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

June 13, 2000

Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - ISSUANCE OF AMENDMENT REGARDING ELIMINATION OF RESPONSE TIME TESTING (TAC NO. MA6768)

Dear Mr. Scalice:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 24 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated September 28, 1999 as supplemented March 17, 2000.

The amendment revises the Technical Specification Section 1.1, Definitions for "Engineered Safety Feature (ESF) Response Time" and "Reactor Trip System (RTS) Response Time" to provide for verification of response time for selected components, provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

A copy of the safety evaluation is also enclosed. Notice of issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Robert Martin

Robert E. Martin, Sr. Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 24 to NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 24
License No. NPF-90

1. The Nuclear Regulator Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated September 28, 1999, as supplemented March 17, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-90 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 24 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. TVA shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, to be implemented no later than prior to startup following the Unit 1, Cycle 3 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Project Licensing Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 13, 2000

ATTACHMENT TO AMENDMENT NO. 24

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
1.1 - 3	1.1 - 3
1.1 - 5	1.1 - 5
B 3.3 - 62	B 3.3 - 62
	B 3.3 - 62 a
B 3.3 - 63	B 3.3 - 63
B 3.3 - 118	B 3.3 - 118
	B 3.3 - 118 a
B 3.3 - 119	B 3.3 - 119
B 3.3 - 120	B 3.3 - 120

1.1 Definitions (continued)

$\bar{E}$ – AVERAGE DISINTEGRATION ENERGY	$\bar{E}$ shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MeV) for isotopes, other than iodines, with half lives > 15 minutes, making up at least 95% of the total noniodine activity in the coolant.
ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME	The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.
L_a	The maximum allowable primary containment leakage rate, L_a, shall be .25% of primary containment air weight per day at the calculated peak containment pressure (P_a).
LEAKAGE	LEAKAGE shall be: a. Identified LEAKAGE 1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank; 2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or

(continued)

1.1 Definitions

PHYSICS TESTS (continued)	a. Described in Chapter 14, Initial Test Program of the FSAR; b. Authorized under the provisions of 10 CFR 50.59; or c. Otherwise approved by the Nuclear Regulatory Commission.
PRESSURE AND TEMPERATURE LIMITS REPORT	The PTLR is the unit specific document that provides the RCS pressure and temperature limits for heatup, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates for the current reactor vessel fluence period. These pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.9.6. Plant operation within these operating limits is addressed in LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," and LCO 3.4.12, "Cold Overpressure Mitigation System (COMS)."
QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3411 MWt.
REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.
SHUTDOWN MARGIN (SDM)	SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.1.14 (continued)

of the Trip Setpoint does not have to be performed for this Surveillance. Performance of this test will ensure that the turbine trip Function is OPERABLE prior to taking the reactor critical. This test cannot be performed with the reactor at power and must therefore be performed prior to reactor startup.

SR 3.3.1.15

SR 3.3.1.15 verifies that the individual channel/train actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in Technical Requirements Manual, Section 3.3.1 (Ref. 8). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment reaches the required functional state (i.e., control and shutdown rods fully inserted in the reactor core).

For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer Function set to one, with the resulting measured response time compared to the appropriate FSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value, provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of sequential tests such that the entire response time is measured.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g. vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.15 (continued)

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

As appropriate, each channel's response must be verified every 18 months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Response times cannot be determined during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.15 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

(continued)

BASES (continued)

REFERENCES

1. Watts Bar FSAR, Section 6.0, "Engineered Safety Features."

2. Watts Bar FSAR, Section 7.0, "Instrumentation and Controls."

3. Watts Bar FSAR, Section 15.0, "Accident Analysis."

4. Institute of Electrical and Electronic Engineers, IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," April 5, 1972.

5. 10 CFR Part 50.49, "Environmental Qualifications of Electric Equipment Important to Safety for Nuclear Power Plants."

6. WCAP-12096, Rev. 7, "Westinghouse Setpoint Methodology for Protection System, Watts Bar 1 and 2," March 1997.

7. WCAP-10271-P-A, Supplement 1, and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," May 1986 and June 1990.

8. Watts Bar Technical Requirements Manual, Section 3.3.1, "Reactor Trip System Response Times."

9. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar.

10. ISA-DS-67.04, 1982, "Setpoint for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants."

11. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996

12. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.9 (continued)

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of sensor/transmitter drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. For channels with a trip time delay (TTD), this test shall include verification that the TTD coefficients are adjusted correctly.

SR 3.3.2.10

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in Technical Requirements Manual, Section 3.3.2 (Ref. 8). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the Trip Setpoint value at the sensor, to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate FSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of sequential tests such that the entire response time is measured.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time

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BASES

REQUIREMENTS

SURVEILLANCE SR 3.3.2.10 (continued)

tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g. vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" provides the basis and methodology using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel.

Therefore, staggered testing results in response time verification of these devices every 18 months. The 18 month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.10 (continued)

This SR is modified by a Note indicating that the SR should be deferred until suitable test conditions are established. This deferral is required because there may be insufficient steam pressure to perform the test.

There is an additional note pertaining to this SR on Page 3 of Table 3.3.2-1 of the Technical Specification, which states the following (Ref. 14):

Note h: For the time period between February 23, 2000 and prior to turbine restart (following the next time the turbine is removed from service), the response time test requirement of SR 3.3.2.10 is not applicable for 1-FSV-47-027.

SR 3.3.2.11

SR 3.3.2.11 is the performance of a TADOT as described in SR 3.3.2.8, except that it is performed for the P-4 Reactor Trip Interlock, and the Frequency is once per RTB cycle. This Frequency is based on operating experience demonstrating that undetected failure of the P-4 interlock sometimes occurs when the RTB is cycled.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Function tested has no associated setpoint.

REFERENCES

1. Watts Bar FSAR, Section 6.0, "Engineered Safety Features."

2. Watts Bar FSAR, Section 7.0, "Instrumentation and Controls."

3. Watts Bar FSAR, Section 15.0, "Accident Analyses."

4. Institute of Electrical and Electronic Engineers, IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," April 5, 1972.

(continued)

BASES

REFERENCES (continued)

5. Code of Federal Regulations, Title 10, Part 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants."

6. WCAP-12096, Rev. 7, "Westinghouse Setpoint Methodology for Protection System, Watts Bar 1 and 2," March 1997.

7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," and "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation System." May 1986 and June 1990.

8. Watts Bar Technical Requirements Manual, Section 3.3.2, "Engineered Safety Feature Response Times."

9. TVA Letter to NRC, November 9, 1984, "Request for Exemption of Quarterly Slave Relay Testing, (L44 841109 808)."

10. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar.

11. Westinghouse letter to TVA (WAT-D-8347), September 25, 1990, "Charging/Letdown Isolation Transients" (T33 911231 810).

12. Design Change Notice W-38238 associated documentation.

13. WCAP-13877, Rev. 1, "Reliability Assessment of Westinghouse Type AR Relays Used As SSPS Slave Relays," August 1998.

14. TVA's Letter to NRC dated February 25, 2000, "WBN Unit 1 Request for TS Amendment for TS 3.3.2 - ESFAS Instrumentation."

15. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

16. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 24 TO FACILITY OPERATING LICENSE NO. NPF-90

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By letter dated September 28, 1999, the Tennessee Valley Authority (the licensee, TVA) submitted a request for changes to the Watts Bar Nuclear Plant, Unit 1 (WBN), Technical Specifications (TS). The requested changes would revise the TS Section 1.1, Definitions, for "Engineered Safety Feature (ESF) Response Time" and "Reactor Trip System (RTS) Response Time" to provide for verification of response time for selected components, provided the components and the methodology for verification have been previously reviewed and approved by the U.S. Nuclear Regulatory Commission (NRC).

2.0 BACKGROUND

Instrument channel response time is, generally, the time span from when a monitored variable exceeds a predetermined setpoint, at the channel sensor, until the actuated device begins its safety function. Response time testing (RTT) has been an integral part of the TS instrument surveillance program to assure the proper functioning of the sensors and instrumentation loops for the ESF and the RTS.

The Westinghouse Owners Group (WOG) performed two analyses to assess the impact of elimination of RTT for instruments and instrument loops. These analyses also discussed alternate test methodologies that would show that the instrumentation was functioning correctly. The first of these analyses was the WOG Licensing Topical Report WCAP-13632-P, Revision (Rev.) 2, "Elimination of Pressure Sensor Response Time Testing Requirements," dated August 1995, which was approved by the staff's safety evaluation (SE) dated September 5, 1995 (Reference 1). The second analysis, WCAP-14036-P, Rev. 1, "Elimination of Periodic Protection Channel Response Time Tests," dated December 1995, was approved by the staff's SE dated October 6, 1998 (Reference 2). The NRC staff's SEs, approving WCAP-13632-P, Rev. 2, and WCAP-14036-P, Rev. 1, stipulated certain conditions that individual plant licensees must meet when implementing the guidelines in WCAP-13632-P, Rev. 2, and WCAP-14036-P, Rev. 1, on a plant-specific basis.

3.0 PROPOSED CHANGES AND EVALUATION

There are two types of changes contained within the licensee's request. The first is to eliminate periodic pressure sensor RTT in accordance with WCAP-13632-P, Rev. 2, and the second change is to eliminate protective channel RTT for the RTS and ESF actuation system in accordance with WCAP-14036-P, Rev. 1.

For the first change, the licensee proposes to no longer perform RTT on the following sensors as listed in Table 1 of its application:

Barton 763
Barton 763A
Barton 764
Barton 752
Foxboro E13DH
Foxboro NE13DH
Foxboro E11GM
Foxboro NE11GM

These sensors are listed in the staff's SE dated September 5, 1995, approving WCAP-13632-P, Rev. 2. Since the staff has already reviewed the generic analysis, the licensee needs only to meet the conditions for plant-specific amendments discussed in Section 4 of this SE.

For the second change, the licensee proposed elimination of RTT for the RTS and ESF system, and instead will depend upon calibration and other periodic testing, as described in WCAP-14036-P, Rev. 1, in order to determine the proper operation and functioning of the RTS and ESF instrumentation. In those cases where the TS requires the licensee to verify that a protective system can meet its protective function in a prescribed time, a bounding response time will be added to those portions of the protective system actual response time tested in order to determine the total system response time. The requirement to actually measure the response times would be eliminated, and instead, the response times will be verified by summing allocated times for sensors, the process protection system, the nuclear instrumentation system, and the logic system. These allocated values will be added to the measured times for the actuated devices and compared to the overall analysis limits.

The TS changes, proposed by the licensee, would revise the TS 1.1 definition for "Engineered Safety Features (ESF) Response Time" and "Reactor Trip System (RTS) Response Time" to provide for verification of response time for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC. The TS requirements for response time verification will continue to be implemented by surveillance requirements (SRs) 3.3.1.15 for the RTS and 3.3.2.10 for ESF actuation system (ESFAS).

The definition for ESF response time would be changed by adding a sentence to allow response times for selected components to be verified. The definition, as augmented by the underlined portion, reads:

> The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel

> sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

Likewise, the definition for RTS response time would be changed by adding a sentence to allow times for selected components to be verified. The definition, as augmented by the underlined portion, reads:

> The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

Evaluation

The addition of these sentences will allow the licensee to verify the component response times rather than performing an actual RTT. These changes are in accordance with the report WCAP-14036-P, Revision 1, and the staff's SE approving that report, and are, therefore, acceptable to the staff.

Proposed Change

The licensee has proposed a change to Bases Section B 3.3.1, RTS Instrumentation, Surveillance Requirements, SR 3.3.1.15: Add two paragraphs after the paragraph ending "The response time may be measured by a series of sequential tests such that the entire response time is measured," and before the paragraph starting "As appropriate, each channel's response must be verified every 18 months on a STAGGERED TEST BASIS." These paragraphs will read:

> Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination

of Pressure Sensor Response Time Testing Requirements," provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

WCAP-14036-P Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

Proposed Change

The licensee has proposed a change to Bases Section B 3.3.1, RTS Instrumentation, to add References 11 and 12, to read:

11. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

12. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

Proposed Change

The licensee has proposed a change to Bases Section B 3.3.2, ESFAS Instrumentation, Surveillance Requirements, SR 3.3.2.10: Add two paragraphs after the paragraph ending "The response time may be measured by a series of sequential tests such that the entire response time is measured," and before the paragraph starting "ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS." These paragraphs will read:

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," provides the basis and

methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

WCAP-14036-P Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

Proposed Change

The licensee has proposed a change to Bases Section B 3.3.2, ESFAS Instrumentation, to add References 14 and 15, to read:

14. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

15. WCAP-14036-P-A Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

Evaluation

These changes describe the rationale that allows the licensee to verify the component response times by using approved methodology instead of performing an actual RTT. These changes are in accordance with WCAP-14036-P, Revision 1, as approved by the staff's SE and are, therefore, acceptable to the staff.

4.0 VERIFICATION OF PLANT-SPECIFIC CONDITIONS

4.1 The NRC staff stipulated several conditions in the generic SE approving WCAP-13632-P, Rev. 2, which must be met by the individual licensee referencing the topical report before the guidance could be implemented in plant specific TS change proposals. From the licensee's submittals, the NRC staff verified that the licensee has met or will meet the applicable conditions as follows:

4.1.1 Condition 1: Perform a hydraulic RTT prior to installation of a new transmitter/switch or following refurbishment of the transmitter/switch (e.g., sensor cell or variable damping components) to determine an initial sensor-specific response time value.

Response: Consistent with the proposed TS and Bases changes and Electric Power Research Institute Report NP-7243, Revision 1, the applicable plant procedures will stipulate that pressure sensor response times must be verified by performance of an appropriate response time test prior to placing a sensor into operational service and re-verified following maintenance that may adversely affect sensor response time. [TVA has also included this in its list of licensee commitments in Enclosure 4 of its September 28, 1999 application.]

Evaluation: This response fulfills the condition in the staff's generic SE, approving WCAP-13632-P, Rev. 2, and is, therefore, acceptable to the NRC staff.

4.1.2 Condition 2: For transmitters and switches that use capillary tubes, perform an RTT after initial installation and after any maintenance or modification activity that could damage the capillary tubes.

Response: Plant procedure revisions (and/or other appropriate administrative controls) will stipulate that pressure sensors (transmitters) utilizing capillary tubes, e.g., containment pressure, must be subjected to RTT after initial installation and following any maintenance or modification activity which could damage the transmitter capillary tubes.

Staff concern: The licensee's response does not address switches. The licensee is requested to address its plans for RTT for switches in response to the condition in the SE. Also, please clarify the meaning of the term "that can be tested" with respect to whether its interpretation would exclude any transmitters or switches that use capillary tubes from the testing addressed by the SE condition.

RAI Response:[1] Switches were intentionally omitted from the original TS change request because there are no switches with capillary tubes in the WBN RTT Program. Additionally, WBN does not employ transmitters for switches with capillary sensing lines in applications that require response time testing.

The term ". . . that can be tested . . ." was added to provide flexibility in the event that a future design condition may need the exclusion. However, since future changes to response time test exclusions require NRC approval, the term is not needed and should be removed. Additionally, since these applications do not exist at WBN, implementation of this condition is not applicable.

WBN has revised Commitment No. 2 of TVA's September 28, 1999 letter to read as follows:

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[1] RAI responses are documented in a March 17, 2000, TVA response to questions asked during a conference call with the NRC staff on January 5, 2000.

Plant procedure revisions (and/or other appropriate administrative controls) will stipulate that pressure sensors (transmitters and switches) utilizing capillary tubes must be subjected to response time testing after initial installation and following any maintenance or modification activity that could damage the transmitter capillary tubes.

Evaluation: This response fulfills the condition in the staff's generic SE, approving WCAP-13632-P, Rev. 2, and is, therefore, acceptable to the NRC staff.

4.1.3 Condition 3: If variable damping is used, implement a method to assure that the potentiometer is at the required setting and cannot be inadvertently changed or perform hydraulic RTT of the sensor following each calibration.

Response: WBN has no pressure transmitters with variable damping installed in any RTS or ESFAS application for which RTT is required; therefore, no WBN procedure changes or enhanced administrative controls are required.

Staff Concern: The licensee's response adequately addresses the present plant condition. However the licensee is requested to address its plans and commitments for addressing RTT issues if future actions result in the replacement of transmitters with those having variable damping capability.

RAI Response: A commitment will be added to the WBN Commitment Tracking System before implementation of the approved TS change that states:

The applicable plant procedures (or appropriate administrative controls) will stipulate that pressure transmitters equipped with variable damping capability in reactor trip system or engineered safety features response time applications, which require periodic response time test, must be subjected to response time testing after initial installation or following any maintenance or modification activity. Administrative controls may include use of pressure transmitters that are factory set and hermetically sealed to prohibit tampering or in situ application of a tamper seal (or sealant) on the potentiometer to secure and give visual indication of the potentiometer position.

Evaluation: This response fulfills the condition in the staff's generic SE, approving WCAP-13632-P, Rev. 2, and is, therefore, acceptable to the NRC staff.

4.1.4 Condition 4: Perform periodic drift monitoring of all Model 1151, 1152, 1153, and 1154 Rosemount pressure and differential pressure transmitters, for which RTT elimination is proposed, in accordance with the guidance contained in Rosemount Technical Bulletin No. 4 and continue to remain in full compliance with any prior commitments to Bulletin 90-01, Supplement 1, "Loss of Fill-Oil in Transmitters Manufactured by Rosemount," dated December 22, 1992. As an alternative to performing periodic drift monitoring of Rosemount transmitters, licensees may complete the

following actions: (1) ensure that operators and technicians are aware of the Rosemount transmitter loss of fill-oil issue and make provisions to ensure that technicians monitor for sensor response time degradation during the performance of calibrations and functional tests of these transmitters, and (2) review and revise surveillance testing procedures, if necessary, to ensure that calibrations are being performed using equipment designed to provide a step function or fast ramp in the process variable and that calibrations and functional tests are being performed in a manner that allows simultaneous monitoring of both the input and output response of the transmitter under test, thus allowing, with reasonable assurance, the recognition of significant response time degradation.

Licensee Response: WBN does not have any Rosemount transmitters installed in any RTS or ESFAS application for which RTT is required as shown in Tables 1 and 2. WBN provided responses to NRC Bulletin 90-01 by letters dated January 31, 1992, and December 22, 1992; and to Bulletin 90-01, Supplement 1, by letters dated January 19, 1994 and October 20, 1994. [As noted in these responses, WBN replaced applicable transmitters with new or refurbished transmitters, eliminating the need for increased monitoring. These letters address the actions that WBN has taken with respect to Item 4.]

Evaluation: TVA's response indicates that there are no Rosemount transmitters in the list of sensors in TVA's application for which RTT elimination is proposed. Therefore, this item is not applicable to WBN. On this basis, TVA's response is consistent with the condition in the staff's generic SE, approving WCAP-14036-P, Rev. 1, and is, therefore, acceptable to the NRC staff.

4.2 The staff's SE approving WCAP-14036-P, Rev. 1, also had a requirement that must be met by the individual licensee referencing the topical report before the guidance could be implemented in plant-specific TS change proposals. The requirement is as follows:

Condition: Since the performance of RTT is a TS requirement, licensees referencing WCAP-14036 must submit a TS amendment to eliminate that requirement for the identified equipment. In that amendment request, the licensee must verify that the failure modes and effects analysis (FMEA) performed by the WOG is applicable to the equipment actually installed in the licensees facility, and that the analysis is valid for the versions of the boards used in the protection system.

Response: TVA provided the following information in their license amendment application dated September 28, 1999:

WCAP-14036-P-A contains the technical basis and methodology for eliminating RTT requirements on protection channels identified in the WCAP. The NRC safety evaluation for WCAP-14036-P-A requires confirmation by the licensee that the generic analysis in the WCAP is applicable to their plant.

TVA has reviewed the plant data for WBN. Tables 1 and 2 identify the RTS and ESFAS equipment which is installed at WBN and subject to response time testing required by TS. TVA has reviewed the FMEAs in WCAP 14036-P-A Rev. 1 to ensure that they are applicable to this equipment, and that the analysis is valid for the versions of the boards utilized at WBN.

Evaluation: This response fulfills the condition in the staff's generic SE, approving WCAP-14036-P, Rev. 1, and is, therefore, acceptable to the NRC staff.

4.3 Bounding (or allocated) sensor response times - Foxboro Flow and Pressure Transmitters

Introduction

In addition to the preceding conditions, when a plant accident analysis determines that a mitigation system is required to actuate in a certain response time, the testing for that response time is generally required by the TS. The licensee's amendment request will eliminate some of the testing previously required. The two topical reports mentioned above provide adequate justification that calibrations and other surveillance testing will prove that the instruments are functioning properly. When the testing is not done to a portion of the instrument loop, but the TS requires the verification of assumptions made in the accident analysis, some assumed or bounding value for the untested portion of the loop must be added to the tested portion, to arrive at a total system response time. WCAP-14036-P, Rev. 1, included those maximum or bounding response times for the RTS and ESFAS equipment analyzed in that report. However, of the two types of pressure sensors listed for WBN (Barton and Foxboro), WCAP-13632-P, Rev. 2, provided similar bounding response times only for the Barton models as indicated by the following note in Tables 1 and 2 of the September 28, 1999, application:

> Except as noted, the sensors installed at WBN were evaluated in WCAP-13632-P-A R2 (Table 9-1). Allocated sensor response times are determined in accordance with Section 9 of WCAP-13632-P-A R2. Response times for Barton transmitters are derived from Table 9-1 of the WCAP. Response times for Foxboro transmitters are supported by actual tests of the transmitters installed at WBN.

Staff Concern

As discussed in a teleconference with TVA on January 5, 2000, the staff's SE for WCAP-13632 notes that Westinghouse has proposed using allocated sensor response times in accordance with the methodology described in Section 9 of WCAP-13632, Rev. 2. Allocations for sensor response times would be obtained from (1) historical records based on acceptable RTT (hydraulic, noise, or power interrupt tests), (2) inplace, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. In this regard, Tables 1 and 2 of WBN's application dated August 30, 1999, identify RTS and ESFAS equipment and provide the bounding response time values to be used for WBN equipment. Note 1 indicates that allocated response times for the Foxboro transmitters are supported by actual tests of the transmitters installed at WBN, e.g., method (1) above. NRC requests that TVA provide this data to the staff and provide a statistical basis for the selection of the allocated response times for the Foxboro transmitters.

Response

TVA responded in its letter of March 17, 2000, that the allocated sensor response times for Foxboro transmitters documented in Tables 1 and 2 [of the WBN application dated September 28, 1999] are based on historical records (Method1) of acceptable RTT obtained from the WBN response time testing program. TVA also indicated that since WBN has limited operating history and hence a limited amount of test data for these instruments, a statistical evaluation of the WBN data would not be meaningful. Therefore, TVA compared the WBN test data with the results of statistical evaluations of RTT test data from the Sequoyah Nuclear plant (SQN). This would enable use of the results of the SQN evaluations to establish bounding values for the Foxboro transmitters at WBN.

The Foxboro transmitters used for the RTS flow measurement at WBN are the same model (E13DH/NE13DH) used at SQN. The flow test data for both plants was obtained from a hydraulic ramp generator test. The Foxboro transmitters used for the RTS and ESFAS steamline pressure measurement at WBN are the same model (E11GM/NE11GM) used at SQN.[2] The steamline pressure data for both plants was obtained using an in situ test method, either power interrupt or noise analysis, which yield comparable results, and the tests were performed by the same contractor, AMS Corporation. The SQN response time test data for these transmitters was included in TVA's letter dated January 13, 2000, "Sequoyah Nuclear Plant Units 1 and 2 - Clarification of Response Time Test Elimination TS Change No. 99-08," which has been incorporated by reference in the WBN March 17, 2000, submittal.

In order to determine an allocated instrument response time value, TVA reviewed the operational history (i.e., the measured response times) for the Foxboro transmitters for SQN as shown in Attachment 2 of the January 13, 2000, SQN submittal. This data was evaluated to determine its statistical mean and standard deviation. An assumed administrative value was chosen which would be compatible with a one-sided statistical tolerance limit so that 95% of the reading would fall within the limits, with a 95% confidence level. The staff has determined that since this is an NRC-approved method for calculating set point values, and this methodology is statistically valid for determining an upper bounding value, this methodology is an appropriate method for calculating response time based upon historical operating data.

Based on its evaluations of the SQN data for the Foxboro model E13DH and NE13DH pressure transmitters used in the RCS flow application, TVA chose a value of 0.35 seconds for the allocated response time. The NRC staff discussed the results, in the SE accompanying issuance of Amendments 251 and 242 for SQN Units 1 and 2 on February 29, 2000, of an evaluation using statistical methodology appropriate for this purpose, that showed a mean value for 70 data points of 0.1354 seconds, a standard deviation of 0.0306 seconds and a one-sided upper tolerance limit of 0.196 seconds. The staff concluded that since the value chosen by TVA as the allocated response time (0.350 seconds) is larger than the calculated one-sided tolerance limit, the allocated value is conservative and is therefore, acceptable. Therefore, the allocated value of 0.350 seconds chosen by TVA in its submittal of March 17, 2000, for WBN is also acceptable.

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[2] SQN also used a Foxboro model NE13DM which is not used for comparable functions at WBN. Accordingly, the model NE13DM is not discussed herein.

Similarly, TVA's evaluation of the Foxboro model NE11GM steam pressure transmitters resulted in calculated mean value of 0.1921 seconds, a standard deviation of 0.0678 seconds and a one sided tolerance limit of 0.331 seconds. In order to utilize the SQN test data for WBN, TVA has chosen to change the earlier value of 0.200 seconds to 0.400 seconds for WBN. The staff concludes that since the value chosen by TVA for WBN as the allocated response time (0.400 seconds) is larger than the calculated one-sided tolerance limit (0.331 seconds), the allocated value is conservative and is therefore, acceptable.[3]

Overall Summary

The final values chosen by TVA for WBN in the submittal of March 17, 2000, are as follows:

Sensor Type	Bounding Response Value
Barton 752	400 mSec
Barton 763/763A	200 mSec
Barton 764	400 mSec
Foxboro E13DH/NE13DH	350 mSec
Foxboro E11GM/NE11GM	400 mSec

Use of these values, and the values found in WCAP-14036-P, Rev. 1, is consistent with the staff generic approval of RTT elimination, and is therefore, acceptable.

On the basis of its review, the staff concludes that the licensee has implemented the provisions of the generic SE for RTT elimination and satisfied the applicable plant-specific conditions in accordance with the approved reports WCAP-13632-P, Rev. 2, and WCAP-14036-P, Rev. 1; therefore, the staff concludes that the proposed WBN TS modifications for selected instrument RTT elimination are acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 56534 dated October 20, 1999). Accordingly, the amendment

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[3]TVA also notes that response times measured at WBN by the hydraulic ramp generator and the noise analysis test methods are bounded by the chosen value of 0.400 seconds.

meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Robert E. Martin
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Date: June 13, 2000

REFERENCES

1. Letter, B. A. Boger, NRC, to R. A. Newton, Westinghouse Owners Group Chairman, September 5, 1995, "Review of Westinghouse Electric Corporation Topical Report WCAP-13632, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," dated August 1995 - Westinghouse Owner's Group Program MUHP-3040, Revision1" (NRC accession number 9509070068).

2. Letter, T. H. Essig, NRC to L. Liberatori, Chairman Westinghouse Owners Group Steering Committee, October 6, 1998, "Safety Evaluation Related to Topical Report WCAP-14036, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" (TAC Number MA0863) (NRC accession number 9810090054).

Mr. J. A. Scalice
Tennessee Valley Authority

WATTS BAR NUCLEAR PLANT

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June 13, 2000

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - ISSUANCE OF AMENDMENT REGARDING ELIMINATION OF RESPONSE TIME TESTING (TAC NO. MA6768)

Dear Mr. Scalice:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 24 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated September 28, 1999 as supplemented March 17, 2000.

The amendment revises the Technical Specification Section 1.1, Definitions for "Engineered Safety Feature (ESF) Response Time" and "Reactor Trip System (RTS) Response Time" to provide for verification of response time for selected components, provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

A copy of the safety evaluation is also enclosed. Notice of issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/RA/

Robert E. Martin, Sr. Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 24 to NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

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