SUPPLEMENTAL SAFETY EVALUATION (SSE) BY THE OFFICE OF NUCLEAR REACTOR REGULATION INITIAL TEST PROGRAM CHANGES TENNESSEE VALLEY AUTHORITY WATTS BAR UNITS 1 AND 2 DOCKET NOs. 50-390, 50-391

1.0 INTRODUCTION

In SSER 19 (Reference 1), the staff found the applicant's Initial Test Program (ITP) up to FSAR Amendment 91 acceptable. Subsequently, by letters of June 7, 1996 (Reference 2), and June 10, 1996 (Reference 3), TVA proposed additional changes affecting the power ascension phase of its ITP. In its June 7, 1996 letter TVA (1) summarized the performance of a large load reduction test (50 percent load reduction) conducted on May 12, 1996 at the Watts Bar Nuclear Plant, and (2) provided its proposal to amend the WBN Final Safety Analysis Report (FSAR), Chapter 14, Table 14.2-2 (Sheet 35, "Large Load Reduction Test Summary") to provide clarification on deviations between the described test objective versus the actual test performed. In its June 10, 1996 letter, TVA TVA provided clarification for power ascension testing performed at the 100 percent power plateau and proposed a change to Chapter 14, Figure 14.2-2, Sheet 2 of the FSAR.

2.0 EVALUATION

Item 1 Section 5, "Power-Ascension Tests," of Appendix A to Regulatory Guide (RG) 1.68, "Initial Test Programs For Water-Cooled Nuclear Power Plants," Revision 2 (August 1978) provides a list of the types of performance demonstrations, measurements, and tests that should be included in the power-ascension test phase of an ITP.

Appendix A to RG 1.68, subparagraph 5.h.h., provides that the applicant demonstrate that the dynamic response of the plant to the design load swings for the facility, including step and ramp changes, is in accordance with design.

For the WBN facility, the dynamic response of the plant to the design load swings is deemed to be in accordance with design once it is demonstrated, via testing, that primary and secondary side systems, including automatic control systems, can successfully sustain, i.e., not lead to any challenges to the reactor protection functions, a 50 percent step decrease in turbine-generator load. WBN FSAR, Chapter 14, Table 14.2-2 (Sheet 35, "Large Load Reduction Test Summary") establishes the acceptance criteria for a successful 50 percent step decrease in

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turbine-generator load as (1) the reactor or turbine does not trip; (2) safety injection is not initiated; (3) pressurizer and steam generators safety valves do not lift; and (4) the plant can achieve stable conditions without manual intervention.

The staff has reviewed the information provided by TVA in enclosures and attachments to Reference 2. Based on this information, the staff concluded that the test that actually occurred was comparable to a ramp load reduction at an approximate rate of 7 percent power per minute. In addition, the staff evaluated TVA's contention that the event on April 16, 1996, in which the plant experienced an 80 percent loss of load with a manual trip of the turbine resulting in an automatic reactor trip, corroborates the successful completion of the large load reduction test.

Based on this review, the staff concluded that (1) the 80 percent load reduction event does not substantiate that primary and secondary side systems, including automatic control systems, can successfully sustain a 50 percent step decrease in turbine-generator load nor is it a comparable event to justify the acceptability of the large load reduction test conducted on May 12, 1996, since the event culminated in a manual turbine trip and resultant reactor trip, which are unacceptable acceptance criteria for the large load reduction test; and (2) TVA has not provided adequate justification that the two-step load reduction, with a 2.5 minute stabilizing period between the steps, challenges the affected systems with the same intensity and complexity as a one-step large load reduction.

Therefore, the staff finds that the test, as performed, has not demonstrated the response of the plant to be consistent with plant design for the large load reduction transient. Consequently, TVA must repeat the large load reduction test as described in Amendment 91 to the WBN FSAR or provide additional justification that the two-step load reduction, with a 2.5 minute stabilizing period between the steps, challenges the affected systems with the same intensity and complexity as a one-step large load reduction.

Item 2 In its June 10, 1996 letter TVA provided a clarification for power ascension testing at the 100 percent power plateau and proposed to revise Chapter 14, Figure 14.2-2, Sheet 2 of the FSAR to include a note clarifying that 100 percent power testing was actually being performed within a range of 95 to 100 percent power. Test descriptions or abstracts listed in Table 14.2-2 do not specify the range of applicability that is defined in the respective testing procedures. TVA added that for tests conducted at power levels as low as 95 percent, the results were extrapolated from the measured power under which the specific test was conducted to the 100 percent value.

Regulatory Position (RP) C.3, "Scope , Testing Conditions, and Length of Testing," of RG 1.68 provides that, "To the extent practical, the plant conditions during the tests should simulate the actual operating and emergency conditions to which the structure, system, or component may be subjected. To the extent practical, the duration of the tests should be sufficient to permit equipment to reach its normal equilibrium condition, e.g., temperatures and pressure,...." Additionally, Section 5, "Power-Ascension Tests," of Appendix A to RG 1.68 states, in part, that "Parenthetical numbers following the items [i.e., the types of performance demonstrations, measurements, and tests that should be included in the power-ascension test phase] listed below indicate the approximate power levels for conducting the tests."

The staff's regulatory position on this issue is, therefore, that for testing which is specified to be performed at certain power levels or plateaus during the power-ascension test phase, the applicant should strive to achieve the specified power level or plateau prior to initiating such testing. Nevertheless, RG 1.68 clearly provides for tolerance allowances in recognition that achieving an exact power level or plateau in not always practical or reasonable.

Based on the above, the staff finds that the TVA's method of extrapolating to 100 percent value those results for power-ascension tests conducted at power levels or plateaus as low as 95 percent is in agreement with the guidance provided in RP C.3, and Appendix A to RG 1.68. This item is closed.

3.0 CONCLUSION

Except for Item 1 above, the staff finds the WBN Units 1 and 2 Initial Test Program (ITP) description contained in Chapter 14 of the FSAR, through the Amendment 91 submittal, to be generally comprehensive and to encompass the major phases of the testing program requirements prescribed by the Standard Review Plant, NUREG-0800, and "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)," Regulatory Guide 1.70.

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4.0 REFERENCES

1. NUREG-0847, Supplement No. 19, "Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant, Units 1 and 2".

2. Letter from TVA to NRC dated June 7, 1996, "Watts Bar Nuclear Plant (WBN) - Power Ascension Test Program - Large Load Reduction Test - Evaluation of Test Results"

3. Letter from TVA to NRC dated June 10, 1996, "Watts Bar Nuclear Plant (WBN) Unit 1 - Power ascension Test Program - Clarification of 100 Percent Power Plateau for Testing"

4. Memorandum dated July 24, 1996, from Eric W. Weiss, Chief, PWR Reactor Systems Section, DSSA, to Robert A. Gramm, Chief, Quality Assurance and Safety Assessment Section, DRCH, "Review of the Large Load Reduction Test for Watts Bar Nuclear Plant (TAC No. M95705)"

5. Regulatory Guide 1.68, "Initial Test Programs For Water-Cooled Nuclear Power Plants," Revision 2 (August 1978)