



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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MAR 21 1979

Docket No. 50-390/391

MEMORANDUM FOR: S. Varga, Chief, Light Water Reactors Branch No. 4, DPM  
FROM: R. M. Satterfield, Chief, Instrumentation and Control Systems Branch, DSS  
SUBJECT: TENNESSEE VALLEY AUTHORITY, WATTS BAR UNITS 1 & 2  
ADDITIONAL QUESTIONS AND POSITIONS

Plant Name: Watts Bar, Units 1 & 2  
Docket Nos: 50-390/391  
Licensing Stage: Operating License  
Milestone No.: 22-12  
Responsible Branch: LWR-4  
& Project Manager: C. Stahl  
Requested Completion Date: April 7, 1978  
DSS Branch Involved: Instrumentation and Control Systems  
ICSB Reviewer: R. Scholl  
Review Status: Incomplete

The enclosed list of questions was prepared by the DSS;PS, Instrumentation and Control Systems Branch for transmittal to the applicant.

These questions are the result of our review and evaluation of the responses to our second round questions and of the applicant's FSAR through Amendment 37 for the Watts Bar Nuclear Plant.

Outstanding items included in the Second Round Questions are:

1. Qualification of Safety Related Equipment.
2. Identification of Safety Systems and Safety Related Systems and Equipment.
3. Identification of NRC requirements applicable to safety systems and implementation of these requirements.

These questions are necessitated because of inadequate responses by the applicant to second round questions. Given the extent of these additional questions, we are not now able to complete our evaluation. Accordingly, we recommend that the date for issuance of ICSB SER input be established after the applicant has tendered acceptable responses to our questions.

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*R. M. Satterfield*  
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Chief, Instrumentation and Control Systems Branch, DSS

cc: See next page  
Enclosure: As Stated

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WATTS BAR NUCLEAR PLANT  
SECOND ROUND QUESTIONS

031.119  
(Q031.44)  
(T3.11-2B)

The response to Question 031.44(2) indicates that there are areas within the primary containment (e.g. steam generator enclosure and pressurizer enclosure) where accident conditions may exceed the values given in FSAR Table 3.11-2B. For each such area within the primary containment, please provide the following information:

- (1) The name of the area,
- (2) The maximum and minimum pressure and temperatures which are expected to occur before or during any design basis event,
- (3) A listing of all Class 1E equipment which is located in that area,
- (4) The extremes of temperature and pressure for which each such piece of equipment has been qualified, and
- (5) A justification for the use of each piece of equipment which is listed in part 3 above and which is not qualified for the environment described in Part 2 above.

031.120  
(Q031.44)  
(T 1.7-1)

Please clarify the contradiction between the response to Question 031.44(7), which states that the safety related systems in FSAR Table 1.7-1 are identified by a code number, and the contents of FSAR Table 1.7-1, which does not provide a code number for systems such as the power range instrumentation but provides a code number for the turbo-generator.

031.121 (F8.3-37) (Q031.44) The response to Question 031.44(15) indicates that the reactor protection system is designed for operation at 117.6 to 122.4 Vac at 59.5 to 60.5 Hz. The response also indicates that this is the voltage that is supplied by the static inverter. However, FSAR Figure 8.3-37 shows that the alternate supply for this Class 1E equipment is the 480 Vac shutdown boards which could result in instrument supply voltages of 106.65 to 130.35 Vac at 58.8 to 61.2 Hz. Therefore:

- (1) Justify the use of the 480 Vac shutdown boards as the backup supply for the static inverter loads
- (2) Complete the response to Question 031.44(15) by stating the limits of energy supply to which the reactor protection system has been qualified by testing.

031.122 (7.2.2.1) (Q-31.44) (T 7.1-1) Please clarify the discrepancy between FSAR Table 7.1-1, Note 1, Paragraph 2 and FSAR Section 7.2.2.1.3 with regard to response time testing of the nuclear instrumentation, exclusive of the detectors.

031.123 (Q031.44) (T 1.3-1) (6.3.5.1) Describe how the design which is presented in your response to Question 031.44(26) satisfies the requirements of General Design Criterion 21. Also, please provide the following additional information on the boron injection capability at Watts Bar:

- (1) Clarify the discrepancy between the response to the question and the information which is presented in FSAR Table 1.3-1.

(The staff notes that redundant heaters are provided in Sequoyah.)

- (2) Describe how the design of the boron injection tank satisfies the requirements of 10CFR 50.55a(h). (Please note the definition of protection system as given in General Design Criterion 20)
- (3) Define "duplicate" as it is used in the response to the question and FSAR Section 6.3.5.1.

031.124 Clarify the apparent discrepancy between the response to Question  
(Q031.29) 031.44 (18b) and the actual wiring of the circuit from the isolation  
(Q031.44) card in the Solid State Protection System that provides the communi-  
cations between the two trains necessary to generate the  
general warning alarm. This clarification should include a justification  
for this wiring not meeting the separation criteria which are specified  
in the response to Question 031.29.

031.125 Please clarify the response to Question 031.44(33) by:

- (7.5.3.3) (1) Clarifying the discrepancy between the material which is quoted  
(7.7.1.3) in response to Question 031.44 (33) and the material contained  
(Q031.44) in FSAR Section 7.5.3.3.3.13.  
(Q031.95)
- (2) Clarify the discrepancy between the use of administrative controls  
which is mentioned in the response to Question 031.44(33) and FSAR  
Section 7.5.3.3.13 and the information which is presented in FSAR  
7.7.1.3.6 that indicates that administrative procedures will  
not be relied upon.

031.126  
(Q031.45)

The staff notes that your response to Question 031.45 references WCAP-7817 Supplements 2 and 3. Accordingly, please provide the following additional information that is required to assure proper use of the Topical Report:

- (1) Identify the manufacturer, type number and model number of the static inverter that was tested as described in WCAP-7817 and Supplement 2.
- (2) Identify the manufacturer, type number and model number of the static inverter that is installed at Watts Bar.
- (3) Identify the manufacturer, type number and model number of the Safeguards Actuation Rack that was tested as described in WCAP-7817.
- (4) Identify the manufacturer, type number and model number of the Safeguards Actuation Rack that is installed at Watts Bar.
- (5) Verify that the Nuclear Instrumentation System equipment that is identified in Table 2-1 of WCAP-8830 "Seismic Operability Demonstration Testing of the Nuclear Instrumentation System Bistable Amplifier" is identical to the Nuclear Instrumentation System equipment tested in WCAP-7817.
- (6) Verify that the Nuclear Instrumentation System equipment that is identified in Table 2-1 of WCAP-8830 "Seismic Operability Demonstration Testing of the Nuclear Instrumentation System Bistable Amplifier" is identical to the Nuclear Instrumentation System equipment that is installed at Watts Bar.

031.127(RSP) It is the staff's position that the responses to Questions  
(031.47)  
(040.1) 031.47, 040.1, and 040.57 are, as a group, unacceptable, because  
(040.57) FSAR Table 3.10-1 does not provide the information which is  
(T3.10-1) requested in Question 040.57 and because the response to Question  
040.57 does not provide the information which was requested by  
Question 031.47. Therefore, please provide the following  
information:

- (1) Identify each instrument that is to be mounted on the subject rack
- (2) Provide the information that is required by Section 3.10.2 of Regulatory Guide 1.70 for each instrument identified under Part 1 above. (Please note that, for such complex equipment that cannot be modeled accurately enough to predict its response correctly for functional verification, qualification by testing is required.)

031.128 The response to Question 031.51 is incomplete and therefore, unacceptable.  
(Q031.51) Please provide the following additional information:

- (1) Discuss the consequences of freezing non-safety instrument tubing such as the turbine generator first stage pressure lines which provide input to various control systems. (This type of event is what caused Salem Unit 1 to exceed the insertion limit.)
- (2) Clarify the discrepancy between your response to Question 031.51 and the fact that the following major components are located out of doors:
  - (a) Refueling Water Storage Tank,

031.128  
(Q031.51)

- (b) Feedwater Lines, and
- (c) Main Steam Lines.

031.129(RSP) It is the staff's position that the responses to Question 031.053  
(Q031.53)

are incomplete and indicate that not all Class 1E equipment has been suitably qualified. As a result, the responses are unacceptable.

With regard to the responses to Question 031.53 please:

- (1) Clarify if the Comsip-Delphi (model K-111M) hydrogen analyzers have been environmentally qualified and, if not, justify their use in a Class 1E system. If the analyzers have been qualified, provide the information which was requested in Parts 2 thru 10 of Question 031.53.
- (2) In lieu of damper actuator, FC033-1 (which you state is not Class 1E), please provide the requested information on damper actuator FC031-6.
- (3) Provide the material which is referenced in Parts (11) (c) and (11) (f) (I) of your response to Question 31.54 for the staff's review.
- (4) Clarify the discrepancy between your response to Question 031.54 part (11) (c) and FSAR Section 1.6.
- (5) Justify not environmentally qualifying Class 1E equipment which is located outside of containment. This justification should include a discussion of how these systems satisfy the following criteria or, as an alternative, why you should be exempt from the requirements of:
  - (a) General Design Criteria 1, 2, 3, and 4,

031.129(SRP)  
(Q031.53)

- (b) IEEE Std 279-1971 Sections 3(7), 3(8), and 4.4, and
- (c) IEEE Std 323-1971 Sections 1, 4, and 5.

- (6) Provide an updated estimate as to when the response to Question 31.54 (11) (e) will be available.
- (7) Provide an amended response to Question 031.54(12) which covers the material specified in subparts (a), (b), and (c) of the cited question.

031.130(RSP)  
(3.11.4.2)  
(6.3.1.4)  
(6.3.2.11)

It is the staff's position that the information which has been provided in response to Question 031.54 is not sufficiently complete to resolve the staff's concern. In this regard, please note that FSAR Sections 6.3.1.4 and 6.3.2.11 (which were revised in response to Question 031.44(3)) still refer to an active failure. As a result Section 6.3 appears to contradict Section 3.11.4.2.3 and the staff is not certain that the position stated in Question 31.54 will be satisfied. Please describe how your design satisfies the staff's position that is presented in Question 031.54.

031.131  
(Q031.063)  
(T7.2-4)

Clarify the discrepancy between your response to Question 031.063 and the contents of FSAR Table 7.2-4.

031.132  
(Q031.75)

The response to Question 031.75 is unclear. Please provide the following additional information:

- (1) State if the response is only applicable to response time testing and, if so, identify and justify the use of jumpers in other periodic testing.

- 031.132  
(Q031.75)
- (2) Identify the log(s) in which jumper information would be entered.
- (3) Describe how the requirements of Regulatory Guide 1.47 will be satisfied if a jumper is used.

031.133  
(Q031.76)  
(Q040.70)

Clarify the discrepancies between your responses to Questions 031.76 and 040.70.

031.134  
(Q031.87)

The response to Question 031.87 is incomplete. Please provide your response to part (2)(B) of Question 031.871.

031.135  
(1.7)  
(Q031.88)

Identify the plant schematics that are listed in FSAR Section 1.7 that show the details of the valve gag circuitry.

031.136  
(7.7.1.3)  
(Q031.95)

The revisions to FSAR Section 7.7.1.3.6 which have been provided in response to Question 031.95 appear to be incomplete. Describe how the Watts Bar bypass indication design satisfies the positions in Section C of Regulatory Guide 1.47 when the bypassed or inoperable status is not the result of a manipulation of an electrical control. (e.g. an instrument root valve is closed or a major maintenance cross connect is operated.)

031.137  
(Q031.97)

The response to Question 031.97 is not understood. Therefore please Explain how increasing the pressurizer pressure, by use of the backup heaters, "help limit the pressure overshoot on the recovery from the" transients which cause primary system pressure increase.

031.138  
(6.2.4-21)  
(Q031.101)

The response to Question 031.101 is incomplete and refers to a FSAR Section which contains contradictory information. It is, therefore, unacceptable. Please:

- (1) Describe the boron concentration measurement system in accordance with the requirements of Section 7.7 of the Standard Format and Content of Safety Analyses Reports for Nuclear Power Plants.
- (2) Clarify the discrepancy between the description of the sample system isolation control on FSAR page 9.3-6, which states that all valves are manually controlled, and FSAR Figure 6.2.4-21.
- (3) Provide the electrical schematics for valves 43-54D, 43-56D, 43-59D, 43-63D, 43-55, 43-58, 43-61, and 43-64.

031.139  
(Q031.77)

The staff has found that the plant drawings are not sufficiently complete to permit an independent verification of the response to Question 031.77. Therefore, please amend all drawings (e.g. 47W610-62-3) to indicate the source of air for each air operated valve.

031.140  
(Q031.111)  
(Q031.77)

The responses to Questions 031.77 and 031.111 appear to be incomplete. Identify the seismic Category I water source which is to be used during a loss of ac power and identify the dc power sources for the auxiliary control air system.

031.141  
(RSP)  
(Q031.115)

It is the staff's position that your answers to Parts 1, 3 and 4 of Question 031.115 are not responsive to the staff's need for additional information and are, therefore, unacceptable. Provide an amended responses to the staff's question.

031.142  
(Q030.12)  
(Q031.44)

The response to Question 031.44.(31) is not understood. Therefore, please provide the following types of information for each parameter:

- (1) Quantify the normalization factor, and
- (2) Explain why different accuracies are assumed in FSAR Chapters 7 and 15. (e.g. FSAR Table 7.5-1 states that the Wide Range Temperature accuracy is  $\pm 56^{\circ}\text{F}$  yet Chapter 15 assumes a TAV accuracy of  $\pm 6.5^{\circ}\text{F}$ .)

031.143  
(Q031.84)  
(Q031.118)

The responses to Questions 031.84 and 031.118 are incomplete. Please state when the revised FSAR material will be available for our review.

031.144  
(3.10)  
(3.11)

Identify each type of relay in Watts Bar that must be energized or that must remain energized during a seismic event. For each of these relay types, provide the following information:

- (1) Manufacturer's name and model number,
- (2) The minimum voltage at which it must operate,
- (3) The voltage at which it was seismically qualified,
- (4) The normal operating voltage, and
- (5) The locations and functions of this type of relay.

Justify the seismic qualification of any relay that was not qualified by test or that was not tested in both the energized and de-energized state.

031.145 (RSP)  
(7.6)  
(8.1)  
(15.1.1)  
(F8.1-2)  
(F8.1-3)

It is the staff's position that the information which is available in FSAR Sections 7.7 and 8.1 does not support the assumptions of FSAR Section 15.1.1 with regard to transients and the failure of non-Class 1E equipment. Therefore, for each non-Class 1E instrumentation and control system please provide:

- (1) The system name,
- (2) The system response which is assumed in each of the events presented in Chapter 15,
- (3) The system power source (traceable back to a bus shown in FSAR Figure 8.1-2 or 8.1-3),
- (4) The consequences of a loss of power to the named system, and
- (5) For each bus which is identified in Part 2 above, provide the results of an analysis of the consequences of summation of the applicable failures which were identified in response to Part 3 during:
  - (a) Full Power Operations,
  - (b) Hote Standby,
  - (c) Hot Shutdown, and
  - (d) Cold Shutdown.
- (6) Where the consequences which are identified in the response to Part 4 above include changes in reactor power, temperature, and/or pressure; also provide the sequence of events and a description of how the transient is terminated.