used to define the scope of this program, along with the program elements that TVA would complete, to determine whether, upon proper implementation, the program would provide reasonable assurance that the equipment would meet their design criteria and perform their intended function. The staff determined whether the program would promptly identify any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related SSCs, in accordance with Appendix B Criterion XVI.

3.3 Program Nature of Implementation

3.3.1 Identification and Classification

TVA has developed a master equipment list (MEL) to identify all WBN Unit 2 safety-related, quality-related and nonquality-related equipment required for Unit 2 operation. Also, TVA will utilize the Unit 1 MEL to identify all such equipment currently in service to support Unit 1 operation and required for Unit 2 or dual-unit operation (e.g., common equipment). Equipment that is quality-related for consideration of Seismic Class II over I (II/I) issues are considered as nonquality-related equipment except for Seismic II/I related parameters. Additionally, equipment or components to be replaced (i.e., new equipment) are excluded from the scope of the process because preservice degradation is irrelevant.

The identified equipment or components have been divided into functional categories of equipment / components using the function codes contained in the MEL. Components that do not have unique identification codes (such as switches and relays) are classified by commodity type.

3.3.2 Inspection and Evaluation

For all equipment that will be inspected and evaluated, preservice degradation criteria have been developed based on material types, equipment or component locations, conditions experienced since original installation, and current functional status. Expected preservice degradation mechanisms are identified for each combination of material type, location, equipment condition, and functional status.

3.3.3 Refurbishment or Replacement

Under TVA's program, no other inspection or evaluation is required for equipment that will be refurbished rather than accepted as-is. During refurbishment, the licensing basis, design specifications, and vendor technical documents will be used to ensure the equipment is capable of meeting its original licensing, design, and vendor functional requirements.

A Refurbishment Scope Evaluation Form will be prepared for each component to record applicable information such as the specific refurbishment activities to be performed, special considerations, work documents and / or procedures to be utilized, and the basis for the determination.

Complete component replacement may be specified in lieu of refurbishment.

3.3.4 Component / System Testing

Prior to Unit 2 operation, industry standard or special component tests will be performed consisting of actions such as motor bumps for rotation, instrument calibrations, flushing, and functional testing of individual components. The tests are intended to demonstrate compliance with component specific specifications and requirements. System flushes, system hydrostatic tests, and the system preoperational test programs performed in accordance with NRC Regulatory Guide (RG) 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," may serve as the confirmation of the component's capability to meet its design criteria.

3.4 Evaluation

3.4.1 Civil Structures and Mechanical Equipment

The NRC staff reviewed TVA's letters dated December 9, 2008, and July 8, 2009, to determine whether sufficient information was provided to demonstrate that the program related to civil structures and mechanical equipment provides adequate guidance to identify, classify, inspect and evaluate pre-service degradation of active and passive safety-related, quality-related and non-quality related equipment. The staff evaluated the program as it relates to degradation effects for containments, structures and component supports, within the scope of the refurbishment program and subject to inspection and review. The staff evaluation included an assessment of whether the program appears to be capable of informing TVA if these item are capable of meeting design specifications and vendor functional specifications, and applicable requirements in 10 CFR 50.55a and 10 CFR 50, Appendix A. Portions of SSCs that are shared between WBN Units 1 and 2 and that are in operation to support Unit 1 are governed by the requirements of 10 CFR 50.65 in a manner sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions.

Staff Evaluation

The NRC staff reviewed the Watts Bar Unit 2 Completion Project Refurbishment Program, documented in Revision 2 to TI216, to confirm that TVA's proposed inspections, reviews, and evaluations were consistent with program objectives.

During an onsite audit and subsequent review, the NRC staff found that in Section 3.4 of the applicant's procedure, TI-119, "Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting – 10 CFR 50.65", TVA provided a list of the WBN Unit 2 SSCs that are currently managed by Unit 1, and found that the majority of the Unit 2 SSCs are currently inspected under the WBN Unit 1 Maintenance Rule Program. The remaining civil/structural SSCs are required to be verified and inspected by the WBN Unit 2 Refurbishment Program, and include:

a. Steel Containment Vessel
b. Reactor Building (Interior Concrete Structures and Ice Condenser)
c. Category I Water Tanks and Pipe Tunnels (Refueling Water Storage Tank Foundation)
d. Miscellaneous Tanks Foundation

In response to questions raised by the staff during a meeting with TVA on August 6, 2009, TVA provided additional information in a letter dated September 22, 2009. In this regard, TVA stated that the potential corrosion of embedded steel and identification of degraded concrete will be identified though a series of civil/structural inspections and walkdown plans that are currently in place. However, the NRC staff disagreed with the TVA's statement that visual inspections could detect the corrosion of the embedded steel. During an audit conducted during the week of October 14, 2009, TVA provided the staff with the site river water and well water sampling values, as listed below:

	River water (09/11/2009)	Well water (10/23/2009)
pH	8.15 > 5.5	7.13 > 5.5
chloride	7.88 ppm < 500 ppm	6.9 ppm < 500 ppm
sulfate	16.9 ppm < 1500 ppm	74 ppm < 1500 ppm

The NRC staff reviewed the above data and found that for inaccessible structural components, such as below-grade concrete, the effects of corrosion of the embedded steel will be adequately managed by TVA. The staff determined that TVA's response to the staff's concern over potential corrosion of embedded steel acceptable because the site water sampling values for the river water and well water are nonaggressive, which is in accordance with the recommendation in American Concrete Institute Standard 349.3R.

TVA stated that inspectors will be trained in accordance with American National Standards Institute (ANSI) Standard N45.2-1971. Maintenance personnel will be qualified for the task. This training will be documented and tracked using the existing training and qualification programs. TVA provided its Procedure TI-119 on maintenance rule performance indicator monitoring, trending, and reporting, which contained in Section 3.4 a list of WBN Unit 2 SSCs currently managed by Unit 1. However, the NRC staff was unable to determine how TVA linked these training qualification requirements from ANSI N45.2-1971 to Procedure TI-119. Therefore, the implementation of training and qualification for inspectors will be the subject of future NRC staff inspections.

TVA stated that during the construction of WBN Units 1 and 2, instrumentation for monitoring differential settlement of the main structures was installed and periodic readings were obtained. TVA also stated that after several years, the differential settlement between the structures was insignificant. Therefore, it discontinued the monitoring for both units in 1984. During the review of TVA Calculation WCG-1-861, the staff confirmed that the settlement readings at WBN were insignificant since January 1984. Therefore, the staff agreed with TVA's determination that the settlement monitoring program is no longer required.

In its September 22, 2009, response, TVA stated that anchor bolts are visually inspected under various programs (e.g., NRC Bulletin 79-14, "Seismic Analyses for As-Built Safety-Related Piping Systems," Program). TVA also stated that quality control (QC) documentation records was retrieved, reviewed, and evaluated to ensure proper installation of anchor bolts for safety-related pipe supports. Further, for any anchors that do not have this documentation, it planned

to conduct a pull test. TVA stated that if the pull test does not show that the anchor has adequate capacity, the anchor will be replaced. During the staff's onsite audit and review, TVA stated that approximately 5 percent of the anchor bolts do not have QC documentation; however, none of the pull tests had yet been performed. Because, this documentation is still under development, the NRC staff will conduct inspections to follow-up on the adequate implementation of this program requirement.

TVA stated that procedure 25402-3DP-G04G-00090, "WBN Unit 2 Completion Project-Engineering Evaluation for Commodity Refurbishment," was under development. Therefore, the implementation of the program requirements will be evaluated through follow-on inspections.

TVA stated that the majority of the masonry walls are in common buildings. Also, the walls in the common buildings and in the Unit 1 Reactor Building were covered in the Unit 1 masonry wall program. The NRC staff reviewed TVA's Maintenance Rule Programs Procedure TI-119 and found that in Section 3.3, "Structural Monitoring Database," that the procedure provided the types of degradation for inspection (e.g., under Concrete and Masonry Walls). However, the staff noted that the procedure specifies actions for "Significant Cracks." However, the term "significant crack" is not quantified. Therefore, the implementation of Procedure TI-119 will be the subject of NRC followup inspection to determine if the program requirements are being adequately implemented.

Conclusion

The NRC staff concludes that TVA's program in this area provides reasonable assurance that the potential degradation effects are included for the relevant civil and structural SSCs for monitoring and trending under the WBN Unit 1 Maintenance Rule Inspection Program. In addition, the staff confirmed that the steel containment vessel, reactor building interior concrete structures and ice condenser and tank foundations were adequately incorporated into the WBN Unit 2 refurbishment program for civil/structural equipment, and will be subject to inspection, review, and management. Therefore, the staff finds that the program, when properly implemented, should adequately manage the identification of potential degradation effects and refurbishment activities. The implementation of the program will be the subject of planned NRC followup inspection to determine if program requirements are being adequately implemented.

3.4.2 Coatings

The TVA Refurbishment Program for WBN Unit 2 addresses coatings as a commodity. According to the program, coatings will be identified and evaluated by the WBN Coatings Program. These protective coatings are categorized as a passive component and would be inspected for degradation by visual inspection and pull testing. The coating degradation mechanisms identified by the TVA are physical damage, chipping, peeling, blistering, and chemical attack. Any degradation identified will be evaluated to determine if the coating would be refurbished or replaced.

Staff Evaluation

The program's method to identify, inspect, and evaluate the protective coatings is acceptable to the staff. Visual inspection and pull testing are acceptable as methods of coatings inspection for

degradation because these type of methods have been endorsed by RG 1.54, Revision 1, "Service level I, II, and III Protective Coatings Applied to Nuclear Power Plants," July 2000. The degradation mechanisms that were identified by TVA are all able to be identified by the inspection methods listed. The NRC staff finds this acceptable because these types of mechanisms are listed in American Society for Testing and Materials, "Standard Guide for Establishing Procedures To Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant," D 5163-96, which is endorsed by RG 1.54 Revision 1. Any degradation identified would be evaluated to either be refurbished or replaced. This is acceptable to the staff, since refurbishing or replacing degraded coatings would return the coatings to original design specifications. The specific details of the implementation of the methods used by TVA to determine the degradation and any corrective actions after identifying the degradation will be the subject of NRC inspection of program implementation.

3.4.3 Instrumentation and Controls

Staff Evaluation

To ensure that TVA's refurbishment program envelops all SSCs, TVA used the MEL for Unit 1 and Unit 2 and associated unique identifiers. TVA then removed from the list all Unit 1 equipment as well as Unit 2 equipment that is being monitored as part of Unit 1 operation. In response to question from the staff regarding the subcomponents inside panels or other devices, TVA responded in its letter dated September 22, 2009, that it verified this list against construction package closure documentation, walkdowns, drawing reviews, vendor manual reviews, and other design documentation. Unique identifiers that do not have a direct correlation from Unit 1 and Unit 2 were added to the Unit 2 MEL based on this review. Subcomponents are addressed as part of the activity for the parent components. TVA then removed from the Unit 2 MEL all those SSCs that are being replaced. Under the refurbishment program, TVA will evaluate all the remaining SSCs. Based on this process, the NRC staff finds that TVA has an acceptable program to identify all SSCs that need to be evaluated.

The instrumentation and control systems and components are categorized as environmental qualification (EQ) related or safety-related/quality-related. Each of these components is then evaluated under the refurbishment program based on the function, category, and subdescription and categorized as either being replaced, refurbished, or inspected. TVA defines refurbishment as the "[p]erformance of activities to restore a component to its design specifications or vendor specifications (i.e., restore to like new performance)." Under the program, TVA defines inspection as "[d]isassembly to the extent necessary to verify or measure critical attributes, which may be affected by time, cleanliness, and conditions of bearing or seating surfaces or components. Inspection includes both internal and external aspects of the item."

TVA's refurbishment program states that it will replace the instrumentation and control SSCs that are required to be environmentally qualified. It will refurbish or replace most of the active SSCs that are either safety-related or quality-related. Since refurbishment is defined as performance of activities to restore a component to its design specifications or vendor specifications, the NRC staff finds this acceptable subject to the staff's inspection of the adequacy of TVA's action to bring these components to like-new performance. Diesel generator instrumentation, electromechanical and mechanical indicators and thermocouples are being inspected by TVA, including all passive safety-related or quality-related instrumentation and control SSCs. The staff finds TVA's approach acceptable because the procedures and

implementation of these procedures will be the subject of future NRC inspection to ensure that all these components will be restored to like-new condition.

Conclusion

Based on its review of TVA's submittal, the NRC staff has concluded that the refurbishment program will include all relevant instrumentation and control SSCs for WBN Unit 2. Through its inspections, the NRC staff will confirm that TVA has taken proper action to verify or restore the condition these SSCs so that the intended functions are maintained.

3.4.4 Electrical

The NRC staff reviewed the construction refurbishment program to determine whether sufficient information was provided to demonstrate that the aging effects for passive and active electrical components, within the scope of the construction refurbishment program and subject to inspection and review, would be adequately managed to provide reasonable assurance of the continued availability of the required power to shut down the reactor and to maintain the reactor in a safe condition after an anticipated operational occurrence or a postulated design-basis accident.

TVA defines refurbishment as performance of activities to restore a component to its design specifications or vendor specifications (i.e., restore to like new performance). TVA defines replacement as the replacement of degraded equipment and/or parts which are not expected to meet the equipment's specifications or which would potentially fail over time, such as gaskets, packing, elastomers, etc.

Staff Evaluation

The NRC staff was concerned with the effect of the extensive layup period had on electrical components. Based on this concern, the staff requested TVA to respond to several requests for additional information. In this regard, the staff requested that TVA show how it considered the effects of shelf life, pre-aging and other degradation factors for active and passive electrical instrumentation and control components that will be refurbished. In response, TVA clarified that in most cases where equipment included in 10 CFR 50.49 scope was being refurbished, the non-metallic age-degradable parts would be replaced as part of the construction refurbishment program. In those cases where the installed equipment contains age-degradable materials that were not being replaced (e.g., motor insulation, electrical penetration pigtails, etc.), TVA would adjust the qualified life to account for any aging during the layup period due to thermal degradation, radiation exposure, humidity and cycling, if applicable.

The staff further requested TVA to describe the methodology for adjusting the qualified and design life of components to account for aging during the layup period. In its May 27, 2010, response, TVA stated that for the period of time that the component has been in layup state, the EQ aging calculation will be performed using a bounding ambient temperature and accumulated radiation dose for the layup period. Because most equipment has been subjected to temperatures much less than temperatures expected during normal operation, the impact to the overall qualified life is expected to be minimal (based on the use of the Arrhenius equation). TVA stated that this assessment would be documented in the associated EQ Binder for the component type.

In its letter dated May 27, 2010, TVA also provided a discussion on the basis, methodology, and criteria used to define the categories of electrical components, to determine whether to replace or refurbish, and to establish the actions needed to refurbish specific components. In this letter, TVA stated that the majority of active safety-related components would be replaced. TVA noted that active components of relatively simple design (e.g., hand switches) or components for which it has well established refurbishment processes (e.g., motors, breakers) were exceptions to this practice. TVA further stated that it would inspect and/or refurbish passive equipment.

The staff requested additional information on the condition of the cables in WBN Unit 2. In its response, TVA stated that it has visually inspected safety-related cables to resolve the Cable Issues Corrective Action Program Plan, which the NRC staff has approved, and compiled the 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. TVA also stated that any cable found with visible damage will be either replaced or repaired using an approved WBN procedure. From this inspection, TVA has concluded that WBN Unit 2 cables are in good material condition.

Furthermore WBN Unit 2 cables in the Auxiliary and Control Buildings are in raceways (i.e., trays and conduits) that are in the same environment as the corresponding WBN Unit 1 cables. Because most cables in WBN Unit 2 have either not been energized or have been energized for limited periods of time, cable degradation caused by internal heating is not applicable. For WBN Unit 2 cables that are in service supporting WBN Unit 1 or common equipment, the cable degradation due to internal heating is equal to the degradation of the similar cables of Unit 1.

TVA also stated that the layup conditions of the cables at WBN Unit 2 were equal to or better than the Level C or D storage requirements of ANSI N45.2.2. When installed in their final configuration in trays or conduits, the cables are trained to bend radius values that meet requirements for long-term installation. Additionally, the cables are protected from sunlight and external weathering elements and are not exposed to heating effects of being energized or temperature cycling. Thus, even though WBN Unit 2 cables may have been in a layup condition for an extended period, factors that would cause accelerated degradation are not present, and therefore cable life has not been diminished. TVA supplemented the above information in its May 27, 2010, letter by providing additional details on the specific actions being taken to assess the condition of electrical cables that were subjected to the layup period.

The staff also requested TVA to provide assurance that the EQ requirements for WBN Unit 2 components not being replaced were maintained identically to WBN Unit 1 EQ program. In its response, TVA stated that the EQ-related installation and maintenance requirements are specified in the Qualification Maintenance Data Sheets (QMDS) section of each EQ binder. With the exception of new equipment that is being installed in WBN Unit 2 to replace obsolete equipment, the WBN Unit 2 EQ equipment will be addressed in the existing EQ binders and will have the same QMDS requirements as the comparable WBN Unit 1 equipment. For new equipment that is not presently installed in WBN Unit 1, the QMDS requirements will be specified in the QMDS section of a new EQ binder. Implementation of the QMDS requirements will be tracked and documented for WBN Unit 2 EQ component prior to startup.

The staff requested TVA to provide assurance that electrical components not being replaced or refurbished will be free of corrosion and dust, externally and internally. TVA responded by

stating that components that are not replaced or refurbished will be inspected to ensure these components are free of corrosion and significant dust both externally and internally. Any components found to have corrosion or significant dust will be cleaned or appropriate corrective action, including replacement if necessary, will be taken. Based on this information, the NRC staff expects TVA's program will reasonable ensure that these components will be dust free.

Additionally, the staff requested TVA to describe how the construction refurbishment program ensures that EQ requirements for components not being replaced were maintained during the layup period. In response to this request, TVA stated that WBN Unit 2 components that are not being replaced can be divided into two categories: (1) WBN Unit 2 components required for WBN Unit 1 operation, and (2) WBN Unit 2 components not utilized in WBN Unit 1 operation. TVA stated that the WBN Unit 2 components required for WBN Unit 1 operation have been maintained in the WBN Unit 1 EQ program. For WBN Unit 2 EQ components that are being added to the EQ program for WBN Unit 2 startup (e.g., WBN Unit 2 components not utilized in WBN Unit 1 operation), but are not being replaced, TVA stated that each maintenance requirement specified in the applicable QMDS will be baselined as part of the EQ program implementation prior to startup. EQ equipment not being replaced is limited to medium voltage motors, containment electrical penetration assemblies, and terminal blocks. TVA contends that these devices have been maintained in controlled environments and in a less severe environment than WBN Unit 1.

Since refurbishment is defined as performance of activities to restore a component to its design specifications or vendor specifications, the NRC staff finds TVA's proposed construction refurbishment program acceptable subject to the staff's inspection of the adequacy of TVA's action to bring these components to like-new performance (i.e., these components will be in compliance with the original licensing and design basis, and meet or exceed vendor specifications and the original criteria specified in procurement documentation). Furthermore, the staff finds applicant's approach acceptable because the procedures and implementation of these procedures will be the subject of future NRC inspection to ensure that all these components will be restored to like-new condition (i.e., these components will be in compliance with the proposed licensing and design basis, and meet or exceed vendor specifications and the original criteria specified in procurement documentation).

Conclusion

Based on the above evaluation, the staff concludes that TVA provided reasonable assurance that the program will adequately determine that all electrical equipment will meet or exceed vendor specifications and the original criteria specified in procurement documentation. Furthermore, the staff concludes that the program is sufficient to determine whether WBN Unit 2 SSCs will meet or exceed original specifications and be in compliance with 10 CFR 50.49. The staff also finds the proposed construction refurbishment program for WBN Unit 2 to be consistent the requirements in 10 CFR 50.49 and the requirements of GDCs 1, 4, and 17. Therefore, the NRC staff concludes that the proposed construction refurbishment program for WBN Unit 2 passive and active electrical components is acceptable.

3.4.5 Heating, Ventilation, and Air Conditioning (HVAC) and Containment Systems

The NRC staff reviewed the component categories that were addressed concerning the HVAC and containment systems components. According to the program, any degradation identified will be evaluated to determine if the components would need to be refurbished or replaced. With regard to component categories in this area, the components required to be verified and inspected by the WBN Unit 2 Refurbishment Program, include:

a. Seals
b. Heaters
c. Cooling coils
d. Ducts
e. Pipe
f. Valves
g. Fans
h. Filters

Staff Evaluation

TVA stated that active mechanical safety-related and quality-related commodities are to be refurbished to their original design specification under Procedures CCPP 25402-000-GPP-0000-TI216 and CCPP 25402-000-GPP-0000-N1302, "Component Refurbishment Evaluation." TVA work documents will be used for each specific class or type of active commodity. Upon completion of the refurbishment and prior to fuel load, TVA will establish the qualified life for these commodities.

With regard to the SSCs comprising the various ventilation systems, the staff finds that method to identify, inspect, and evaluate the above categories TVA's refurbishment program are acceptable. Any degradation identified would be evaluated to either be refurbished or replaced. The staff finds this acceptable because refurbishing or replacing degraded components would return these components to original design specifications. The specifics of the methods used by TVA to determine the degradation and determining the corrective actions after identifying the degradation will be the subject of NRC inspection of the implementing procedures.

Conclusion

The NRC staff concludes that TVA provided reasonable assurance that the refurbishment program will adequately determine that all HVAC equipment and containment system components will meet the original criteria specified in procurement documentation. The staff also concludes that this program includes acceptable methods to identify and evaluate these items. Therefore, the NRC staff concludes that the proposed construction refurbishment program for WBN Unit 2 HVA and containment system components is acceptable.

3.4.6 Component Testing

The TVA refurbishment program for WBN Unit 2 applies to all active and passive equipment and components required for WBN Unit 2 operation. In the program, a process including guidance and criteria is provided for determining whether an evaluation/inspection or a refurbishment/replacement will be performed for certain safety-related and quality-related SSCs.

The program also identifies required component/system testing to ensure that all affected SSCs are capable of meeting their original design specifications.

Staff Evaluation

The NRC staff reviewed TVA's refurbishment program as related to inservice testing (IST) of the safety-related pumps, valves and snubbers (SPVSs). Under this program, TVA is responsible for the performance of the associated component testing.

Section 50.55a of 10 CFR Part 50 requires that IST of certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 pumps and valves, as well as snubbers, be performed at initial and subsequent 120-month (10-year) IST program intervals in accordance with the ASME Code, Section XI or ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) incorporated by reference in the regulations. More specifically, ASME Code, Section XI and OM Code also require preservice tests of SPVSs. In Amendment No. 97 to the WBN Unit 2 Final Safety Analysis Report, TVA stated that IST of ASME Code Class 1, 2, and 3 pumps and valves will be conducted to the extent practical in accordance with the 2001 Edition of the ASME OM Code with Addenda through 2003. The NRC staff noted in a request for additional information dated June 3, 2010, that 10 CFR 50.55a requires that this IST be performed in accordance with the latest edition and addenda of the OM Code on the date 12 months before the date of issuance of the OL. On the basis of the current TVA schedule, the Code of record for WBN Unit 2 should be 2004 Edition of the OM Code

Conclusion

The WBN Unit 2 Refurbishment Program indicates that the pumps, valves or snubbers originally installed, refurbished, or replaced, are subject to preservice and inservice tests in accordance with requirements of 10 CFR 50.55a and the ASME Code. As stated in its request for additional information, the staff has noted that the stated edition of the ASME OM Code referenced in the IST Program needs to be updated. The NRC staff will review the resolution of this issue in its evaluation of the IST Program. Therefore, testing required by 10 CFR 50.55a and the ASME Code will provide reasonable assurance that all affected SPVSs will perform their intended function.

4.0 CONCLUSION

The NRC staff reviewed TVA's proposed program to inspect, evaluate, and refurbish, as necessary, SSCs that had been installed prior to the time that WBN Unit 2 construction was deferred in the late 1980's and had not been subject to a continuous preservation and maintenance program. The NRC staff found that, (1) TVA was refurbishing or replacing most active components and instruments, (2) TVA had determined the potential degradation mechanism for each category of components, along with any contributing environmental factor, (3) the acceptance criteria were developed from the licensing basis, design specifications, and vendor specifications, (4) the proposed inspections and testing included in the program could be expected to identify degradation, and (5) refurbishment activities would be in accordance with applicable vendor and design specifications or requirements. The NRC staff also finds that TVA's proposed refurbishment plan described in Procedure TI216 provides adequate guidance and objectives for the development of implementation procedures.

Therefore, the staff concludes that the TVA refurbishment program plan is of adequate scope, considers appropriate program elements, and upon proper implementation, would provide reasonable assurance that the equipment would meet their design criteria and perform their intended function. In addition, the implementation of this program will be the subject of follow-on inspections by the NRC staff.

If you have questions regarding this correspondence, please contact me at 301-415-1457.

Sincerely,

/RA/

Patrick D. Milano, Senior Project Manager
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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

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Safety Evaluation

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